

National E-Conference on **Computer Science & Technology Allies in Research – NCCSTAR**

16th and 17th July 2021

Organised by

Department of Computer Science &
Engineering and Information Science &
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on

“COMPUTER SCIENCE & TECHNOLOGY ALLIES IN RESEARCH”

NCCSTAR - 2021

16th & 17th July 2021

Organized Jointly by

**Department of Computer Science & Engineering and
Information Science & Engineering**

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R R Institute of Technology, setup with a mission of imparting education to all sections of society, was established in the year 2008 to render highest standards of academic achievement with moral and social commitments. Converting the idea of providing high quality education combined with excellent infrastructure into a reality in Indian context. R R Institute of Technology have proved the capability of placing students after completing their course in prestigious organization across the country and aboard.

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Computer Science & Engineering Department aims to impact quality education to students and make them skilful, tech-savvy professional leaders with entrepreneurial qualities. The CSE department was set up in the year 2008 with an intake of 60 with the approval of AICTE and increased to 120 in the year 2021. The laboratories are highly modernized to reflect the rapidly changing trends in technology which are supported by high speed Laboratories and Internet facility. The Department has well qualified, experienced faculty and excellent research facilities.

ABOUT THE CONFERENCE

The National E-Conference on “Computer Science & Technology Allies in Research” (NCCSTAR - 2021) which will be held at R R Institute of Technology, Bengaluru on 16th and 17th July 2021 through online platform. This Conference will provide a dedicated platform to peer Researchers, young inspired Scientists, Academicians, Industrialists to meet at one place to share and gain knowledge through presentation & discussion in the field of Computer Science & Engineering. The primary goal of the conference is to promote Research and Developmental activities in the mentioned fields. The conference will be valuable and important platform to share and examine the advances. Apart from scientific knowledge, the conference provides the interaction space where one can have interaction with everyone and make new national collaborations. All the Delegates and Industry clients will have an opportunity to meet and make new contacts to enhance their product standards.

Message from Chairman's Chamber



The National Conference on “Computer Science & Technology Allies in Research”, proved to be a store house of knowledge and information. The faculties of Computer Science & Engineering and Information Science and Engineering, R R Institute of Technology, pride in announcing the dates of the conference on 'Computer Science & Technology Allies in Research' in a combined undertaking the Departments of CSE & ISE have slated the conference at the National level on 16th & 17th of July 2021. I truly acknowledge the hard labour of the organizing team and also their effort to amass the contributions to the “Computer Science & Technology Allies in Research” by various resources from multiple sectors of the technology.

I wish a pleasurable, stimulating and didactic session for the entire team and participants.

Sri. Y. Raja Reddy
Chairman
PKMET, Bengaluru

Message from Secretary



I am happy that R R Institute of Technology is organizing a National E-Conference on “Computer Science & Technology Allies in Research” (NCCSTAR - 2021)” on 16th and 17th July 2021. It is believed that education is an effective medium of social transformation. I am glad to say that over a span of decades, R R Institute of Technology has become one of the premier engineering colleges in the state & national in producing quality engineers. I hope that the society will be benefited through this National Conference by sharing rich experiences, innovations and technical ideas from delegates. I am sure that this conference will bring together students, scientists, researchers and faculty members in the field of science, engineering and technology to share their research findings. I wish R R Institute of Technology all the very best and grand success to NCCSTAR - 2021.

Sri. Kiran H. R.
Secretary
PKMET, Bengaluru

Director's Cell



Today's Students are the treasure house of resource tomorrow. I like to recommend all the students for a charged participation, in the conference on 'Computer Science & Technology Allies in Research' [NCCSTAR-2021] to get themselves fully equipped with the pedagogy and technical expertise that they need, to tackle with the challenges, they are going to face in the professional field.

I Congratulate the Departments of Computer Science and Information Science of R. R. Institute of Technology for turning this event into a confluence of knowledge, erudition and learning for the young Engineers.

A national level conference like this will provide a scope to nurture and nourish the budding Engineers, gain thrust to develop and transform themselves into a greater height.

ALL THE BEST !!

Sri. Arun H. R.

Director
PKMET, Bengaluru

Principal's Message



RR Institute of Technology schedules to hold the National E-Conference on “Computer Science & Technology Allies in Research” (NCCSTAR - 2021) on 16th & 17th July 2021.

The pre-conference phase has received a deluging response from all across the country. Scholars from different fields and areas of research on ‘Computer Science & Technology Allies in Research’ demonstrated their findings and also presented their papers.

We regret for not being able to accommodate all on the pulpit. I express my warm greetings to all our esteemed guests, scholars, and participants. I wish you all an enlightening encounter with the ‘Computer Science & Technology Allies in Research’, the focal point pertinent to the modern era.

On behalf of the students, faculties and colleagues I deeply appreciate the effort and enthusiasm of the organizing team for shoving and, grading up this confabulation to a national level symposium.

I personally thank the faculties and the Departmental HOD of Computer Science & Information Science, RRIT for their dedication and involvement in shaping up the success of the National level E-conference on ' Computer Science & Technology Allies in Research'.

Dr. Mahendra K. V.
Principal
R. R. Institute of Technology

Convener's Corner



“Promises get Friends but Performances keep them Alive”

We are very much pleased to organize two day National E-Conference on “Computer Science & Technology Allies in Research” (NCCSTAR - 2021) during July 16th & 17th 2021. The field of “Computer Science & Technology Allies in Research” has been a booming area of action and activities for young engineers. This being a volatile area where today’s discovery/invention becomes tomorrow’s history, a Conference like this indeed, is in demand. This National Conference on “Computer Science & Technology Allies in Research” is a platform of knowledge where the participants are getting wider berth to exchange and reciprocate information with the fellow fraternity. It ignites in engineers the spur to explore the field of immense possibility and potentiality. NCCSTAR – 2021 is focusing on the key issues, of recent trends & advancements, relevant to this field. It is organized keeping in view the need to bridge the gap between the academia, researchers and industry experts from different parts of the country. The conference aims to cover a wider range of topics like Mobile Communications, Data Service Analytics, Wireless Networks, Image and Signal processing, Artificial Intelligence, IOT and embedded computing. A Conferences as this, is practically a convergence of knowledge and information from various Channels of Technology.

I express my deep seated gratitude to Honorable Chairman Sri. Y. Raja Reddy, Secretary Sri. Kiran H. R. & Director Sri. Arun H. R. for patronizing the entire event. I am beholden to our Principal Dr. Mahendra K. V. for his perpetuating support from the beginning. I also acknowledge the contributions of Technical Advisory Committee, the Organizing Committee, Session Chairpersons, Keynote Speaker, participants and also the efforts of all who are directly or indirectly involved, to turn this event into a success.

Dr. Manjunath R
Professor & Head, CSE & ISE Department, RRIT

Contents

SL No	Paper ID	Title	Author Name	Page No
1	I102	A Writing Overview On Magnificent Mirror	Malashree G, Jayanth Jain DV, Saikat Das Alin, Saurav Dhar, Tilak Panenu	1
2	I103	Virtual Picture Utilizing Using Raspberry Pi3	Malashree G,Jayanth Jain D V,Saikat Das Alin,Saurav Dhar,Tilak Panenu	6
3	I105	Survey On : Digitalized Metro System	Vijaykumar M Bhat, Vismaya S Rao,Tousifkhan Soudagar, Vaishnavi N, Kavyashree S	14
4	I106	Deepfake Creation And Detection Using Cycle Gans	Shruthi S, Charan K, Naveed Ahmed, Nikith Kumar N, Shankar R A	16
5	I107	A Survey Work On Line Following Versatile Robot Obstruction Aversion Utilizing Gunsight Innovation	Dhananjaya M K, Mohan Krishna G, Varun Kumar V G, Yashwanth T U, Y N Prathap Reddy,	22
6	I108	Survey On Skin Cancer Prediction With Image Segmentation On Cloud Using Machine Leaming Models	Dr. Manjunath R, Bhoomika,Ashwini R, Mamathashree T, Chandana S	29
7	I109	A Review Study Of Traffic Anomaly Intrusion Detection Using Artificial Intelligence	Prof. Dhananjaya M K, Dantene Davis, Abhishek Singh,Amarjeeth Singh, Fahad Ahmad	32
8	I110	COVID-19 Outbreak Data Analysis And Risk Prediction	Mr. Sandeep H,Yashash T V, Vikas B, Varun Kumar T H, Shashank V	38
9	I111	A System For 3d Reconstruction From Multiple Views	Dr. Manjunath R,Vinod G, Sanjeev Kandel, Pallavi K, Preethi D	42
10	I112	Risk Analysis And Management In Software Development	Akhshita Sharma, Dr. Manjunath CR, Potluri Sairaj	50
11	I113	Plant Leaf Disease Detection Using Machine Leaming	Meghana M,Pooja Manjunath Naik,Koustuba Gurikar,Nithya P N,Amith K S	58
12	I114	A Novel Approach For Skin Cancer Prediction With Image Segmentation On Cloud Infras tructureus ing Machine Learning Models	Dr. Manjunath R, Ashwini R, Mamathashree T, Bhoomika S P, Chandana S	65
13	I115	A Review Model Of Uber Data Analysis Using Data Science	Prof. Dhananjaya M K, Dantene Davis, Abhishek Singh,	72
14	I116	Augmented Reality For Artistic Interpretation	Chandana H, Ashritha A R , Apoorva B M, Ranjitha J	77
15	I117	Survey On De-Duplication Of Cloud Amalgamated Data Using Fuzzy Logic	Prof. Ranjith. V, Yamini Sahukar. P, Akshara. M, Paitho Sharothi Biswas	81

16	I118	Medkit For Blind.	Mujtaba Nayaz, Mohammad Faizal, Dr. Soumya naik	88
17	I120	Convulsion Identification Using Electromyography Signals	Dr Sumanth V, Kavya R, Varsha S, Yashaswini S, Dasari Pavithra	94
18	I121	Reaping Perpetual Benefits By Integrating Biological And Information Sciences As The New Paradigm Of Bioinformatics	ABHIJIT BANDYOPADHYAY, Sumanta Mukhopadhyay	100
19	I122	Speech Recognition Using CNNART	Shruthi S, Ankit Kumar Choudhary, Rahul Thakur, Rohit Kumar, Sameer Kshetri	105
20	I123	Survey On Detecting COVID-19 Using Chest X-Ray Images On Deep Learning	Dr. Sumanth V, Rakesh J, Lavanya H S, Seema I D, Kusuma K J	111
21	I124	Watch Your Driving: A Driver Health Monitoring System Using Raspberry Pi	Sharan G S, Srikanth S, Suraj S T, Veena K B, Santhosh Y N	116
22	I125	'Deaf People Will Hear Again': How Virtual Reality Can Change The World	B. Yasmeen Shadab, C. Silpa	124
23	I127	A Survey Work On Towards Exploring The Potential Of Alternative Quantum Computing Architectures	Dhananjaya M K, Mohan Krishna G, Yashwanth T U	129
24	I128	Role Of Blockchain In Finance And Accounting	Dr. Naveen M, Martha S	136
25	I129	Wheel Defect Detection Of Moving Railways Using Machine Learning	P. Varshi Priya, C. Silpa	140
26	I131	Prediction Of Heart Disease Using Data Visualization And Machine Learning	Priyanka Vutkur	144
27	I132	Automated Ultrasonic Disinfectant Rover To Maintain Hygiene Environment Using IoT	Prof. Veena V, Shaik Nasreen Vaibhav Shresth Yuvraj Singh Rajawat	154
28	I133	Intelligent Parking Management System Using Android And IoT	Dr Naveen M, Kavyashree S	161
29	I134	IoT Based Air Quality Monitoring System Using Sensors With Machine Learning Analysis	Dr Naveen M, Martha S, Kavyashree S, Vinutha GS, Sweta Gupta	165
30	I135	Tomato Leaf Diseases Detection Using Convolutional Neural Networks	Nithin K, Amit Singh Rajput, Brijesh Kumar Nishad, Dhiraj Kumar Singh, Anil Kumar Mahato	171
31	I136	Blockchain Based Internet Of Medical Thing	KVSS Dheeraj kumar, C.Silpa	177

32	I137	Screening System For Early Detection Of Diabetic Retinopathy	Balaraju G, Lavanya S, R Gaganashree, Ramya E, Savita Narayan Kammar	183
33	I138	Network Intrusion Detection Using Supervised Machine Learning Technique With Feature Selection	T.Somasekhar, Abhilash L Bhat, Akhila P	187
34	I139	A Survey Of Scanning Techniques For 3D Reconstruction	Dr. Manjunath R, Vinod G, Sanjeev Kandel, Pallavi K, Preethi D	192
35	I140	A Comprehensive Study On Cloud Computing Paradigm	Nithin K, Amit Singh Rajput, Brijesh Kumar Nishad, Dhiraj Kumar Singh, Anil Kumar Mahato	198
36	I141	Survey On Early Detection Of Diabetic Retinopathy	Balaraju G, Lavanya S, R Gaganashree, Ramya E, Savita Narayan Kammar	203
37	I142	Surveying & Analysis Of Detecting COVID-19 Pneumonia From Chest X-Ray Convolutional Neural Network	Aipitha Martin, Mithun K, D U Krupa, Keerthana T J, Sirisha S	205
38	I144	A Security And Privacy Concepts In Fog Computing	Swetha KB, Meghana BN	210
39	I145	Review On Ubiquitous Computing	Swetha KB , Narasimhareddy gari naresh	217
40	I146	Brain Tumour Detection Using Convolutional Neural Network	Mohammed Ayaan Baig, Mithun B N	224
41	I147	Online Invigilator	Ashwin Rao, Danish Kalam, Barshan Roy, Faisal Noor	231
42	I148	Iot Based Ubiquitous Health System	Swetha KB ,Ruthvik T	237
43	I149	QUIC - Improving The Transport And Security Of The Domain Name System	Purvansh Jain, Dr. Manjunath CR, Mihir Shah	245
44	I150	A Study On Price Prediction Of Bitcoin Using Deep Learning	Shruthi S, Shankar R A, Charan K, Naveed Ahmed, Nikith Kumar N	252
45	I151	A Study On AI And Deep Multi-Layer Perceptron Based Methods To The Assistance Of Visually Impaired People	K. K. Baseer, Sathvika Kolla, Haradeep Sivadanam	259
46	I152	Portable Camera Based Text Reading Of Objects For Blind Persons	Mohammed Ali Baig, Mohammed Tausif Pasha, Dr Sowmya Naik	264
47	I153	A Study On Interface For Sighting And Navigating Visually Impaired	K. K. Baseer, Jahnavi. M, Vyshnavi. A	268

48	I154	Forecasting On Crime Analysis And Prediction Using Machine Leaming	Shruthi S,Ankit Kumar Choudhary, Rahul Thakur, Rohit Kumar, Sameer Kshetri	274
49	I155	A Method For Prevention Of Shark Attacks Using Communicating Autonomous Drones	Shashidhar S, Saneeth Banik, Dr. Sowmya Naik	281
50	I156	Access Control Convention For Front Line Reconnaissance In Drone Helped Using Iot	Tariq Mohammed Sarfaraz, Shreyas R Gowda, Dr Sowmya Naik	285
51	I158	Surveying & Analysis Of Parkinson's Disease By Applying ML Algorithms	Aipitha Martin, Mithun K, D U Krupa, Keerthana T J, Sirisha S	289
52	I159	Covid-19 Chatbot	Nishanth T, Rachana G, Vasantha S, Raghavendra Rao BG	295
53	I160	Covid 19 Face Mask Detection And Alert System Using Machine Learning Techniques	Ambica, Meghana, Manoranjini, Roopa, Kavyasree	300
54	I161	Automatic Music Transcription Using Conventional Networks	Chanabasana,Rakesh, Roshan Sharath	306
55	I162	Arduino Based Home Automation Using Android Application	Mr. Emmanuel R,Aadarsh Kumar Singh, Dipendra Kumar Mahato, Lalbabu Mandal, Sujeeet Kumar Chaudhary	313
56	I163	Multipurpose Iwalk Stick For Visually Impaired	Mr. Nagesh H B, Mr. Harish L, Dr. Bharathi Gururaj, Mrs . Ashwini A M, Mrs. Vijaya D	317
57	I164	Quality Inspection In Manufacturing PCB With RCNN And LSTM	Dr. Bharathi Gururaj,Mr.Harish L, Mr. Nagesh HB, Mrs Ashwini AM, Mrs Vijaya Dalawai	333

A Writing Overview On Magnificent Mirror

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Paper ID-102

ABSTRACT: This task depicts the plan and advancement of a cutting edge reflect that offers rearranged and adaptable administrations to the home climate. The mirror interface gives clients the flexibility required for better administration and incorporation of day by day errands. On a standard with there penny progresses in the Internet of Things guidelines and applications, the mirror is intended to empower inhabitants to control the family brilliant machines and access customized administrations. The target of building a Smart mirror is to help save time by aiding individuals empowering them to refresh with highlights like Daily News, Weather Forecast, Mail notices, Phone Network and some more. The objective is to foster a savvy astute mirror that do considerably more than a normal mirror and its reasonable for home and business needs and has an expansive application prospect.

KEYWORDS: Raspberry Pi, Internet of Things, Smart Mirror, face Recognition, Voice Recognition.

I. INTRODUCTION

These days, IoT is the significant idea with respect to every one of the gadgets and activities. The utilization of web can be seen all over the place. It is assessed that constantly 2020, there will be up to 21 billion gadgets across the globe associated with 'Web of Things' methods each man can convey 7-8 IoT gadgets which will be persistently associated with the Internet. Our way of life is totally associated with the Internet at the end of the day Internet has become the fundamental need of human existence. The development of IoT will bring about collection of uncommon information which should be prepared and examined. Web of Things offers boundless freedoms to upgrade correspondence among gadgets and information sharing yet this equivalent element makes it profoundly helpless according to the perspective of safety.

It's anything but a divider mounted mirror it shows data like news, climate, schedule and different things identified with our necessities. A shared objective for building a keen mirror is to utilize a top notch single direction glass, a LCD screen, an edge to hold the glass and screen, and a movement sensor to identify an individual and an internet browser called streak with python to give the product highlights like 'Alexa' and drive the presentation further. This paper will examine about the plan of savvy reflect. Shrewd mirror accompanies Amazon ALEXA application which is a voice administration that reacts to our inquiries. The savvy reflect is likewise ready to perform face acknowledgment utilizing pi camera.

II. RELATED WORK

The Proposed Intelligent Mirror framework works in two modes.

- A. Stanalone Mode When client isn't before reflect, it's anything but a customary mirror. This otherwise called Power Saving Mode as in this mode all hardware circuits are in OFF state.
- B. OnlineMode This mode actuated when client come before mirror and it show all pertinent data to client. In online mode, raspberry pi module gets associated with web and show all client required information. Square level framework outline is displayed in fig 1. Equipment and Software for plan of framework are referenced underneath.

Hardware Requirements:

- a) Camera – REES52 Raspberry Pi 3 model B+ steady 5MP camera.
- b) Two way Glass reflect - 18 x 24 x 0.2 crawls by keen mirror unit.
- c) Infrared Module – 38 KHz Geekworm IR Control Kit.
- d) Raspberry Pi 3 module B+.
- e) Microphone and speaker
- f) Display Unit
- g) Temperature Sensor
- i) Humidity Sensor

Software and Computer Language Requirements:

- a) HTTP
- b) PHP

c)Python

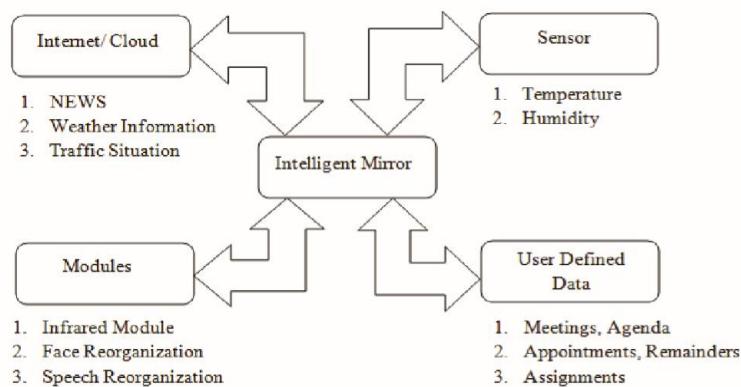


Fig. 1. System Block diagram.

- a) Camera: camera is needed to recognize right client. this should be possible by utilizing picture handling or face acknowledgment on Raspberry Pi. Chosen Raspberry Pi has committed port to associate camera on it.
- b) Two-way Glass Mirror: Mirror utilized for this task is a two-way reflect which is mostly intelligent on one side and straightforward from opposite side.
- c) Infrared Module: This is significant unit of this framework. This unit consistently stay in ON mode for constant perception of client.
- d) Temperature Sensor: This sensor is associated with Raspberry Pi module. This gives client ongoing temperature information of general climate.
- e) Humidity Sensor: The association of this sensor is same like temperature sensor.
- f) Microphone and Speaker: This unit is needed to take contributions to the structure voice (from client). This makes framework complementary where both mirror and client talk with one another.
- g) Display Unit: Connect VGA port of Display unit situated at mirror to Raspberry Pi module utilizing HDMA interfacing. Here we can utilize capacitive presentation yet contrasted with capacitive showcase Infrared presentation has progresses that we can utilize it when our hands are not dry.
- h) Face Recognition: LBP chips away at parting a picture into neighborhood of pixels and think about the power of the middle pixel to the encompassing ones.
- i) Voice Recognition: Recognition calculation carried out and tried on MATLAB dynamic time traveling was discovered to be more exact and more straightforward when applied to separated word acknowledgment while covered up Markov model was more solid for sentence acknowledgment.

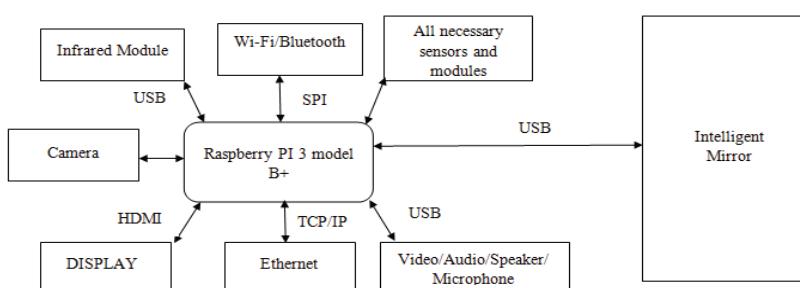


Fig. 2. Interfacing of Raspberry Pi with Hardware.

Pi is Operating System (OS) based little PC which is heart of this framework. Clever mirror comprises of numerous modules and sensors (as referenced in above area) which get interfaced with Raspberry Pi as displayed in Fig. 3. For this undertaking we pick "Raspberry Pi 3 module B+" which is latest and progressed rendition. The best highlights of this module are its comprises of Broadcom BCM2837B0, Cortex-A53 (ARMv8) 64-digit SoC @ 1.4GHz, Ethernet availability, camera port, contact screen show port, 4 USB 2.0 ports which is needed for associating IR, Face and Speech Recognizing modules. It requires 5V/2.5A DC power info and it additionally support Power over Ethernet [4]. This model satisfies every one of the prerequisites of proposed framework without associating any extra microcontroller or processor.

III. PROPOSED SYSTEM

The savvy reflect comprise of a USB receiver, Raspberry pi 4 board, two drove strips, pi camera for face discovery and speaker and screen show with two way glass reflect film. LED1 and LED2 is utilized for demonstrating reason. After the word alexa is given to the receiver one drove is getting turned ON for example listening method of Alexa and the other drove it is getting turned on while talking or noting method of alexa. A two way reflect which can work both as intelligent and transparent mirror is joined to a LED screen. This gives two significant functionalities for example emulating a typical mirror just as filling in as a presentation for continuous information refreshes. iii)Personalized information and data administrations: Anyone utilizing this mirror will actually want to get continuous updates of traffic, stocks, news and features, date, time, climate refreshes just as different reports of our specific advantages. iv) Voice Commands: User will actually want to provide voice orders to the mirror utilizing an amplifier associated with the Raspberrypi 4. The Magic mirror will show information in agreement to the client orders

IV. LITERATURE REVIEW

1. Real Time Smart Mirror System Using Internet on Things [Mayur Wani] [IEEE: 2019]

In 2017 paper published, this paper have large a range of kinds of modem partners and devices for example remote helpers advanced cell phone and wearable, which have a reason to facilitate and enhanced day to day activity which carry all important activities of human beings. It can used fundamentally around essential human needs, for example penusing, planning, exploring and other comparable exercises.

2. Voice Controlled Smart Mirror with Multi Factor Authentication [Adokiye Charles Njaka, Na Li, and Lin Li] [IEEE: 2018]

In this paper, the authors developed a smart mirror system. For instance, Philips Home Lab created an intelligence personal care system that implemented an Interactive Mirror to provide customized services to the users. The system is capable of displaying TV feeds, monitor the latest weather, and so on. The mirror has an LCD display combined with a mirrored surface and a processor to provide intended services. Another mirror is developed by Sam Ewen and Alpay Kasal at Lit Studios is a touch and gesture functional mirror. Five students at Chalmers University in Sweden designed a HUD mirror. They use 3d a two-way mirror to allow the LEDs mounted behind to illuminate the information.

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Smart Mirror for Home and Work Environment[Muhammad Hamza]

The idea of designing this Smart device is to bring technology in our daily life into a mirror and making it smart[1]. The basic question which arises is that what are the needs that a smart mirror can fulfill?[2] There was always a need of a device which can help people to plan their daily activities while doing their other household activities[2]. Multitasking with technology help us to save time and maintain schedule as time management is an important aspect of life[3], [4]. Smart mirror also acts as a personal assistant such as scheduling appointments, reminding task by fetching information from the user's Google account or any other cloud storage[4]. If a person in the morning wants to check news headlines or weather no one has time to switch on the TV or read the newspaper, if there is a device that can fulfill the needs without requiring any physical efforts, as it can only be imagined the amount of time it will save[3], [5], [6]. Smart mirror aims to display images as well as provides customize information such as current weather, date and local time, news, headlines, personal profiles, emails, messages, social media and notifications[2], [4], [6]–[9]. The device also suggests health tips after monitoring health conditions live to the user[4], [7]. To fit the desired concept of health care environment some modules are designed and programmed focusing specially on a multi user environment which allows users to track their daily life activities and access personal information while displaying some basic information[10].

4. Year: 2018

Author: Ayushman Johri Student, Sana Jafri Student, Noida, Raghav Narain Wahi Student, Dr. Dhiraj Pandey

Title: Smart Mirror: A time-saving and Affordable Assistant

One of the problems faced by people these days is catching up with daily news amidst their busy work schedules. The proposed smart device helps in solving this problem. Smart Mirror is a mirror which allows touch-free user interaction with important information displays in the form of widgets on the screen, while also providing SOS calling and messaging features. The display has mirrorlike reflective properties while still displaying information in typical lighting conditions consisting of fluorescent, incandescent and LED light as fluorescent and incandescent lighting are the most common type of lighting in home and offices, which are the most likely environments for the Smart Mirror to be installed.

5. Year: 2018

Author: Kun Jin, Xibo Deng, Zhi Huang, Shaochang Chen

Title: Design of the Smart Mirror Based on Raspberry Pi

This paper tells about the design of smart mirror using Raspberry Pi. The mirror looks like the regular mirror but the difference is it displays weather, temperature, time, and web application for college. It is implemented using peripherals like raspberry pi, LED monitor covered with a two-way acrylic sheet. It can connect to the Internet and can retrieve data from the internet which displays weather report of the particular location. It provides natural interaction between user and the admin. Approach taken to build this platform is similar to MVC (Model-View Controller) Software pattern. Here controller act as admin which receive all requests data and then works with the Model to prepare data needed by the View.

V. POSSIBLE OUTCOME

The savvy reflect which goes about as a keen home control stage is a cutting edge framework that gives clients a simple to-utilize reflect interface, permitting clients admittance to adaptable administrations in an exceptionally intuitive way, while performing different undertakings at the same time. The primary qualities are that this is another sort of savvy gadget that individuals don't see each day and it looks extremely awesome. The mirror works both as an ordinary mirror just as a mirror showing day by day notices to the approved client.

There are loads of channels or notices that the client can see on the mirror like Facebook, Gmail, news and so forth. The mirror is likewise used to show time, climate, date and so forth. The mirror goes about as an individual associate just as presentations significant notification and is additionally an enquiry place. The client can collaborate with the mirror utilizing voice orders.

Keen mirror configuration enjoys the benefits of little size, basic activity, minimal expense, serious level of easy to use, customized UI and numerous different benefits which is reasonable for some, applications like school, home, workplaces and so on. In general, the proposed savvy reflect framework joins different functionalities to concede clients admittance to customized data administrations.

VI. CONCLUSION

It's a face which reflects people states of being, temperament, looks and feelings. Mirror is the instrument which passes on human's semiotics. This paper introduced plan outline of Intelligent Mirror System which utilizes Raspberry Pi as a center preparing unit. It gives all important data like news, climate condition, arrangements, plans, tasks and so on by perceiving right client utilizing face and voice perceiving unit when it works in Online mode. It's anything but a customary mirror in independent mode when nobody is before reflect. This is more intelligent mirror in which both client and mirror interface with one another with camera and mouthpiece connected to framework. This framework can be utilized in home, boutique, design/entertainment worlds and so forth. By utilizing further developed sensors, beam optics, picture handling instruments, proposed framework can be utilized in medical services, winning inns, Airports and so forth. In future, this framework can be reached out to make windows, entryway as a keen contraption.

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Virtual Picture Utilizing Using Raspberry PI3

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Paper ID-103

ABSTRACT: At the present time, people can access information at a glance through laptops, mobile phones, desktop and more but some extra interaction is required to access the information. As technology is growing its being easier to access information, in past information was available through paper, then through computers, and now it can be access through smart phones and other devices. The motive of this paper is to provide more information to user without making more effort to get it, Here the idea of Smart Mirror originated, Modern appliances require input through keyboard or touch screen interface which require little effort to access information but this interactive mirror allows user to access data quickly and comfortably through voice and other devices. The smart mirror consists of peripheral such as LED monitor, camera, LED lights, speakers, microphone, covered with one-way mirror. This interactive mirror provides some basic amenities on default screen such as time, news updates and weather, and also perform some advance functions such as monitoring system direct to smart phones, also includes all feature of smartphone.

KEYWORDS: Mirror, Raspberry, Sensor, Camera, IOT

1. INTRODUCTION

Everyone knows what a mirror is. It is an object found in most people's homes. In mirrors we see our reflections. But what happens when you combine the idea of a mirror with technology? What possibilities are there and how smart could a mirror be? These are some of the questions that inspired my choice of final year project, a project which aimed to develop a smart mirror and a small operating system to power it. The device was to go beyond an ordinary mirror, to have a screen inside that you would be able to interact with by using voice commands, and smart phones or other devices. Presentation and punctuality are two of the most valued qualities in modern society. However, it can be difficult to effectively prepare for the day while remaining knowledgeable about current affairs and still maintain a timely schedule. In the morning, it is imperative to prepare for the day in front of a mirror, which is often a slow process. Additionally, factors such as the current weather conditions can influence how a person prepares for the day. Finding an efficient way to check all the factors that can affect how a person prepares for the day while also not adversely affecting the tasks that are performed in front of a mirror can be a challenge. The goal of our project was to create a product that will provide quick and easy access to the time, news, and weather while simultaneously allowing a person to go through their morning routine. Our product should enhance productivity while providing a functional and enjoyable user experience.

2. RELATED WORK

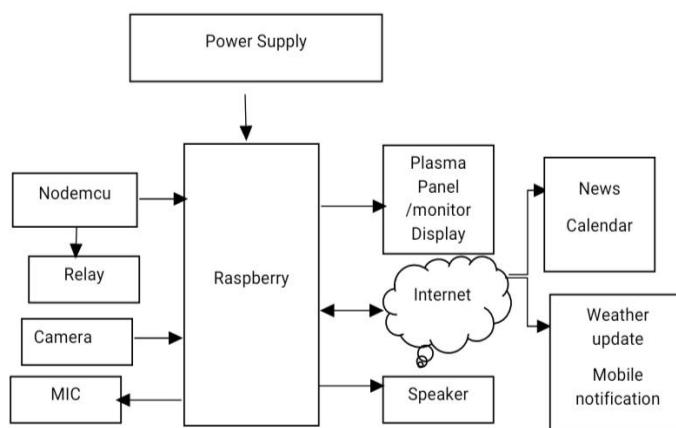


Fig: Block diagram of smart mirror

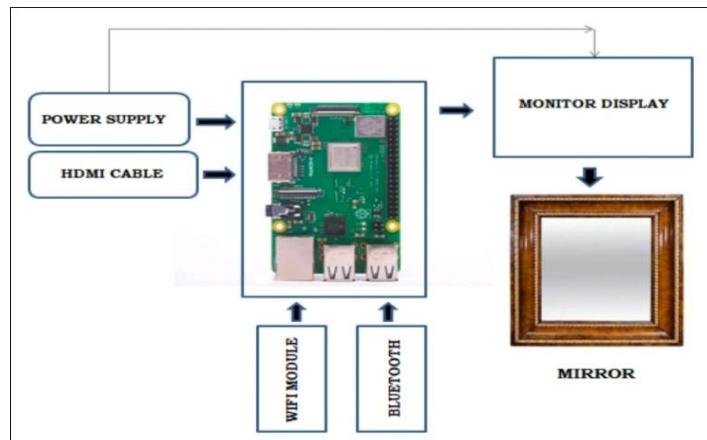


Fig: System analysis and design of smart mirror

The microcontroller used to control the mirror and the LCD displays will need to be powered by a 5V power supply. This will not need to be portable as the mirror will be stationary after its initial installation. A 3.3V regulator will need to be included for some components. Therefore, a 5V wall wart power supply and an on chip voltage regulator are the best choices to meet the power requirements. The embedded system used in the mirror will need to be able to interface with a WiFi interface as well as LCD displays. The WiFi will need to be able to work within a home, so it should be sensitive enough to pick up the signal from a home WiFi router. The system will need to be able to take user input to program the user's location, initial SSID information, and switch what data is being displayed on the auxiliary screen. There will need to be communication to determine if a person is present and the system needs to be woken from its sleep state. The displays must be able to show all relevant text and icons, and refresh quickly enough to allow for regular information updates. Overall, all the code must be compact enough to fit and run on the microcontroller we plan to use. All the hardware will need to fit within this profile and the displays will need to be properly scaled.

Proposed system and block diagram for smart mirror are shown in Fig. The aim of designing this model is to create an interactive interface which can be conveniently used in home environment as well as commercial space. Various services like weather, calendar, traffic, news stock updates etc. can be accessed and controlled using voice commands. The Raspberry Pi 3 is connected to a Monitor via HDMI cable and a webcam is attached using a universal serial bus. Raspberry Pi is powered up using a 5V/2A DC supply.

SYSTEM SETUP:

a) Raspberry Pi : The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games. The Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red camera.

b) Technical Specification:

- Processor
- Broadcom BCM2387 chipset.
- 1.2GHz Quad-Core ARM Cortex-A53 (64Bit)
- 802.11 b/g/n Wireless LAN and Bluetooth 4.1 (Bluetooth Classic and LE)
- IEEE 802.11 b / g / n Wi-Fi. Protocol: WEP, WPA WPA2, algorithms AES-CCMP (maximum key length of 256 bits), the maximum range of 100 meters.
- IEEE 802.15 Bluetooth, symmetric encryption algorithm Advanced Encryption Standard (AES)with 128-bit key, the maximum range of 50 meters.
- GPU
- Dual Core Video Core IV® Multimedia Co-Processor. Provides Open GL ES 2.0, hardware-accelerated Open VG, and 1080p30 H.264 high-profile decode.
- Memory

[1] 1GB LPDDR2

- Operating System

[2] Boots from Micro SD card, running a version of the Linux operating system or Windows 10 IoT

- Dimensions

[3] 85 x 56 x 17mm

- Power

[4] Micro USB socket 5V1, 2.5A

c) Camera: A webcam in this project is used to recognize user's face and display tweets. Any type of webcam is compatible with Raspberry Pi. In this project the webcam used is Logitech C270 HD Webcam.

d) Microphone: One mode of interaction with the smart mirror is through microphones. Two microphones were used to power the voice recognition capabilities of the device. USB microphones had to be used because the Raspberry Pi does not have a regular microphone input. The first microphone is a cheap simple one connected through a USB sound card to the Pi. The second microphone is actually a PS3 Eye camera that I had at home and that connects directly through the USB. However, only the microphone part of the PS3 Eye is being used. The voice recognition system works by listening for someone to clap with the first microphone and once that happens the second, higher quality microphone is triggered to listen for a voice command.

e) Mirror: A special mirror known as a two way mirror or observation mirror is used in this project. A two mirror is special as compared to an ordinary household mirror. Unlike a household mirror, the two way mirror is not painted with an opaque color on the back, instead its left untouched. This gives the property of the mirror being reflective one side and transparent/translucent from the other. Hence the two way mirror acts as mirror as long as there is no light sent from the back of mirror.

f) OpenCV: OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. This software is mostly used for image processing and video analysis. With the help of this programming the computer processes and ultimately understands images and videos.

OpenCV is a Python library that was designed to solve computer vision problems. OpenCV was originally developed in 1999 by Intel, but later, it was supported by Willow Garage. It supports a wide variety of programming languages such as C++, Python, Java, etc. Support for multiple platforms including Windows, Linux, and MacOS.

OpenCV Python is nothing but a wrapper class for the original C++ library to be used with Python. Using this, all of the OpenCV array structures gets converted to/from NumPy arrays. This makes it easier to integrate it with other libraries that use NumPy. For example, libraries such as SciPy and Matplotlib.

g) Python: Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax makes it an ideal language for scripting and rapid application development in many areas on most platforms

h) Raspbian OS:

Raspbian is a free operating system optimized for the Raspberry Pi hardware. Raspbian comes with over 35,000 packages, pre-defined functions which helps in easy installation on a Raspberry Pi computer.

3. PROPOSED ALGORITHM

We use haar cascade algorithm for face detection.

- Haar Cascade:

It is a machine learning object detection algorithm used to identify objects in an image or video and based on the concept of features proposed by Paul Viola and Michael Jones in their paper "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001.

It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.

The algorithm has four stages:

- [5] Haar Feature Selection
- [6] Creating Integral Images
- [7] Adaboost Training
- [8] Cascading Classifiers

It is well known for being able to detect faces and body parts in an image, but can be trained to identify almost any object.

Initially, the **algorithm needs a lot of positive images of faces and negative images** without faces to train the classifier. Then we need to extract features from it.

First step is to collect the Haar Features. A Haar feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums.

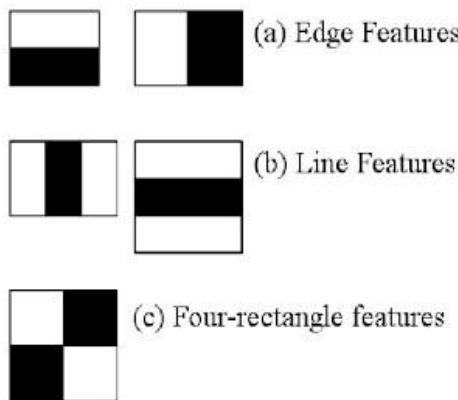


Fig: Integral Images are used to make this superfast

But among all these features we calculated, most of them are irrelevant. For example, consider the image below. Top row shows two good features. The first feature selected seems to focus on the property that the region of the eyes is often darker than the region of the nose and cheeks. The second feature selected relies on the property that the eyes are darker than the bridge of the nose. But the same windows applying on cheeks or any other place is irrelevant.

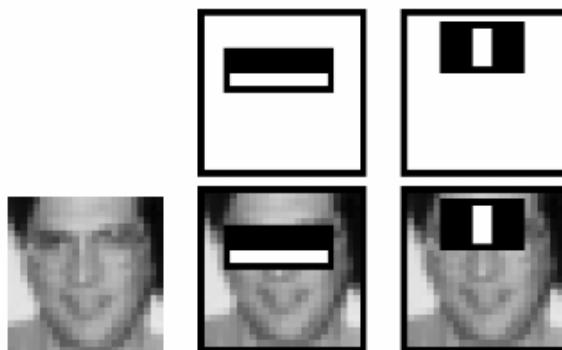


Fig : AdaBoost

This is accomplished using a concept called AdaBoost which both selects the best features and trains the classifiers that use them. This algorithm constructs a “strong” classifier as a linear combination of weighted simple “weak” classifiers. The process is as follows.

During the detection phase, a window of the target size is moved over the input image, and for each subsection of the image and Haar features are calculated. You can see this in action in the video below. This difference is then compared to a learned threshold that separates non-objects from objects.

Because each Haar feature is only a “weak classifier” (its detection quality is slightly better than random guessing) a large number of Haar features are necessary to describe an object with sufficient accuracy and are therefore organized into **cascade classifiers** to form a strong classifier.

Cascade Classifier:

The cascade classifier consists of a collection of stages, where each stage is an ensemble of weak learners. The weak learners are simple classifiers called *decision stumps*. Each stage is trained using a technique called boosting. Boosting provides the ability to train a highly accurate classifier by taking a weighted average of the decisions made by the weak learners.

Each stage of the classifier labels the region defined by the current location of the sliding window as either positive or negative. *Positive* indicates that an object was found and *negative* indicates no objects were found. If the label is negative, the classification of this region is complete, and the detector slides the window to the next location. If the label is positive, the classifier passes the region to the next stage. The detector reports an object found at the current window location when the final stage classifies the region as positive.

The stages are designed to reject negative samples as fast as possible. The assumption is that the vast majority of windows do not contain the object of interest. Conversely, true positives are rare and worth taking the time to verify. A *true positive* occurs when a positive sample is correctly classified.

A *false positive* occurs when a negative sample is mistakenly classified as positive.

A *false negative* occurs when a positive sample is mistakenly classified as negative.

To work well, each stage in the cascade must have a low false negative rate.

If a stage incorrectly labels an object as negative, the classification stops, and you cannot correct the mistake. However, each stage can have a high false positive rate. Even if the detector incorrectly labels a nonobject as positive, you can correct the mistake in subsequent stages. Adding more stages reduces the overall false positive rate, but it also reduces the overall true positive rate.

Cascade classifier training requires a set of positive samples and a set of negative images. You must provide a set of positive images with regions of interest specified to be used as positive samples. You can use the Image Labeller to label objects of interest with bounding boxes. The Image Labeler outputs a table to use for positive samples. You also must provide a set of negative images from which the function generates negative samples automatically. To achieve acceptable detector accuracy, set the number of stages, feature type, and other function parameters.

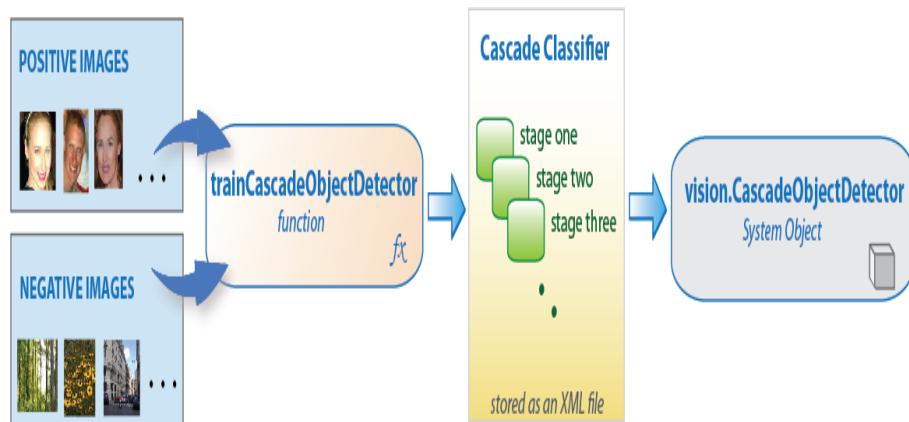


Fig : Cascade Classifier



Fig: Steps in Cascade Classifier

4. SIMULATION RESULTS

Expected Outcomes:

- 1) Work as a normal reflective mirror so that the user can use it as a regular mirror.
- 2) A two-way mirror which can function both as reflective and see through mirror is attached to a LED monitor. This provides two major functionalities ie. Mimicking a normal mirror as well as working as a display for real time data updates.
- 3) Personalized data and information services: Anyone using this mirror will be able to get real time updates of traffic, stocks, news and headlines, date, time, weather updates as well as other reports of our particular interests.
- 4) Voice Commands: User will be able to give voice commands to the mirror using a microphone connected to the Raspberry pi 3.

Snapshots:



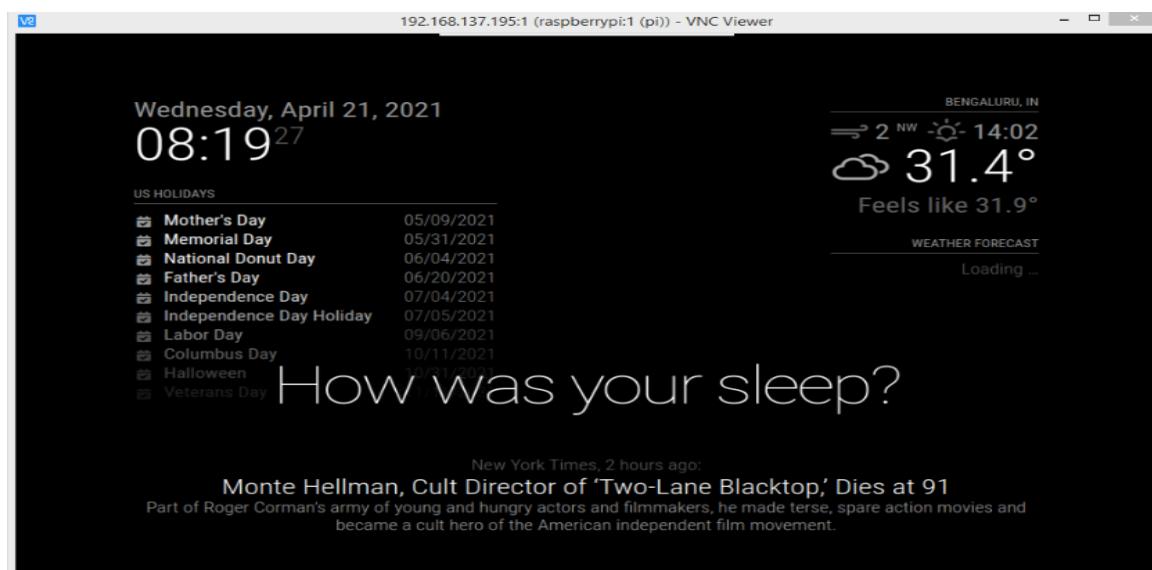


Fig: Snapshots of working smart mirror

5. CONCLUSION AND FUTURE WORK

The Smart Mirror thus accomplishes this, by still being a mirror without all the technology inside it, making it very approachable to use and integrating seamlessly into our lives. The Smart Mirror has scope in the field of IoT and home automation. The Smart Mirror can be connected to the home appliances, mobile devices, etc. which can expand the functionality of the mirror. The facial recognition technology used can be future enhanced as a means of security. Adding security means that no one can try to access sensitive data that maybe displayed on your mirror via the use of APIs. We believe that the future of the home will be a brilliantly connected ecosystem of smart technology designed to make your life easier, more enjoyable, and efficient. Obviously there are a ton of opportunities in the home for technology integration but a mirror is one of the best places to start.

1. The main goal of the smart mirror was to reduce the time needed in a user's daily routine. In this project we have designed a smart mirror which provides a natural interaction between the user and the information like time, date, temperature (which are customized by the user).
2. The display of the mirror is provided by a flat led monitor.
3. This monitor will display all the necessary information which are used by the users.
4. The smart mirror did the thinking for the user with intelligent, commonly used applications such as clock, calendar, daily news, to-do list etc.

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Survey On : Digitalized Metro System

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Paper ID-105

ABSTRACT:- Transportation plays a major role in our day-to-day life. This paper aims to develop a transaction process through online payment instead of manual process. We can reduce the difficulty of people; carrying a ticket during journey in metro and make traveling more easier by use of E-ticketing. Use of metro cards reduces the time consumed during manual ticket generation; but the commuters must always ensure carrying the card with them during their journey. Our system enables the commuters to manage the reservation and cancellation.

INTRODUCTION

As generation is growing speedily, we need to replace ourselves to being contact with new technology. The Commuter wishes get to rid of staying in long queue for buying tickets, which is time killing process. This application reduces paper artwork, time consumption and makes the affiliation of booking ticket in much less hard and quicker way and performs functionalities like getting the key records of commuters. This application allows the metro department to keep an account of the users, revenue generated and tickets purchased, As the duplication of tickets is being a problem for the department currently. It helps the department to maintain the revenue. The proposed device is an internet based software which presents data regarding timings, fares route maps. This device manages public remarks approximately offerings through its complaint section. This tool additionally includes a web fee tag recharge module wherein users can recharge their metro cards online through the website. It contains an user module where commuters can purchase the metro tickets in QR-code format which will be saved in passenger's mobile phone in an encoded form, and also the information will be saved in the IOT based cloud database for security purpose. There is moreover an administrator module in which administrator can add stations, trains, route maps.

II. REVIEW OF LITERATURE

Paula Fraga-Lamas (2017): The role of enabling technologies in revolutionizing the railway industry was investigated in this study. LTE and other broadband technologies have the capacity required to develop new services. To better understand potential customer needs, a systematic review of GSM-R specifications and services was presented. Furthermore, For services, like smart infrastructure, railway operations, Passenger Information Systems train control systems, safety assurance, advanced monitoring of assets, the latest technologies and the main academic and commercial developments were thoroughly examined in order to expose the IoT capabilities to reinforce competitive advantages [1].

Nora Alsubaie (2018): This study presented the design and implementation of an Riyadh Metro Reservation System to allow and assist passengers in handling reservations, making changes and cancellations, and requesting refunds, as well as eliminating the significant human interference in the current process of ticket issuance, efficiently managing ticketing transactions, and resolving the delays associated with issuance[2].

Prof. Dr S B Sonkamble (2018) This paper describes a smart metro payment system that uses biometric authentication, such as fingerprint authentication, to make the rail ticketing process simple. This system allows people to pay for their tickets without having to wait in a line. This device will reduce the amount of time spent in line for rail tickets. The system would use cutting-edge technology to streamline the rail ticketing process. This system has the potential to assist India in becoming a digital country[3].

M Abhishek Nair (2019): The aim of this paper is to create a system that eliminates the hassles of everyday travel. Physical tickets/tokens, as well as any other UID card/documents, are no longer needed for travel. The consumer would have a more relaxed and easy travel experience with this suggested approach. Another possibility for this project is to incorporate the same technology as a smartphone application, allowing users to book tickets directly from their phones, eliminating the need for a separate storage[4].

Arun Francis G (2019): This paper aims to introduce the use of RFID in ticketing process. Using RFID in a real-time method makes it easier to obtain data from passengers via a database, and these types of RFID are inexpensive and reusable. When compared to other technologies, scanner technology is much simpler and makes it much easier. If the project is applied to railways, the embedded systems can be even more complex, and they are very close to scanner technologies. With the aid of an RFID scanner and an RFID tag, the Fast Ticketing method can be implemented. As compared to other ticketing methods, this type of quick and dependable method is much simpler to implement[5].

Bhargav Dave (2020): The aim of this paper is to create a cloud-based, integrated internet of things (IoT) platform for asset management of elevated metro rail projects. This platform would provide real-time information about the project's different assets and their locations, allowing for better asset management. Furthermore, a platform prototype is being built in which sensors are installed on assets for traceability, and stakeholders can access this information directly via this web-based application. This platform would aid in the reduction of information management errors [6].

Prof. Ravindra Jogekar (2020): This paper states that QR-Code technology could be more easily integrated into current open vehicle platform foundations. QR-Code has all of the characteristics that make it a viable innovation for mass open vehicle ticketing: rapid contactless exchanges, security, and ease of use. The proposed arrangements are based on a combination of gauges and technologies, and they make use of existing contactless foundations. Our proposed application would be useful for both novice and experienced users. The proposed application will be used to book a ticket without having to wait in lines for nearby trains, and it will be easy for a ticket checker to determine if the ticket is valid or invalid. Both ticket bookers and ticket checkers can save time by using this Android application[7].

III.CONCLUSION:

The aim of developing this system is to provide an Android application for metro railway management. The entire system is secured , efficient and less time consuming. This project is very useful in daily life and can be efficiently implemented or worked upon. In The proposed online metro ticketing system, the operation would be fully automated, efficient, enhanced and cost-effective. The proposed system can also be implemented in other places like tollgates, bus ticketing and others.

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Deepfake Creation And Detection Using Cycle Gans

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ABSTRACT: The Creation and Detection of Deepfakes, Deep learning has been successfully applied to a variety of complex problems, ranging from big data analytics to computer vision and human-level control, using Cycle GANs. However, advances in deep learning have also been used to develop software that can cause threats to privacy, democracy, and national security. Deepfake is a popular technique based on artificial intelligence for image synthesis. As it can produce images without paired training data, it is more powerful than traditional image-to-image translation. Deepfake algorithms can create fake images and videos that humans cannot distinguish from authentic ones. The proposal of technologies that can automatically detect and assess the integrity of digital visual media is therefore indispensable. The most common form of deepfakes involves the generation and manipulation of human imagery. Generative deep learning algorithms have progressed to a point where it is difficult to tell the difference between what is real and what is fake. This technology has creative and productive applications. For example, realistic video dubbing of foreign films, education through the reanimation of historical figures, and virtually trying on clothes while shopping. There are also numerous online communities devoted to creating deepfake memes for entertainment, such as music videos portraying the face of actors.

KEYWORDS: Survey, Review, Deepfakes, Artificial Intelligence, Deep Learning, Computer Vision, Autoencoders, Forensics, GAN(Generative Adversarial Networks).

I. INTRODUCTION

A Deepfake refers to a specific kind of synthetic media where a person in an image or video is swapped with another person's likeness. The increasing sophistication of smartphone cameras and the availability of good internet connection all over the world has increased the ever-growing reach of social media and media sharing portals have made the creation and transmission of digital videos easier than ever before. The growing computational power has made deep learning so powerful that would have been thought impossible only a handful of years ago. Like any transformative technology, this has created new challenges. So-called "Deepfake" is produced by deep generative adversarial models that can manipulate video and audio clips. Spreading of the Deepfake over social media platforms has become very common leading to spamming and speculating wrong information over the platform. These types of Deepfake will be terrible, and lead to threatening, misleading common people. To overcome such a situation, Deepfake detection is very important. So, we describe a new deep learning-based method that can effectively distinguish AI-generated fake videos (Deepfake Videos) from real videos. It's incredibly important to develop technology that can spot fakes so that the Deepfake can be identified and prevented from spreading over the internet. The underlying mechanism for deepfake creation is deep learning models such as autoencoders and generative adversarial networks, which have been applied widely in the computer vision domain. These models are used to examine facial expressions and movements of a person and synthesize facial images of another person making analogous expressions and movements. Deepfake methods normally require a large amount of image and video data to train models to create photo-realistic images and videos. There is also a positive use of deepfakes such as creating voices of those who have lost theirs or updating episodes of movies without reshooting them. However, the number of malicious uses of deepfakes largely dominates that of the positive ones. The development of advanced deep networks and the availability of a large amount of data have made the forged images and videos almost indistinguishable to humans and even to sophisticated computer algorithms. This paper presents a survey of methods for creating as well as detecting deepfakes.

II. LITERATURE SURVEY

Deepfake video's explosive growth and illegal use are a major threat to democracy, justice, and public trust. As a result, there is an increased demand for fake video analysis, detection, and intervention. Some of the related words in deep fake detection are listed below:

ExposingDF Videos by Detecting Face Warping Artifacts [1] used an approach to detect artifacts by comparing the generated face areas and their surrounding regions with a dedicated Convolutional Neural Network model. In this work, there were two-fold Face Artifacts.

Their method is based on the observations that the current DF algorithm can only generate images of limited resolutions, which are then needed to be further transformed to match the faces to be replaced in the source video.

Exposing AI Created Fake Videos by Detecting Eye Blinking [2] describes a new method to expose fake face videos generated with deep neural network models. The method is based on the detection of eye blinking in the videos, which is a physiological signal that is not well presented in the synthesized fake videos. The method is evaluated over benchmarks of eye-blinking detection datasets and shows promising performance on detecting videos generated with Deep Neural Network-based software DF.

Their method only uses the lack of blinking as a clue for detection. However certain other parameters must be considered for detection of the deep fake like teeth enchantment, wrinkles on faces, etc. Our method is proposed to consider all these parameters.

Using capsule networks to detect forged images and videos [3] uses a method that uses a capsule network to detect forged, manipulated images and videos in different scenarios, like replay attack detection and computer-generated video detection.

In their method, they have used random noise in the training phase which is not a good option. Still, the model performed beneficial in their dataset but may fail on real-time data due to noise in training. Our method is proposed to be trained on noiseless and real-time datasets.

Detection of Synthetic Portrait Videos using Biological Signals [5] approach extracts biological signals from facial regions on authentic and fake portrait video pairs. Apply transformations to compute the spatial coherence and temporal consistency, capture the signal characteristics in feature sets and PPG maps, and train a probabilistic SVM and a CNN. Then, the aggregate authenticity probabilities to decide whether the video is fake or authentic.

Fake Catcher detects fake content with high accuracy, independent of the generator, content, resolution, and quality of the video. Due to the lack of discriminators leading to the loss in their findings to preserve biological signals, formulating a differentiable loss function that follows the proposed signal processing steps is not a straightforward process.

III. PROBLEMS IDENTIFIED

- The explosive growth in deepfake video and its illegal use is a major threat to democracy, justice, and public trust. Due to this, there is an increased demand for fake video analysis, detection, and intervention.
- Most of the current research aimed at combating the impact of deepfakes has focused on automated deepfake detection using algorithms to determine whether a specific image, audio clip or video has been significantly modified from an original.
- The ability to detect must extend to journalists, fact-checkers, and civil society groups in an easy-to-understand interface. Deepfake detection solution development faces a tradeoff between open-source datasets and models and deterring adversaries who could use those resources to improve deepfakes.

IV. METHODOLOGY AND APPROACH

Deepfakes rely on a type of neural network called an autoencoder. These consist of an encoder, which reduces an image to a lower-dimensional latent space, and a decoder, which reconstructs the image from the latent representation. Deepfakes utilize this architecture by having a universal encoder that encodes a person into the latent space. The latent representation contains key features about their facial features and body posture. This can then be decoded with a model trained specifically for the target. This means the target's detailed information will be superimposed on the underlying facial and body features of the original video, represented in the latent space.

A popular upgrade to this architecture attaches a generative adversarial network to the decoder. A GAN trains a generator, in this case, the decoder, and a discriminator in an adversarial relationship. The generator creates new images from the latent representation of the source material, while the discriminator attempts to determine whether or not the image is generated. This causes the generator to create images that mimic reality extremely well as any defects would be caught by the discriminator. Both algorithms improve constantly in a zero-sum game. This makes deepfakes difficult to combat as they are constantly evolving; any time a defect is determined, it can be corrected.

Given a training set, this technique learns to generate new data with the same statistics as the training set.



Fig1: Deepfake technology used to create facial morphing

4.1 Model Training

A training model is a dataset that is used to train an ML algorithm. It consists of the sample output data and the corresponding sets of input data that have an influence on the output. The training model is used to run the input data through the algorithm to correlate the processed output against the sample output. The result from this correlation is used to modify the model.

This iterative process is called “model fitting”. The accuracy of the training dataset or the validation dataset is critical for the precision of the model. There are several types of machine learning models, of which the most common ones are supervised and unsupervised learning. The machine learning model needs the outcomes to determine the features that best predict the outcomes.

During the training process, the data are sorted by outcomes and the algorithm extracts statistical patterns to build the model.

V. PROPOSED SYSTEM

Our approach for creating and detecting the deepfake will be a great contribution in avoiding the percolation of the deepfake over the world wide web. The project can be scaled up from developing a web-based platform to a browser plugin for automatic deepfake detections. Even big applications like WhatsApp, Facebook can integrate this project with their application for easy pre-detection of deepfake before sending it to another user.

Step 1. Datasets: There are some sources such as YouTube, Face Forensics++, Deep fake detection challenge dataset, etc, to train the mixed datasets, consisting of equal numbers of images/videos. Our newly preparing dataset contains 50% of the original video and 50% of the manipulated deepfake videos. The dataset is split into 70% train and 30% test set.

Step 2. Preprocessing: Dataset preprocessing includes the splitting of the video into frames. Followed by face detection and cropping the frame with the detected face. To maintain the uniformity in the number of frames the mean of the dataset video is calculated and the new processed face cropped dataset is created containing the frames equal to the mean. The frames that don't have faces in them are ignored during preprocessing.

Step 3. Model: The Data Loader loads the preprocessed face cropped video and splits the videos into train and test sets. Further, the frames from the processed videos are passed to the model for training and testing in mini-batches.

Step 4. ResNext CNN for Feature Extraction: Instead of writing the rewriting the classifier, we are proposing to use the ResNext CNN classifier for extracting the features and accurately detecting the frame-level features. Following, we will be fine-tuning the network by adding extra required layers and selecting a proper learning rate to properly converge the gradient descent of the model. The 2048-dimensional feature vectors after the last pooling layers are then used as the sequential LSTM input.

Step 5. LSTM for Sequence Processing: Let us assume a sequence of ResNext CNN feature vectors of input frames as input and a 2-node neural network with the probabilities of the sequence being part of a deep fake video or an untampered video. The key challenge that we need to address is the design of a model to recursively process a sequence in a meaningful manner. For this problem, we are proposing the use of a 2048 LSTM unit with a 0.4 chance of dropout, which is capable to do achieve our objective. LSTM is used to process the frames in a sequential manner so that the

temporal analysis of the video can be made, by comparing the frame at 't' second with the frame of 't-n' seconds. Where n can be any number of frames before t.

Step 6. Predict: A new video is passed to the trained model for prediction. A new video is also preprocessed to bring in the format of the trained model. The video is split into frames followed by face cropping and instead of storing the video into local storage, the cropped frames are directly passed to the trained model for detection.

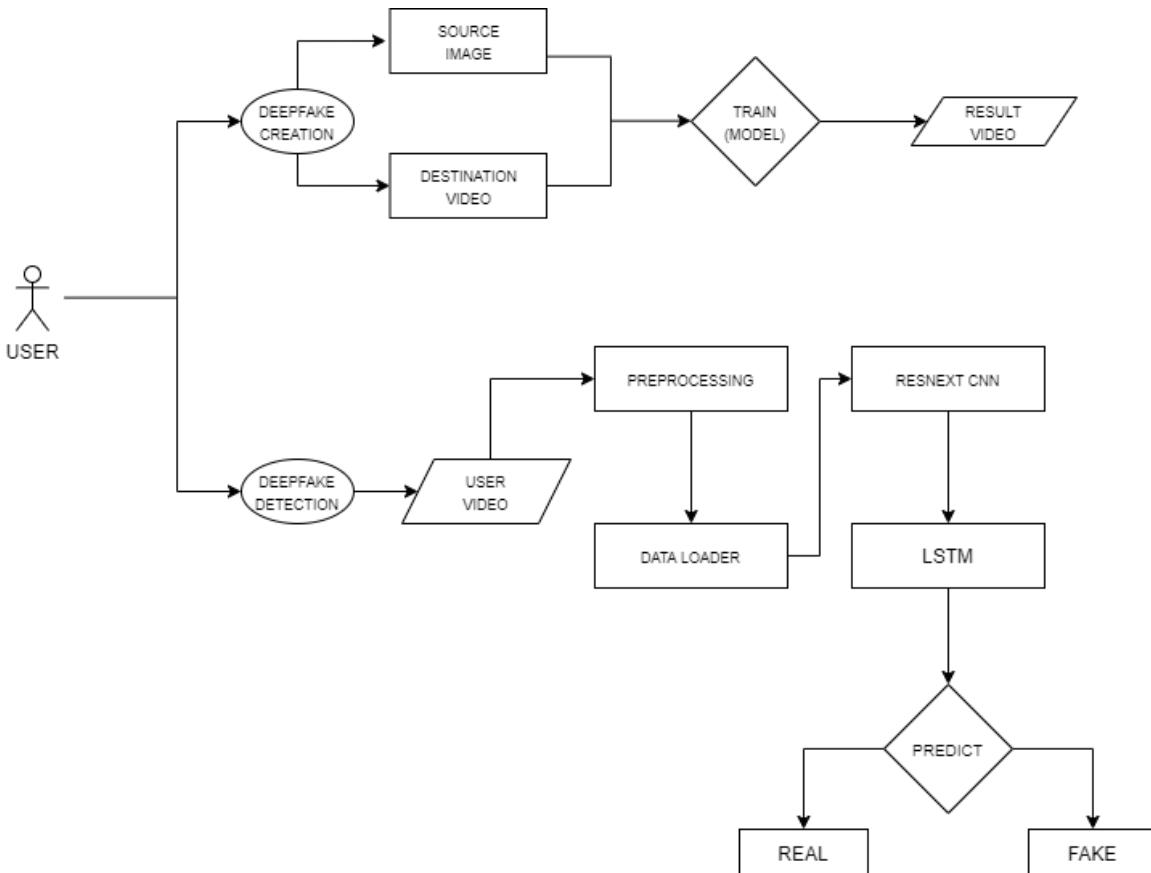


Fig 2: System Architecture for deepfake creation and detection

VI. RESULT AND DISCUSSION

Deepfakes have begun to erode the trust of people in media contents as seeing them is no longer commensurate with believing in them. They could cause distress and negative effects to those targeted, heighten disinformation and hate speech, and even could stimulate political tension, inflame the public, violence or war. This is especially critical nowadays as the technologies for creating deepfakes are increasingly approachable and social media platforms can spread those fake contents quickly. Sometimes deepfakes do not need to be spread to a massive audience to cause detrimental effects. People who create deepfakes with malicious purposes only need to deliver them to target audiences as part of their sabotage strategy without using social media.

On the other hand, current detection methods mostly focus on drawbacks of the deepfake generation pipelines, i.e. finding the weakness of the competitors to attack them. This kind of information and knowledge is not always available in adversarial environments where attackers commonly attempt not to reveal such deepfake creation technologies. Recent works on adversarial perturbation attacks to fool DNN-based detectors make the deepfake detection task more difficult.

Another research direction is to integrate detection methods into distribution platforms such as social media to increase its effectiveness in dealing with the widespread impact of deepfakes. The screening or filtering mechanism using effective detection methods can be implemented on these platforms to ease the deepfakes detection. Using detection methods to spot deepfakes is crucial, but understanding the real intent of people publishing deepfakes is even more important.

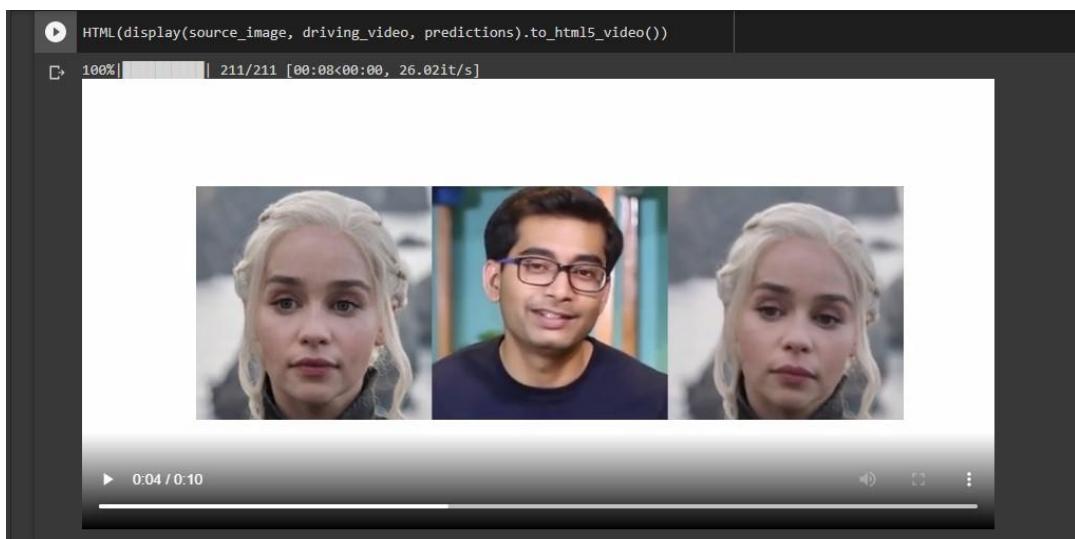


Fig 2: Deepfake Creation - Output Page

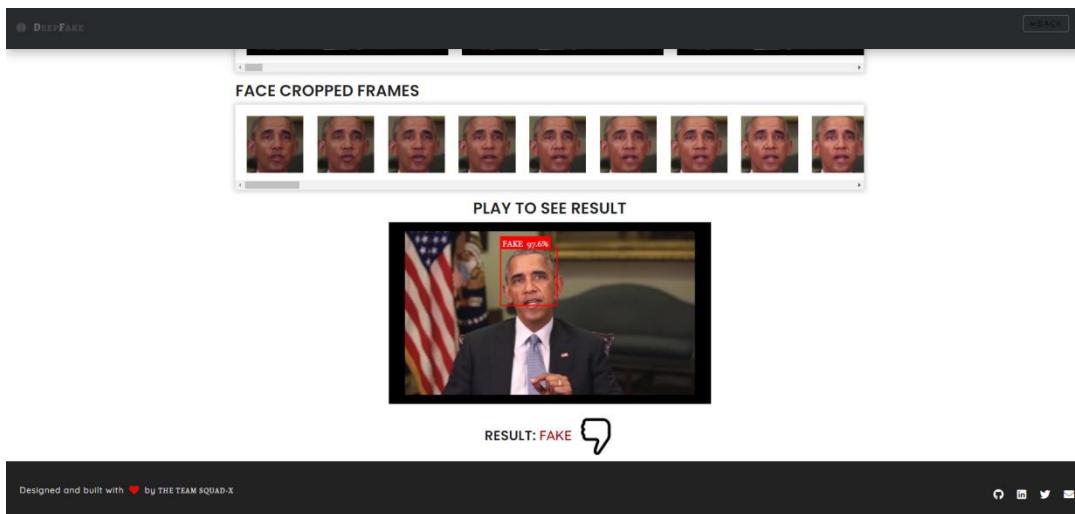


Fig 3: Deepfake Detection - Fake Output

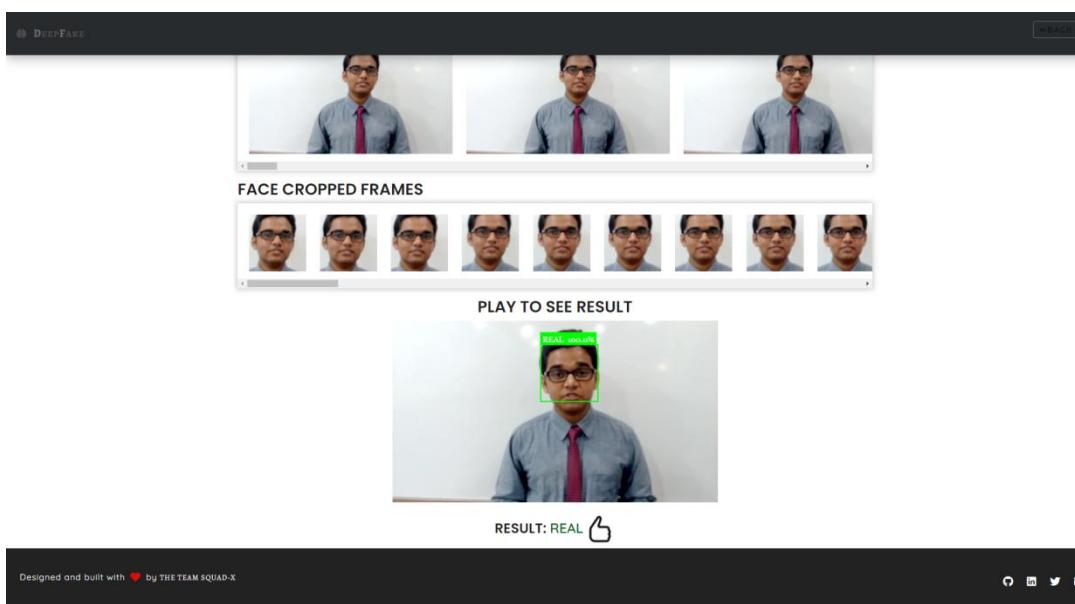


Fig 4: Deepfake Detection - Real Output

VII CONCLUSION

Deepfakes' quality has been increasing and the performance of detection methods needs to be improved accordingly. The inspiration is that what AI has broken can be fixed by AI as well. Detection methods are still in their early stage and various methods have been proposed and evaluated but using fragmented data sets. An approach to improve the performance of detection methods is to create a growing updated benchmark data set of deepfakes to validate the ongoing development of detection methods. This will facilitate the training process of detection models, especially those based on deep learning, which requires a large training set.

The project is designed with a neural network-based approach to classifying the video as deep fake or real. The proposed method is inspired by the way in which deep fakes are created by GANs with the help of Autoencoders. Our method is used to detect frame levels using ResNext CNN and to classify video using RNN along with LSTM. The proposed method is capable of detecting a video as a deep fake or real based on the parameters.

Our project consumes moderate time, so in the upcoming days, we can use faster CPU hardware to implement new technologies and algorithms to get efficient and optimal results in a short duration.

Our method has not considered the audio. That's why our method will not be able to detect the audio deep fake. But we are proposing to achieve the detection of audio deep fakes in the future.

In the near future, we can build mobile-based applications wherein users instantly create and detect any deep-fake videos using this design.

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A Survey Work On Line Following Versatile Robot Obstruction Aversion Utilizing Gunsight Innovation

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ABSTRACT: This paper portrays the line following robot utilizing arduino for reviewing , assessing and improving the transporation of essential materials inside the medical care foundations, ventures too. The proposed framework recognize the dark way and continue toward its on to the ground . This framework facilitates crafted by material movement just as limits the labor. This innovation focuses on the gotten, prompt and building transportation of merchandise. This paper plans to carry out controlled development of robot by tuning control boundaries and accordingly accomplish better execution. This robot is transcendently configuration to continue in a predefined way. To find this way two sensors are utilized. Robots like this are fundamentally utilized in mechanical plants involving of pick and spot office. This robot conveys parts from wanted source to objective by following fixed way. As of late part of exploration has been done to engage the robotization in clinics also in businesses. This robot is made to supply the fundamental products such infusions, medication, and so on. This paper is isolated into equipment and programming modules. Lately a lot of time and exertion have been spent on creating frameworks to empower a self-sufficient robot to follow a checked way utilizing a dream system. The Line Following Vehicle is an installed machine that can distinguish and follow the line drawn on the floor. By and large, the way is predefined and can be either noticeable like a dark line on a white surface with a high differentiated shading or it tends to be undetectable like an attractive field. It is an incorporated plan from the information on Mechanical, Electrical and PC designing. This paper presents a 9W LDR sensor based Line Following Vehicle plan and creation methodology which consistently coordinates along the dark blemish on the white surface. This minimal effort essential electronic part based line detecting robot can convey a sensible burden without getting off the line.

KEYWORDS: Ultrasonic, Infrared ,UNO ,Motor Driver, Servo Motor.

I INTRODUCTION

A line following vehicle is essentially a robot intended to follow a „line“ or way previously foreordained by client. This line or way might be just about as straightforward as an actual white line on floor or as perplexing way checking plans for example inserted lines, attractive markers and laser manage markers. To distinguish these particular markers or „lines“, different detecting plans can be utilized. These plans may fluctuate from straightforward ease detecting circuit to extensive vision frameworks. The decision of this plans would be subject to detecting precision and adaptability required. From mechanical perspective, line following vehicle has been carried out in semi to completely self-ruling plants. In this climate, these robots capacities as materials transporter to convey items from one assembling spot to another where rail, transport furthermore, gantry arrangements are unrealistic. Aside from line following abilities, these robots ought to have capacity to explore intersections and settle on which intersection to turn and which intersection to disregard. To add on to intricacy of the issues sensor situating additionally assumes a part in improving the robots execution for errands referenced before."Roboticist" redirects here. It is not to be confused with Cybemeticist. Not to be confused with Cybernetics. Robotics is an interdisciplinary field that integrates computer science and engineering. Robotics involves design, construction, operation, and use of robots. The goal of robotics is to design machines that can help and assist humans. Robotics integrates fields of mechanical engineering, electrical engineering, information engineering, mechatronics, electronics, bioengineering, computer engineering, control engineering, software engineering, among others. Robotics develops machines that can substitute for humans and replicate human actions. Robots can be used in many situations and for many purposes, but today many are used in dangerous environments (including inspection of radioactive materials, bomb detection and deactivation), manufacturing processes, or where humans cannot survive (e.g. in space, underwater, in high heat, and clean up and containment of hazardous materials and radiation).

II. RELATED WORK

This really ends up being a fairly troublesome inquiry. A few definitions exist, including the accompanying: A reprogrammable, multifunctional controller intended to move material, parts, apparatuses, or specific gadgets through different modified movements for the presentation of an assortment of undertaking. A programmed gadget that performs capacities regularly attributed to people or a machine as a human. This sort of robot was before plan for computerization in enterprises for transportation reason. With progression in innovations, this sort of robot is utilized in Distribution center the executives of Amazon. Of course Amazon has dispatched 'SCOUT' a conveyance robot which homes conveyances .However it's anything but a line following robot yet works with comparable component. A short time back there was a cover of this robot for transportation around there. Here products were shipped as well as individuals treat it as a way for transportation vehicle for them. Shockingly there exist absence of progress in Medical care focuses with subject to mechanization. This paper plans to proffer a mechanized robot to Medical services communities for simplicity of conveyance of meds, food , infusions, and so on..The most punctual robots as we probably are aware them were made in the mid 1950s by George C. Devol, a creator from Louisville, Kentucky. He concocted and protected a reprogrammable controller called "Unimate," from "All inclusive Computerization." For the following decade, he endeavored to sell his item in the business, yet didn't succeed. In the last part of the 1960s, financial specialist/engineer Joseph Engleberger gained Devol's robot patent and had the option to change it into a mechanical robot and structure an organization called Unimation to deliver and showcase the robots. For his endeavors and triumphs, Engleberger is referred to in the business as "the Dad of Advanced mechanics." The scholarly world likewise gained a lot of headway in the creation new robots. In 1958 at the Stanford Exploration Organization, Charles Rosen drove an examination group in building up a robot called "Shakey."

III. METHODOLOGY

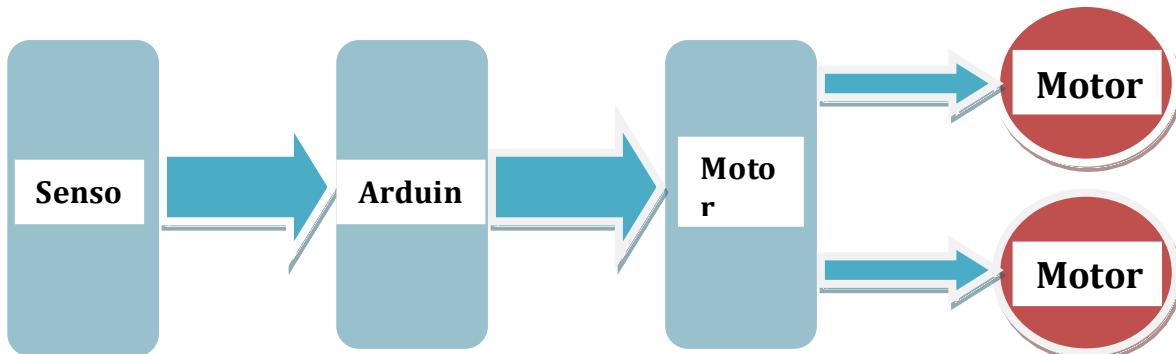


FIG 3.1 Block Diagram of Line Following Robot

These robots have the capability to detect a black or dark line on a lighter surface depending on the contrast. They estimate whether the line underneath them is shifting toward their left or right as they move over them. Based on that estimation, they give respective signals to the motors to turn left or right so as to maintain a steady center with respect to the line.

These robots usually use an array of IR (infrared) sensors in order to calculate the reflectance of the surface beneath them. The basic criteria is that the black line has a lesser reflectance value (black absorbs light) than the lighter surface around it. This low value of reflectance is the parameter used to detect the position of the line by the robot. The higher value of reflectance will be the surface around the line. So in this linear array of IR sensors, if the leftmost or rightmost IR sensor presents the low value for reflectance, then the black line is toward the left or right of the robot correspondingly. The controller then compensates for this by signaling the motor to go in the opposite direction of the line. The IR sensor array consists of individual IR LEDs and IR photodiodes. The IR light emitted by the LED strikes the surface and is reflected back to the IR photodiode. The photodiode then gives an output voltage proportional to the reflectance of the surface (high value for a light surface and low for a black or dark surface).

IR sensors sense the mirrored light as per the detected light by IR sensor Arduino chooses course of engines. On the off chance that left sensor sense dark line then the line supporter will move left. Similarly on the off chance that correct sensor sense dark line, the line adherent will move right. If both sensor sense dark line at that point line adherent will stop. The Entire Line following mechanical vehicle is separated into three areas: Sensor segment, Control Segment, Driver Area.

1) Sensor section

This part contains IR diodes, potentiometer, Comparator (Operation Amp) and LED's. Potentiometer is utilized for setting reference voltage at comparator's one terminal and IR sensors are utilized to detect the line and give a change in voltage at comparator's second terminal. At that point comparator thinks about the two voltages and produces a computerized signal at yield. Here two IR sensors are utilized.

2) Control Section

Arduino used for controlling entire the interaction of line devotee robot. The yields of comparators are associated to advanced pin number 2 and 3 of Arduino. Arduino read these signs and send orders to driver circuit to drive line tracker

3) Driver Section

Driver segment comprises engine driver and two DC engines. Engine driver is utilized for driving engines on the grounds that Arduino doesn't supply sufficient voltage and current to engine. So we add an engine driver circuit to get sufficient voltage and current for engine. Arduino sends orders to this engine driver and afterward it drive motors. The 4 information pins for this L293d, pin 2,7 on the left and pin 15, 10 on the privilege as appeared on the pin outline. Left info pins will manage the turn of engine associated across left side and right information for engine on the correct hand side. The engines are pivoted on the premise of the data sources gave across the info sticks as Rationale 0 or Rationale 1. In straightforward you need to give Rationale 0 or 1 across the information pins for pivoting the engine.

VI ALGORITHM

The precision of the development of a line devotee for the most part relies upon the engine development and detecting framework. Numerous calculations are utilized to facilitate the line information read by the sensors to control the engines. However, a basic and most exact control is acquired by PID (proportional integral derivative) algorithm.

- [1] START
- [2] Read LM and RM
- [3] If LM and RM both on white surface.
- [4] Move forward (rotate both motor on full speed)
- [5] Go to step-2
- [6] If LM on black line
- [7] Move left (reduce left motor speed to half)
- [8] Go to step 2
- [9] If RM on black line
- [10] Move right (reduce right motor speed to half)
- [11] Go to step 2
- [12] If LM and RM on black line
- [13] Stop

V. EXPERIMENTAL RESULTS

L293D motor driver shield

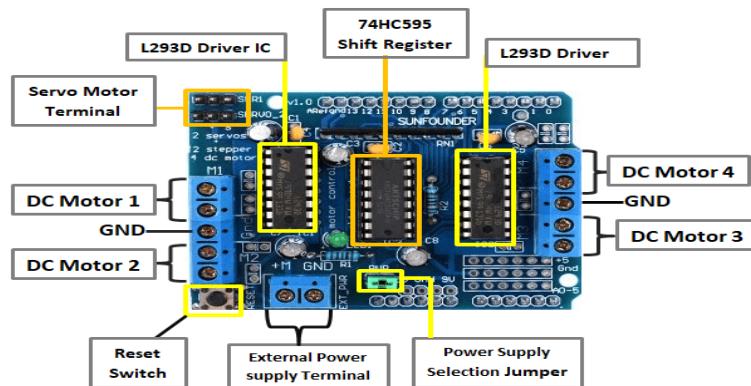


FIG: 5.1 L293D motor drivers

L293D motor driver

The L293D is a dual-channel H-Bridge motor driver capable of driving a pair of DC motors or single stepper motor. This shield offers total four H-Bridges and each H-bridge can deliver up to 0.6A to the motor. The shield also comes with a 74HC595 shift register that extends 4 digital pins of the Arduino to the 8 direction control pins of two L293D chips. His motor shield can drive DC motors having voltages between 4.5 to 25V. We are using DC Motors that are rated for 9V. So, we will connect external 9V power supply to the EXT_PWR terminal. The motor is connected to any of M1, M2, M3 or M4 motor terminals .In this case, Arduino pin11 for M1, pin3 for M2, pin5 for M3, pin6 for M4 and pins 4, 7, 8 and 12 are all in use.

Ultrasonic Sensor

As the name indicates, ultrasonic / level sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. ultrasonic / level sensors measure the distance to the target by measuring the time between the emission and reception.

An optical sensor has a transmitter and receiver, whereas an ultrasonic / level sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic / level sensor, a single oscillator emits and receives ultrasonic waves alternately.

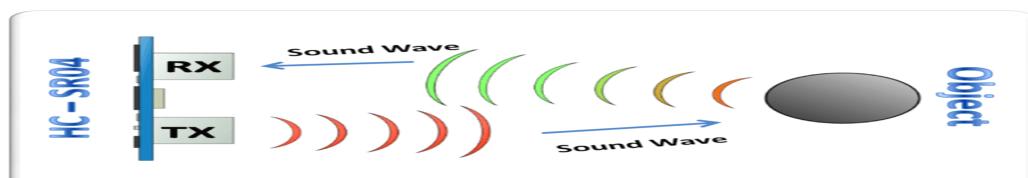


FIG: 5.2 Ultrasonic Sensor

The distance can be calculated with the following formula:

$$\text{Distance } L = \frac{1}{2} \times T \times C$$

where L is the distance, T is the time between the emission and reception, and C is the sonic speed. (The value is multiplied by 1/2 because T is the time for go-and-return distance.)

Infrared Sensors

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.

The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode . Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

Servo motor

A servomotor is a linear actuator or rotary actuator that allows for precise control of linear or angular position, acceleration, and velocity. It consists of a motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. A servomotor (or servo motor) is a simple electric motor, controlled with the help of servomechanism. If the motor as a controlled device, associated with servomechanism is DC motor, then it is commonly known as a DC Servo Motor. If AC operates the controlled motor, it is known as a AC Servo Motor.

DC motor

The DC engine is the engine which changes over the immediate current into the mechanical work. It deals with the standard of Lorentz Law, which expresses that "the flow conveying conduit set in an attractive and electric field experience a power". Also, that power is the Lorentz power.

A DC engine is an electrical machine which changes over electrical energy into mechanical energy. The fundamental working rule of the DC engine is that at whatever point a current conveying conductor places in the attractive field, it encounters a mechanical power.

Fleming's left-hand rule and its size choose the bearing of this

Arduino Uno



FIG:5.3 Arduino Uno Board

Arduino Uno is a microcontroller board dependent on the ATmega328P (datasheet). It has 14 computerized input/yield pins (of which 6 can be utilized as PWM yields), 6 simple information sources, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB association, a force jack, an ICSP header and a reset button.

VI. RESULTS

Through this paper we have used line following robot carrying medicine has been designed for providing the medicine to the patient whenever they need it. A Line follower robot is an electronic system that can detect and follow the line drawn on the floor. This *robot* carries components from desired source to destination by *following* fixed path.

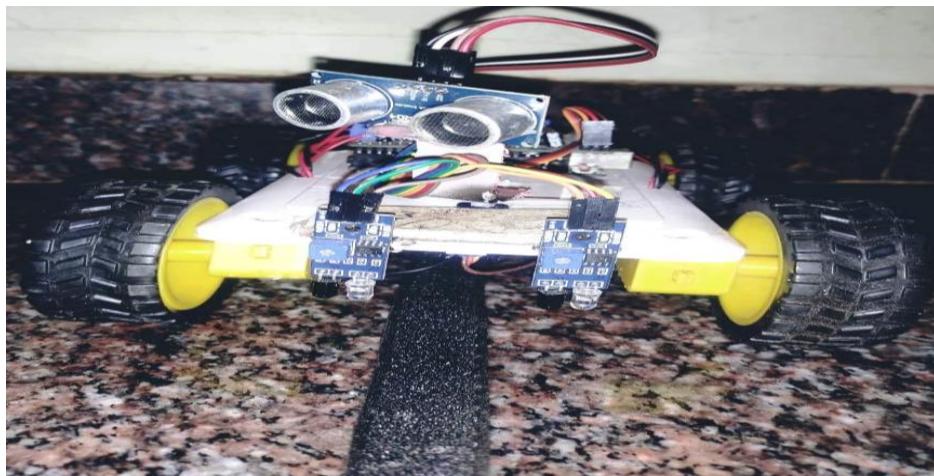


FIG: 6.1 line follower robot

VII CONCLUSION

The goal of line following automated vehicle is to follow a line on its given way which is acquired for which it utilizes IR sensors which recognizes the line and sends the data to L293 engine driver IC and afterward H-connect which controls the working of the wheel. Arduino uno controls the other operations. The line following mechanical vehicle was at last finished. A great deal of exertion was placed into the plan, execution and long stretches of work before the PC, composing and investigating the code. The robot was at last running with a couple of glitches to a great extent which were arranged in the later modifications of the firmware. The line following robot still has a couple of deficiencies yet accomplishes a large portion of the destinations. A ton of information on miniature regulators, a more profound and more clear perspective on the engineering, ports and any remaining utilitarian squares was accomplished. Likewise had a look take a gander by any stretch of the imagination basic utilitarian pieces of the undertaking like the gem oscillator, rationale doors and the works. So, a line following mechanical vehicle requires a line and it follows that line. On adding IR sensor, it defeat its constraint. The particulars of line following automated vehicle are It have bunches of various way to go to its objective. It can pick where to follow giving legitimate guidance at beginning. This automated vehicle utilizes modest parts like IR sensor, a low voltage engine, a skeleton (design of robot), which makes this robot a savvy item.

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Survey on Skin Cancer Prediction with Image Segmentation on Cloud Using Machine Learning Models

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ABSTRACT: Early location of skin disease, especially melanoma, is pivotal to empower progressed treatment. Because of the quick development in the quantity of skin malignant growths, there is a developing need of modernized examination for skin lesion. The cutting edge public accessible datasets for skin lesion are regularly went with an extremely restricted measure of division ground truth marking. Additionally, the accessible division datasets comprise of uproarious master explanations reacting the way that exact comments to address the limit of skin lesion are relentless and costly. The sole limit division is imperative to find the sole precisely in dermoscopic pictures and sole determination of various skin lesion sorts. In this work, we propose the completely mechanized profound learning group techniques to accomplish high affectability and high specific in lesion limit division.

I. INTRODUCTION

Skin disease is one of the significant kinds of malignancies and its rate has been expanding over the previous many years. Deep Learning designs can help us with staying away from the progression of manual element extraction. This can save time and can alert the patient if there is any sign. We have attempted to fabricate a vigorous and precise deep learning model that will help dermatologists in recognizing skin malignant growth and will assist with making fundamental moves absent a lot of delay. By taking care of the prepared deep learning models with skin lesion picture information, the specialist can know the sort of sole and choose whether it holds the possibility to metastasize later on or not. There are higher odds of restoring, if the malignant growth is identified in its beginning phases, the fix rate can be about more than 90%.

II. RELATED WORK

The research on neural architecture search had been conducted before the interest in deep learning emerged. Early systems involved random search, grid search and evolutionary algorithms to find the proper architecture of a classic (shallow), fully connected neural network. With the growth of the size of neural networks, many difficulties have arisen due to long training time which limit the possibility of testing new architectures. Not only the training time become longer, but also these arch space larger. With the growth of network structures, the number of hyper parameters describing the architecture increases significantly. Each NAS framework can be described by three elements: search space, search method and performance evaluation strategy. The search space defines which architecture types could be found during the process. The search strategy defines the way the search space should be explored. The performance evaluation strategy defines the way the performance of the proposed network is used. The assumed search space has a crucial impact on the search process. If the search space is too small it leads to poor performance, while on the other hand, if it is too big it could significantly extend the search time. The search space can be described by such factors as the number of layers, number of neurons within the layers, type of layers, activation function, etc. In most cases, the search space is conditional, which means that some hyperparameters have an influence on the total number of hyperparameters e.g. the increase of a number of layers will increase the number of hyperparameters describing those layers. Two types of search space can be distinguished: the network-based search space, and the cell-based search space. The network-based approach explores the whole architecture, whereas the cell-based approach just the cells that are then stacked to solve a given problem. The number of cells in the stack depends on the task being solved. Currently, numerous search methods are used to explore the search space including random search, grid search, evolutionary algorithms, Bayesian optimization, reinforcement learning (RL), and the gradient methods, which are nowadays gaining ground and popularity. The performance evaluation strategy is the way in which the performance of the neural network is estimated. The simplest way is to train each network until convergence and then measure the validation accuracy. Although it provides an accurate estimate of the network architecture, this method is very time-consuming. Many methods have been proposed to speed up the process of network evaluation during the architecture search. Lower fidelity estimates involve network evaluation based on, for instance, limited training time the limited size of dataset or reduced size of photos in the dataset. The learning curve extrapolation strategy allows accelerating the search process by rejecting structures at an early stage of training based on the prediction of their performance. Another approach to speed up the structure performance estimation is to use weight inheritance or function preserving transformation, instead of training the network from scratch.

III. METHODOLOGY

Implement the machine learning model using Python programming language for analysing the skin lesions Train the model using thousands of training data for enabling the model to self-learn Test the model on the given data for the accuracy rate Improve the model to achieve more accuracy than any of the existing systems Implement the Web services using Java/J2EE to make this solution integratable with other applications Deploy the web services over the public cloud to make the solution available to the public across the world.

I. Algorithm

The current system from last two decades have witnessed a lot of efforts that attempt to provide CAD systems capable of distinguishing between melanoma and non-melanoma. However, these early investigations relied on applying low-level hand-crafted features including color, shape, and texture representations. Recently, deep learning convolution neural networks (CNNs) have been getting significant consideration in the domain of medical image diagnostics and particularly in dermoscopy image analysis towards melanoma recognition, and they presented a hybrid approach for melanoma recognition which combined of sparse coding, deep learning, and support vector machine (SVM). We have applied different augmentation operations to the training datasets to enlarge the amount of training data, reduce the overfitting problem, and accelerate the convergence. Skin Lesion Boundary Segmentation via FrCN and Skin Lesion Classification via ResNet-50 are the two new approaches for segmentation and classification of skin lesion respectively, the full resolution convolutional network (FrCN) is an end-to-end supervised deep network which is trained via mapping the entire input image to its corresponding ground-truth masks with no loss, leading to result better segmentation performance of skin lesion boundaries.

II. System Architecture

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could see it as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into a single approach to product development," then design is the act of taking the marketing information and creating the design of the product to be manufactured.

Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user. The increasing importance of software running on generic platforms has enhanced the discipline of software engineering. The design will contain the specification of all these modules, their interaction with other modules and the desired output from each module. The output of the design process is a description of the software architecture.

The design phases are:

- High Level Design
- Detailed Level Design

A. Module Implementation – Training, Testing, and Saving the model

This module implements the Sequential algorithm and ResNet50 libraries for developing the machine learning model to predict the skin cancer from a given input image of a cell. This model uses numerous training images for learning purpose. ResNet, short for Residual Networks is a classic neural network used as a backbone for many computer vision tasks. This model was the winner of ImageNet challenge in 2015. The fundamental breakthrough with ResNet was it allowed us to train extremely deep neural networks with 150+ layers successfully. Prior to ResNet training very deep neural networks was difficult due to the problem of vanishing gradients.

B. Model Implementation - Loading the model to work on new dataset

In this module, the model which is saved on local disk in the previous module will be loaded back into the processor memory. Once the model is created on the processor, we then load the saved weights into the ResNet50 model so that would not require the training and testing process again which in turn saves a really lot of time during prediction of skin cancer disease on a new images. What we get after loading the trained model is the component which already have the intelligence to predict the skin cancer. This model is then provided with an input image to analyse for the skin cancer. By this approach of loading and saving the model to and from the local disk, we save a really lot of time when processing the real time images.

C. Web service Implementation

In this module, we implement the web services to expose the model to the outside world. We expose an HTTP post API against which the user can upload an input image and request for executing the model. The webservice API upon receiving the request from the client, will store the uploaded image inside the '/home/ubuntu/input' location of the amazon EC2 machine and then it invokes the skincancer.py program by specifying this input folder. The output image will be stored inside '/home/ubuntu/output' location inside amazon EC2 machine. To download this image into user's machine, the webservice will provide another URL as a response by clicking on which the image gets downloaded to the client's machine.

D. Third party application

In this module, the sample third party application has been implemented to demonstrate the usage of the web services to the customers. In this application, we implement four steps

Step 1: User Identity: We collect the user's first name and the last name

Step 2: Contact Information: We collect the email ID and mobile number of the client

Step 3: Proof: We will send an OTP to customer and ask them to enter it to prove the identity

Step 4: Execution: User uploads an input image here and clicking on Run button will invoke the web service implemented in the previous module. The downloadable image link will be displayed back to the client once the result is available.

IV. CONCLUSION AND FUTURE WORK

The Skin Cancer Prediction System using numerous Machine learning algorithm, viz. with a prediction result that gives the state of a user leading to diagnostics. Due to the recent advancements in technology, the machine learning algorithms are evolved a lot and hence we use multiple algorithms in the proposed system because of its efficiency and accuracy. In Future, we aim to work on other disease prediction algorithms like heart disease detection, retinopathy diabetes prediction, etc so that all the health related diagnostic can be obtained under a single platform.

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A Review Study Of Traffic Anomaly Intrusion Detection Using Artificial Intelligence

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Paper ID-109

ABSTRACT: In the new evolving world, traffic rule violations have become a central issue for majority of the developing countries. The numbers of vehicles are increasing rapidly as well as the numbers of traffic rule violations are increasing exponentially. Managing traffic rule violations has always been a tedious and compromising task. Even though the process of traffic management has become automated, it's a very challenging problem, due to the diversity of plate formats, different scales, rotations and non-uniform illumination conditions during image acquisition. The principal objective of this project is to control the traffic rule violations accurately and cost effectively. The proposed model includes an automated system which uses IR sensors and camera based on Raspberry PI to capture video. The project presents Automatic Number Plate Recognition (ANPR) techniques and other image manipulation techniques for plate localization and character recognition which makes it faster and easier to identify the number plates. After recognizing the vehicle number from number plate, the SMS based module is used to notify the vehicle owners about their traffic rule violation. An additional SMS is sent to Regional Transport Office (RTO) for tracking the report status.

KEYWORDS: Automatic Number Plate Recognition (ANPR), Artificial Neural Network, Image acquisition, CNN, Tesseract OCR, Canny Edge Detection.

I. INTRODUCTION

Automation in day to day life has gained importance in recent years. The number of accidents on the roads is due to the rule violations such as breaking traffic signals, over-speeding, driving on wrong sides etc. To avoid such traffic violations, traffic police has to be present on the road and has to continuously check if some vehicle is violating the rule. A certain automated solutions were developed to eliminate the violations; however each of them had certain limitations. For example, the video capturing cameras eliminated need of a authority to be present to check rule violation. However, whole stored video had to be checked manually for the rule violation scenario. In this proposed system, a solution for signal breaking violation is given .The system includes an automated system by using IR sensor, camera and number plate recognition application. In this system IR sensor will be placed near zebra crossing line. If any vehicle crosses the zebra line, the desktop application will be initiated and will capture number plate image. Number plate recognition application by using image processing algorithm will recognize number plate and SMS will be sent to the offender in case of rule violation scenario.

Solid In all the countries there are driving rules available for people to drive carefully by being honest and respecting. When these rules are broken it is defined as a road violation. There road violations that happens in day to day traffic. For an example most common violations such as red light violation, over-speeding, overtaking other vehicles through double white lines and single white lines. These road protocols are applied thoroughly for the places where most of the accidents happen. Research team have implemented an OpenCV and python based system upon a PC . This system is implemented to ease the work to the police using a user interface. Image processing technology is used to detect the lanes, vehicles and will identify vehicles who break rules. The team have implemented the system with the ultrasonic sensors in order to system to receive conditions to identify when a violation occur. It will be easier for the police to catch who break laws of the traffic and for the policemen who take bribes and dishonest people will also be reduced. An image of the violation with the location, time, date and an image of the vehicle to the nearest policemen devices by deriving devices around the current location that violation happened.

{This paper is structured as follows: Section II offers a thorough overview of the various violation systems introduced and algorithms used in various publications and research projects. Section III offers methodology, section IV offers experimental results and section V offers results. The conclusion and future work are presented in Section VI.}

II. RELATED WORK

The number of new vehicles on the road is increasing rapidly, which in turn causes highly congested roads and serving as a reason to break traffic rules by violating them. This leads to a high number of road accidents. Traffic violation detection systems using computer vision are a very efficient tool to reduce traffic violations by tracking and Penalizing. The proposed system by Ruben J Franklin, Mohana was implemented using YOLOv3 object detection for traffic violation detections such as signal jump, vehicle speed, and the number of vehicles. Further, the system is optimized in terms of accuracy. Using the Region of interest and location of the vehicle in the duration of frames, determining signal jump. This implementation obtained an accuracy of 97.67% for vehicle count detection and an accuracy of 89.24% for speed violation detection. the proposed architecture of surveillance system with intelligent detection and tracking of multiple vehicles from the surveillance input video using YOLOv3 as an object detection algorithm. This is done through a neural network and an object detection model which are used in the classification of the moving objects into different respective classes, thus achieving vehicle classification. Next, from the same given video footage, traffic lights, zebra crossing, different lanes, and traffic signs are classified this comes under environment awareness. Combining these two, now violations are detected based on violations are then detected these can occur on the road which are signal jump, speed detection, and vehicle count. The main objective is to detect multiple vehicle violation detections and it gives a more detailed picture of concepts and technology involved in creating a traffic violation detection system using computer vision.

III. METHODOLOGY

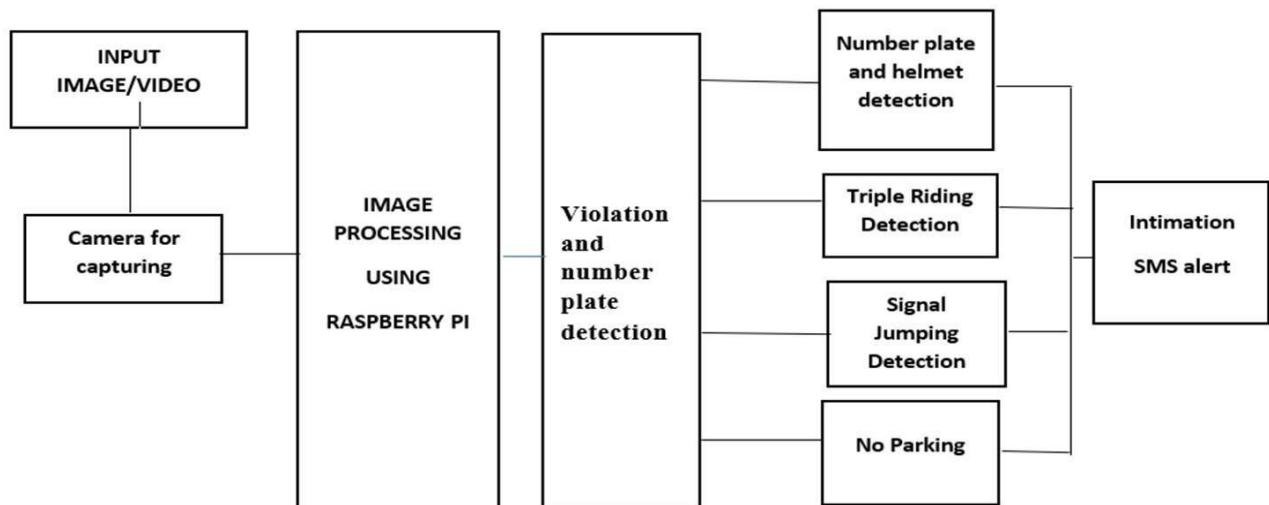


Fig 3.1 : System Architecture of Traffic Intrusion System

License plate recognition (LPR) is one form of ITS (Intelligent Transport System) technology that not only recognizes and counts the number of vehicles but also differentiates them. For some applications, such as electronic toll collection and red-light violation enforcement, LPR records license plates alphanumerically so the vehicle owner can be assessed the appropriate amount of fine. In other cases, like commercial vehicle operations or secure-access control, a vehicle's license plate is compared against a database of acceptable ones to determine whether a truck can bypass a weigh station or a car can enter a gated community or parking lot. A license plate is the unique identification of a vehicle. The basic issues in real-time license plate recognition are the accuracy and the recognition speed. License Plate Recognition (LPR) has been applied in numerous applications such as automatically identifying vehicles in parking lots, access control in a restricted area and detecting and verifying stolen vehicles. Quality of algorithms used in a license plate detector determines the speed and accuracy of the license plate detection. In the past, a number of techniques have been proposed for locating the plate through visual image processing.

A video is taken from a camera, and then each frame of the video is processed as the image. In this stage the license plate region from the given image is located and isolated. Quality of the image plays an important part hence

prior to this stage pre-processing of the image is necessary. So first each frame pre-processed by binarization, noise reduction and edge detection. Then, the license plate is located by different image processing technique.

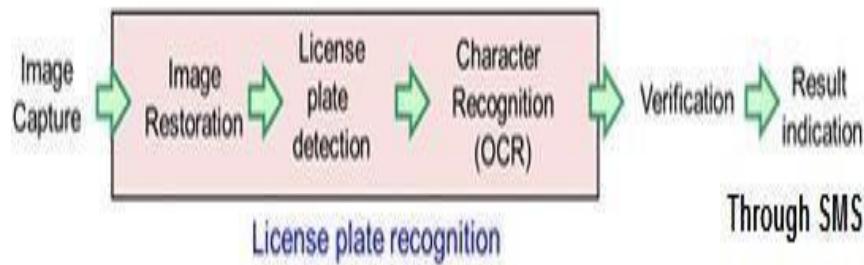


Fig 3.2 : Analysis Model of Traffic Intrusion System

Tesseract OCR: The number plate recognition using Tesseract OCR starts with image acquisition, then the image is being pre-processed to remove any distortions and noise from the image. Then number plate is then localized irrelevant part and characters in the number plate are segmented and then the recognized and output. The license plate recognition detects number plates of all types of vehicles like car, truck and motorcycle. It also works on different number plate styles and fonts with high accuracy.



Fig 3.3 : Number Plate Detection using Tesseract OCR

Gaussian Blur method: Gray scaling and blurring: As the part of pre-processing the input frame got from the CCTV footage, the image is Gray scaled and blurred with Gaussian Blur method.



Fig.3.4: Image Segmentation



Fig. 3.5: Gray Scaling

Canny Edge Detection: The canny edge detector is a multi stage algorithm used to detect wide range of edges in image. Edge detection is the process of identifying the edge in a digital image where the intensity of the image changes sharply or has discontinuities. The unwanted region is removed other than the number plate section.

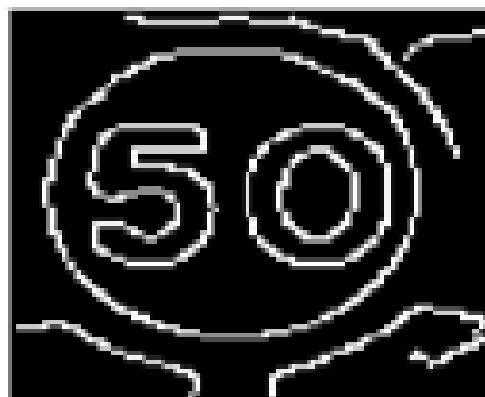


Fig. 3.6: Canny Edge Image

CNN (Convolutional neural network) : The proposed architecture of surveillance system with intelligent detection and tracking of multiple vehicles from the surveillance input video .This is done through CNN and an object detection model which are used in the classification of the moving objects into different respective classes, thus achieving vehicle classification.

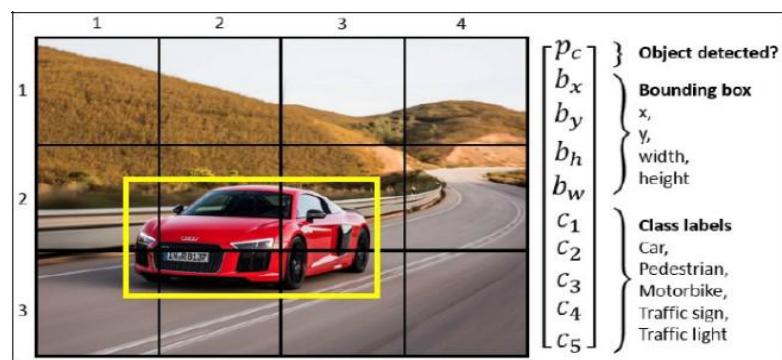


Fig. 3.7: Object Detection

IV. EXPERIMENTAL RESULT

MOTION DETECTION OPERATION: When there is motion, the differences of the profiles are larger than the case when there is no motion. The motion can be detected by selecting a threshold value.

VEHICLE DETECTION ALGORITHM: A vehicle detection operation is applied on the profile of the unprocessed image. The method used here is based on applying edge detector operators to a profile of the image edges are less sensitive to the variation of ambient lighting and are used in full frame applications (detection).

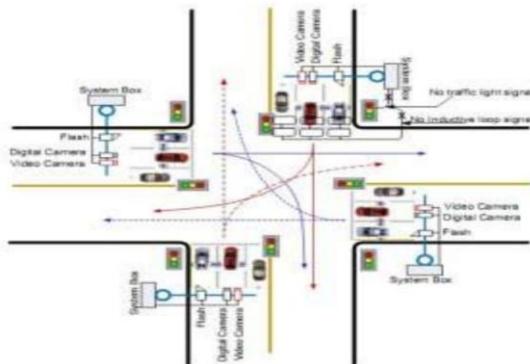


Fig. 4.1: An overview of a purely video processing

TRAFFIC MOVEMENTS AT JUNCTIONS (TMJ): The first step to measure the TMJ parameters using the key region method is to cover the boundary of the junction by a polygon in such a way that all the entry and exit paths of the junction cross the polygon. However, the polygon should not cover the pedestrian marked lines. This step is shown in the figure given below. The second step of the algorithm is to define a minimum number of key regions inside the boundary of the polygon, covering the junction.

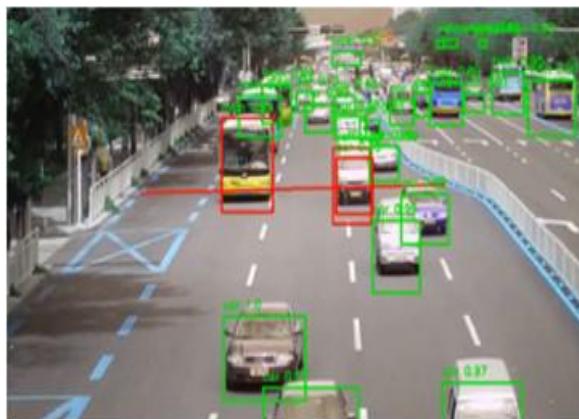


Fig. 4.2: Detection of a traffic violation output frame: bounding box and violation detection (signal jump)



Fig. 4.3: Speed Violation and Lane Change Detection

V. RESULT

Through this paper Number Plate of the vehicle is authenticated and data is taken. Since this model is capable of detecting vehicles in every frame it is having been enhanced to detect the speed of the vehicle in a video. Detection of vehicle crossing during a red light in the image and locate the exact location. Data of the vehicle is taken when the people riding on two-wheeler is more than two. Vehicle parked in the no parking area is given five minutes time to change the vehicle from the spot if not changed violation is detected and fine is sent through SMS. The speed is calculated using all the three principles, the rate of change of the object is the video frame by frame gives us the speed but it is not the true speed. This because the object in the video doesn't move linearly hence the area of the boundary frame by frame gives us the actual distance travelled by the vehicle in the video. The anchor points add more perception to the parameters. With this parameter, the speed of the vehicle is determined.

VI. CONCLUSION

Detections of traffic violation in the video surveillance is challenging as the number of vehicles on the road and traffic rules are depended on the different area of the road and timings. Here in this paper, the methods for traffic surveillance have been presented and the work on motion detection, license plate extraction and character recognition is carried out. Results show that the detection of multiple traffic violations from a single input source is archivable. It should be noted that robust motion detection is a critical task and its performance is affected by the presence of varying illumination, background motion, camouflage, shadow, and etc. The system has an accuracy of 97.67% for vehicle count detection and an accuracy of 89.24% to detect the vehicle speed. The detection time is lower for high dense traffic flow. Thus, the system operation speed is dependent on the density of traffic.

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COVID-19 Outbreak Data Analysis and Risk Prediction

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Paper ID-110

ABSTRACT There is a new world health crisis threatening the public with spread of COVID-19 (Coronavirus Disease-2019). Since December 2019, when Covid-19 emerged in Hunan seafood market at Wuhan, South China and rapidly spread throughout the world, the virus outbreak has been declared a public health emergency of International concern by World Health Organization (WHO). We here summarize the current clinical characteristics data to guide potential COVID-19 about Prevention, Diagnosis, Treatments and Prevention of COVID-19. Here in the proposed system, we propose a Covid-19 Data analysis and risk prediction by providing a dedicated platform for the analysis of data related to Covid-19 and also allows the user to access the predictive model for the estimation and prediction for the risk faced the user. Rather than considering a data consisting of populations, individual data is considered. Using this data, a predictive model is developed and evaluated.

KEYWORDS: Covid19, Machine Learning, Data Set, Encoding, Supervised Learning, Accuracy Score, Confusion Matrix.

I. INTRODUCTION

The COVID-19 pandemic, also known as the coronavirus pandemic, is an ongoing pandemic of coronavirus disease 2019 caused by severe acute respiratory syndrome coronavirus 2(SARS-CoV-2). The World Health Organization declared the outbreak as Public Health Emergency of International Concern in January 2020, and a pandemic in March 2020 by WHO. It was first identified in December 2019 in Wuhan, China. Soon, the virus was in all continents and over 180 countries, and as of this writing, the United States has the highest number of confirmed cases and, sadly, the most deaths. Currently, the existing system consists of data analysis and risk prediction of the higher degree where the model is developed and evaluated on the data of a worldwide scale and the attributes in the data involves of population of countries. The current predictive models predict the trajectory of the course of the epidemic.

Here in the proposed system, we propose a Covid-19 Data analysis and risk prediction by providing a dedicated platform for the analysis of data related to Covid-19 and also allows the user to access the predictive model for the estimation and prediction for the risk faced the user. Rather than considering a data consisting of populations, individual data is considered. Using this data, a predictive model is developed and evaluated.

II. RELATED WORK

COVID-19 pandemic represents a dramatic challenge for healthcare systems worldwide, and it also affects daily urological practice. After China and Italy, Tessin (Switzerland) has been hit the hardest, due to its close proximity to Lombardy and the high number of frontier workers in the area. Our objective was to share with the scientific community how, during the COVID-19 period, there has been a huge modification in urological emergencies throughout all hospitals included in the EnteOspedalieroCantonale (EOC)[1].

At the COVID-19 pandemic onset, when individual-level data of COVID-19 patients were not yet available, there was already a need for risk predictors to support prevention and treatment decisions. Here, we report a hybrid strategy to create such a predictor, combining the development of a baseline severe respiratory infection risk predictor and a post-processing method to calibrate the predictions to reported COVID-19 case-fatality rates. With the accumulation of a COVID-19 patient cohort, this predictor is validated to have good discrimination and calibration (markedly improved compared to that of the baseline predictor). At a 5% risk threshold, 15% of patients are marked as high-risk, achieving a sensitivity of 88%[2].

It is evident through our literature survey, there are cases where patients confirmed with COVID-19 infection have no chest CT abnormalities, contrasting with subclinical infection presenting with positive imaging findings on CT. It is crucial that the clinical impacts of screening asymptomatic patients with chest CT be determined. A more thorough analysis about the existence of any potential benefit on clinical outcomes needs to be addressed against the known financial costs and exposure to ionizing radiation associated with CT scanning. SARS had a mortality rate of 9.5%. This study has several limitations, such limitations preclude the possibility of any deep analysis about potential prognostic imaging variables that could aid in the prediction of worse outcomes[3].

A rising infectious disease involves fast spreading, endangering the health of large numbers of people, and thus requires immediate actions to prevent the disease at the community level. Therefore, CoronaTracker was born as the online platform that provides latest and reliable news development, as well as statistics and analysis on COVID-19. We utilize SEIR modelling to forecast COVID-19 outbreak within and outside of China based on daily observations. We also analyze the queried news, and classify the news into negative and positive sentiments, to understand the influence of the news to people's behavior both politically and economically[4].

III. IMPLEMENTATION

Applications and Languages being used:

- Html and CSS are used for the front end.
- Python is used for the Machine Learning Model.
- Flask Package of Python is used for the Connectivity between the Model and the User Interface .
- Sublime Text Editor is used for the HTML and Flask Programs.
- Spyder is used for Machine Learning Predictive Model.

Description of the Proposed Project:

The Aim of the proposed project is to conduct an analysis and attempt to predict the risk of COVID-19 with respect to an individual using Machine Learning, where the prediction is presented on the Frontend .

Step 1: Encoding of the Data:

Data encoding is performed on the dataset. This helps in developing a more precise and accurate model.

Label Encoding has been applied on the Data Set. Label Encoding refers to converting the labels into numeric form so as to convert it into the machine-readable form. Machine learning algorithms can then decide in a better way on how those labels must be operated. It is an important pre-processing step for the structured dataset in supervised learning.

Step 2: Developing a predictive model

The predictive model to predict the risk and present the analysis of COVID-19 can be implemented through machine learning algorithms such as

Logistic Regression

The Logistic Regression is a regression model in which the response variable (dependent variable) has categorical values such as True/False or 0/1. It actually measures the probability of a binary response as the value of response variable based on the mathematical equation relating it with the predictor variables.

Random Forest

Random forests or random decision forests are an ensemble learning method for classification, regression and other tasks that operates by constructing a multitude of decision trees at training time

Support Vector Machine

A support vector machine (SVM) is a supervised machine learning model that uses classification algorithms for two-group classification problems. After giving an SVM model sets of labelled training data for each category, they're able to categorize new text.

Decision Tree

A decision tree is a flowchart-like structure in which each internal node represents a "test" on an attribute (e.g. whether a coin flip comes up heads or tails), each branch represents the outcome of the test, and each leaf node represents a class label (decision taken after computing all attributes). The paths from root to leaf represent classification rules.

Step 3: Performance evaluation for the model.

The performance of the machine learning model is measured by comparing the results with existing machine learning techniques to generate more accurate and precise result. The Accuracy of different Algorithms is measured using Matrices such as Accuracy Score and Confusion Matrix

IV. PSEUDO CODE

Random Forest Algorithm

Step 1: First, start with the selection of random samples from a given dataset.

Step 2: Next, this algorithm will construct a decision tree for every sample. Then it will get the prediction result from every decision tree.

Step 3: In this step, voting will be performed for every predicted result.

Step 4: At last, select the most voted prediction result as the final prediction result.

V. RESULTS

The Home Page of the proposed Project is shown in the Figure 1. As you can see in the Figure it contains some buttons which will be directed to their respective pages based on the User's necessities. Some of the tabs present in the home page are Symptoms, Precautions, Treatments, EDA, Covid19 Risk Level Prediction, Covid19 India Update and Help Line and Bed Availability. Each page have their own description and functionality which remain distinct in their own need for the user's utility. For Example, Symptoms Page contain the Symptoms which can be observed when the Virus Covid19 chooses to enter an host and begins to wreck havoc on the immunity system of the human body. This starts a chain reaction of symptoms resulting in it getting more vicious as the passage of time is experienced. The Developed Symptoms that arises during this troubled phases are enveloped and encased in the Symptoms Page. The Treatments page constitutes a list of do's and don't's, the hits and the misses, a basic knowledge of Self treatments and Medical treatments that assist in the development of an understanding the help required by an human suffering a Covid19 Affliction .This page can also be used to enhance the literacy surrounding the help provided to a Covid19 Sufferer. The Figure 2 describes an elongated list of various symptoms and circumstances that are related to the corona virus induced disease. Some of these symptoms which are enlisted in this page are fever, breathing problem, dry cough, sore throat, running nose, etc. The combination of yes and no's related to the user's situation provides a comprehensive result by displaying the level of risk in a separate page. Figure 3 and 4 describes the correlation between the features present in the dataset. The model Seaborn is used in representing the data in a graphical manner. This helps in better understanding of the data, hence increasing the literacy of correlation between many features in the dataset. Figure 3 describes a increase in the number of Covid19 cases when human being are found to be venturing across the planet. Figure 4 elaborates on the dismission of the belief that Covid19 cases doesnot depend on the human being present in hazardous environment instead it depends on the measures of the safety taken against the hazardous environment.



Fig.1.Home Page

Fig. 2. Covid19 Risk Level Prediction

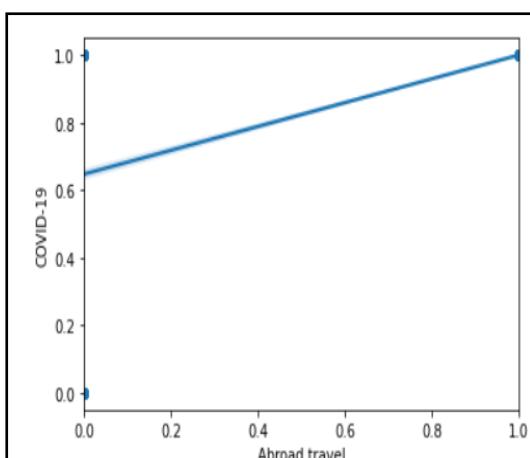


Fig3.Covid19 vs Abroad Travel
 Public Exposed Places

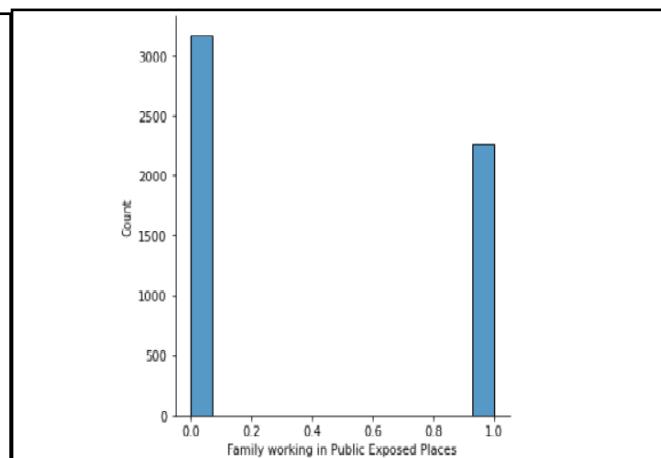


Fig 4. Count of Covid19 vs Family working in Public Exposed Places

VI. CONCLUSION AND FUTURE WORK

Through our analysis, it's been proven that our project predicts the individual's covid-19 risk. Data preprocessing is successfully done on the dataset. Machine learning algorithms such as Logistic Regression, Random Forest, Support Vector Machine, Decision Tree, K Neighbors and Gradient Boosting, Gaussian NB are used in the model. Experimental results shows that random forest technique achieve highest classification accuracy of 98% comparatively with other techniques. The analysis and risks of COVID-19 is predicted through predictive model and presented through a web interface using flask and html. Although, we consider that the goal of the project has been accomplished, there are plenty of improvements that could be done in order to achieve better results. Some aspects like HTML and CSS can be further improved and changing the static page into dynamic page. Further, by implementing more better dataset the results could become more accurate and precise.

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A System For 3D Reconstruction From Multiple Views

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ABSTRACT: 3D reconstruction is a longstanding ill-posed problem, which has been explored for decades by the computer vision, computer graphics, and machine learning communities. There is an increasing need for geometric 3D models in the movie industry, the games industry, mapping (Street View) and others. Generating these models from a sequence of images is much cheaper than previous techniques (e.g. 3D scanners).

In this project, we focus on the problem of 3D scene reconstruction from multiple uncalibrated views. The immediate goal of this project is to create a software package that allows for grouping images belonging to the same scene automatically and perform some interesting evaluations to help decide which keypoint descriptor is more suitable for image matching before 3D reconstruction given the restricted resources. After matching the images, use the results to reconstruct a 3D view for each scene.

KEYWORDS: 3D reconstruction, Camera calibration, Computer Vision, Structure from Motion, Multi-View Stereo, 3D models, Kinect.

I. INTRODUCTION

3D reconstruction from multiple images is the creation of three-dimensional models from a set of images. It is the reverse process of obtaining 2D images from 3D scenes. In recent decades, there is an important demand for 3D content for computer graphics, virtual reality and communication, triggering a change in emphasis for the requirements. Many existing systems for constructing 3D models are built around specialized hardware (e.g. stereo rigs) resulting in a high cost, which cannot satisfy the requirement of its new applications. This gap stimulates the use of digital imaging facilities (such as cameras)

The 3D scene reconstruction from multiple view images is an increasingly popular topic which can be applied to street view mapping, building construction, gaming and even tourism etc. When the reconstruction of a 3D scene is needed, a reliable computer vision based reconstruction method is much more cost-efficient and time-efficient than traditional methods such as aerial photo filming. The 3D scene reconstruction applications such as Google Earth allow people to take flight over entire metropolitan areas in a virtually real Google Earth allow people to take flight over entire metropolitan areas in a virtually real 3D world, explore 3D tours of buildings, cities and famous landmarks, as well as take a virtual walk around natural and cultural landmarks without having to be physically there. A computer vision based reconstruction method also allows the use of rich image resources from the internet. 3D world, explore 3D tours of buildings, cities and famous landmarks, as well as take a virtual walk around natural and cultural landmarks without having to be physically there. A computer vision based reconstruction method also allows the use of rich image resources from the internet.

II. LITERATURE SURVEY

3D reconstruction of buildings has been an active research topic in computer vision, as well as in digital photogrammetry, during the past years. 3D building models are gaining increasing popularity in the areas of urban planning, tourism, etc.

For instance, in April 2019, researchers from the University of Denver used drones for capturing high-resolution images to create a 3D reconstruction of a World War II-era Japanese internment camp in southern Colorado. Furthermore, in June 2018, the National Museum of Antiquities in the Netherlands unveiled the head of Julius Caesar, which was reconstructed with 3D reconstruction technology using a 3D scan of a marble portrait in the museum's collection. 3D reconstruction can help preserve cultural artifacts, architecture, biofacts or ecofacts, and cultural landscapes, by capturing their shape and appearance. For instance, in May 2019, a research team discovered a 99-million-year-old millipede in Burmese amber and the description of an entirely new suborder was possible due to the 3D reconstruction of the fossil. Owing to these advancements, the market studied is expected to register a promising CAGR during the forecast period.

With technological advancements and product innovations, 3D printing technology is being applied in a wide variety of areas, due to which a significant number of reconstruction software solutions for multi-view images are being adopted. The software solutions used in a wide variety of applications are GIS applications, cultural heritage, media and entertainment, manufacturing, healthcare, etc.

For 3D reconstruction, various approaches, such as 123D Catch, PhotoScan, photo tourism, VideoTrace, KinectFusion, and ProFORMA, with various inputs, like image collections, single images, and video footage, are in use. Each approach has its own drawbacks; for instance, if stereo vision is used, depth information, only up to a limited distance, of typically less than 5 meters is available for the reconstruction process. Furthermore, currently, 3D reconstructions have issues with, e.g., shiny, textureless, or occluded surfaces.

3D reconstruction has been instrumental in determining the diagnosis for some diseases whose roots go deep into tissue level. For instance, in July 2018, a case study conducted by the Department of Thoracic Surgery, the First Hospital of Jilin University, Changchun found out that the application of 3D reconstruction in esophageal cancer was safe and effective. Evident by increased investment in research and development by the companies, It is projected to open potential opportunities for the 3D reconstruction market.

The Photo Tourism project[6] investigated the problem of taking unstructured collections of photographs (such as those from online image searches) and reconstructing 3D points and viewpoints to enable novel ways of browsing the photo collection. As shown, the well known example of this is the 3D reconstruction of the Coliseum in Rome from a collection of photographs downloaded from Flickr.

Rander[4] uses 3D digitization method decomposes 3D shape recovery into the estimation of visible structure in each image frame followed by the integration of visible structure into a complete 3D model. Visible surfaces are extracted using multibaseline stereo algorithms. Each range image is converted to a 3D mesh and then to an implicit surface. The resulting global image is reconstructed by a marching cubes implicit surface extraction.

Sebastian Roy[5] introduces a novel technique to find very dense depth maps from stereo images. The Maximum Flow Algorithm is used to find the depth map. A methodology to generate the 3D model given it's implicit surface is demonstrated. The algorithm is a modification of the Marching Cubes Algorithm which generates the actual surface from the implicit surface.

Zisserman[9] describes a system which, given a sequence of images rotating about a single axis or the camera in a perfect circular motion about the object, generates a textured 3D model. His algorithm uses the Fundamental Matrix to obtain 3d Information about the points and then uses the Octree generating algorithm to model the 3D object.

III. PROBLEMS IDENTIFIED

- Many existing systems for constructing 3D models are built around specialized hardware (e.g. stereo rigs) resulting in a high cost, which intimidates many new potential users from integrating this technology in their workflows.

- Visualizations are possible in the form of panoramic mosaics or simple geometric models which require less data to be constructed but also limit the user's ability to freely navigate the environment.
- Designing such systems is an intricate balance between reconstruction quality, speed, spatial scale, and scene assumptions. Existing methods either trade scale to achieve higher quality reconstructions. Or handle larger scenes by trading real-time performance and quality.
- The need for power intensive active sensors that do not work robustly in natural outdoor lighting, produce a sparse set of measurements which are subject to rolling shutter effects under motion and are susceptible to noise.

IV. METHODOLOGIES AND TECHNOLOGIES

Bundler generates a sparse 3D reconstruction of the scene. For dense 3D reconstruction, the preferred approach seems to be to use the multi view stereo packages CMVS and PMVS, developed by Y. Furukawa. Bundler, CMVS and PMVS are all command line tools. As a result, a number of other projects have developed integrated toolkits and visualization packages based on these tools.

Of note are the following, which were evaluated as part of this project:

OSM Bundler - a project to integrate Bundler, CMVS and PMVS into Open Street Map

Python Photogrammetry Toolbox - a project to integrate Bundler, CMVS and PMVS into an open-source photogrammetry toolbox by the archaeological community

VisualSfM - a highly optimized and well integrated implementation of Bundler, PMVS and CMVS. Of particular note are the inclusion of a GPU based SIFT algorithm (SiftGPU) and a multi-core implementation of the Bundle Adjustment algorithm. The use of these packages allows VisualSfM to perform incremental Structure from Motion in near linear time.

Several packages are available for visualization of point clouds, notably MeshLab, CloudCompare and the Point Cloud Library (PCL) which integrates nicely with OpenCV

4.1 Image Database

Our initial database comes from Microsoft's RGB-D 7 Scenes Dataset, and includes 7 scenes which include around 7-10 different views for each scene. The 7-Scenes dataset is a collection of tracked RGB-D camera frames. The dataset may be used for evaluation of methods for different applications such as dense tracking and mapping and relocalization techniques.



Fig 4.1: Microsoft RGB-D 7Scenes Dataset

4.2 SURF and BRISK

SURF is based on the same principles as SIFT, but it improves on SURF by using a box filter approximation to the convolution kernel of the Gaussian derivative operator with the use of integral images. SURF uses a blob detector based on the Hessian matrix to find points of interest. The descriptor is formed by concatenating the histograms of gradients of sub-grids around the keypoint into a 64 dimension vector.

BRISK is a 512 bit binary descriptor with a sampling pattern composed out of concentric rings. It distinguishes between short pairs and lone pairs by their distance. The short pairs are used for building the descriptor by comparing the smoothed intensity of the first point in the pair is larger than that of the second point. This builds the binary descriptor that uses hamming distance instead of Euclidean, which can speed up computation a lot. In our project, I used these two detectors to detect features for image matching, and compared their performance over the dataset.

4.3 Selection of KeyPoints

There are many key points detected when I use SURF and BRISK to detect, and some images have even more than 10,000 keypoints. Suppose I have n number of images to match, and m number of keypoints in each image, then the complexity of keypoints matching is $O(n*n*m*m)$. If I use these key points directly, tremendous computation will be incurred, and therefore not practical in real applications. In order to solve this problem, I only took the most important key points for our task, and here I measured the importance of each keypoint by their individual strength since it is roughly an indicator of how good the keypoint is. Although the strength of some key points will change due to the change of light and there is no guarantee that a good keypoint is still there, it is not that usual, especially in our dataset. In our project, I ran our matching algorithm by considering all the keypoints in each image as a reference, and sorted these key points in terms of their strength, and compared the performance by selecting the different numbers of the most important key points for SURF and BRISK cases, which is the main focus of our project.

4.4 RANSAC

Some matches extracted by comparing the descriptors of keypoints, even with our selection, of two images are actually outliers. In order to remove these invalid matches between two images to build up a more robust matching, I implemented RANSAC to help us. I calculated the fundamental matrix between two images using an 8-point algorithm, and defined a threshold so that one pair of matches is classified as outlier if the error of this pair is larger than it based on the calculated fundamental matrix from the selected 8 points. I randomly took 8 points for each iteration and used the iteration with the least number of outliers as our model, and removed outliers. Figure 3 shows the difference before and after RANSAC.

V. PROPOSED SYSTEM

Given the complexity involved in creating a full-scale SFM and MVS implementation from scratch, the approach to be taken on this project is to implement the Structure from Motion algorithms.

Find feature points in each image using SIFT.

- For each pair of images match key points using the approximate nearest neighbors, estimate the fundamental matrix for the pair using RANSAC and remove matches that are outliers to the recovered fundamental matrix.
- If less than 20 matches remain, then the pair was considered not good.
- Organize the matches into tracks, where a track is a connected set of matching keypoints across multiple images.

3D reconstruction takes images of the same scene as input to generate camera positions and 3D views. Bundle adjustment is used to perform a 3D sparse reconstruction, and CMVS(Clustering Views for Multi-view Stereo) and PMVS(Patch-based Multi-view Stereo) are used to create a dense 3D view.

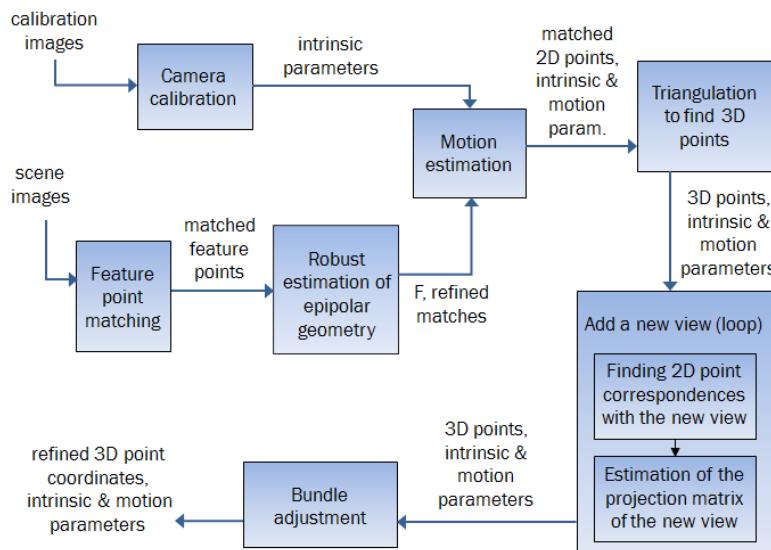


Fig 4.1: Structure from Motion (SfM) Pipeline

VI. RESULTS

In the following examples and the supplementary video we demonstrate compelling reconstructions of a variety of scenes, based on just input from a Microsoft Lifecam. Our implementation runs on a NVidia GTX1050 at 30Hz for the full pipeline including tracking and reconstruction. The following figures show how small scenes can be reconstructed in real-time and finally texture mapped using the RGB data. Whilst these scenes require some texture, given that our algorithm allows matching across larger images, we can find correspondences even in parts of the image that appear texture-less at lower resolutions. Another benefit over active triangulation-based sensors such as Kinect is our ability to image objects at closer ranges, reconstructing finer details.

As the accompanying image shows these reconstructions can be performed rapidly in real-time. As such this opens up AR scenarios that cannot be directly addressed by active sensors such as ones that require lower power devices or outdoor use. As shown in Figures the quality of reconstructions is visibly comparable to Kinectbased reconstruction systems.

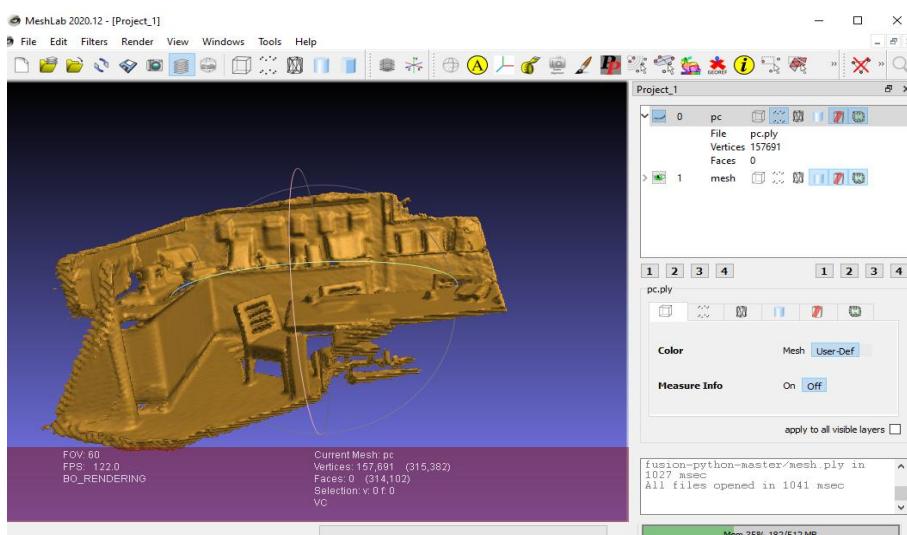


Fig 6.2: Dense reconstructed mesh from the RedKitchen (7Scenes Dataset)

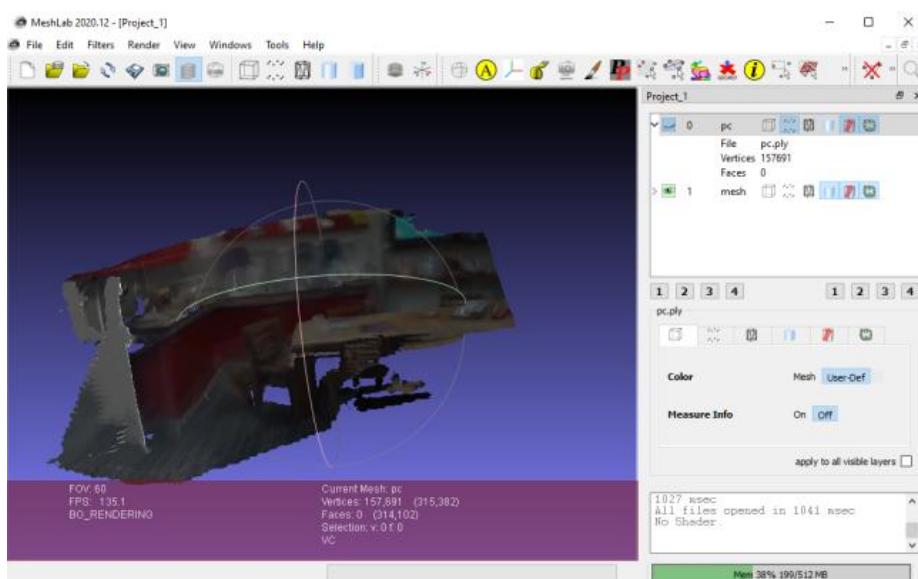


Fig 6.2: Point Cloud from the RedKitchen (7Scenes Dataset)

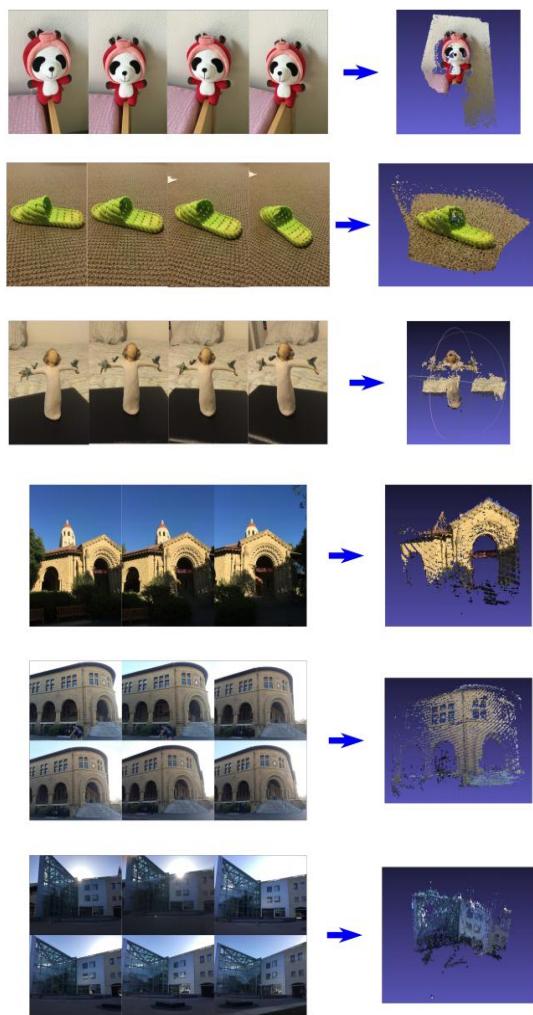


Fig 6.3: Sparse Reconstruction results of various scenes with Princeton SFMedu package. The 3D scene snapshots are taken from MeshLab.

VII CONCLUSION

The Structure from Motion and Multi View Stereo algorithms provide viable methods for building 3D models of objects, buildings and scenes. The key issues with the algorithms are they are fairly CPU and memory intensive, especially when trying to do reconstruction at large scale

To achieve 3D reconstruction from uncalibrated views, we apply SFM, space carving, and voxel coloring to different scenes with a wide range of geometric complexity. We also implement several off-the-shelf packages and examine the performance in different settings. In the two-view SFM, we compute the camera parameters by finding point correspondences and estimating the fundamental matrix. In the multiview SFM, we merge and refine the point clouds using bundle adjustment. The reconstructed result is denser with two-view SFM due to the fact that it is difficult to find correspondence inliers across all the views in multiview SFM. However, the resulting model from the multi-view reconstruction possesses more 3D spatial information. In comparison, with an additional multi-view stereo step that iteratively searches for nearby patches, the Princeton SFMedu package can reconstruct models that resemble the real target objects.

Whilst our system shows a great deal of potential for widening the applicability of 3D reconstruction it does also raise challenges and areas for future work. Whilst we use off-the-shelf hardware, and could potentially migrate our system to mobile RGB cameras (such as those on tablets and mobiles) we are currently using a GPU which requires a desktop or high end laptop to perform efficiently.

One positive aspect of our approach is that it does open up the potential for mobile and tablet cameras to be streamed to a remote server where the computation could occur and the resulting (compressed) data streamed back. This type of scenario would not be possible for active sensors currently as they cannot be readily implemented in mobile devices. Another limiting factor of any RGB approach is that texture is required for both tracking and depth estimation. This is a limitation over active sensors. However, since our stereo matcher is efficient, one interesting possibility is to experiment with increasing the resolution of our input data to a level where texture begins to be exposed in these problem areas.

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Risk Analysis And Management In Software Development

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ABSTRACT- While developing a software, we can easily see that there are different challenges through which we come across, it will either be a choice of a perfect model or implementation for the different phases of that model. With these challenges, it is seen that risk analysis and management is also a challenging and important process during software development. Most of the researches explain software risk management as a software engineering practice which discuss about the software risk management techniques includes risk identification, risk monitoring, risk estimation and risk mitigation. In this paper, we will go through different methods to manage risk, risk in different software development models and risk factor resolution according to the different risk management methods.

KEYWORDS- Risk Management, Risk Factors, Risk Management Methods, Software Development Model.

I. INTRODUCTION

Development of a good software depends upon different models and each model has some process which will work to reduce the complexity of the software by looking into the cost, maintenance of the software as well as risk in the software. Risk is a main cause for the failure of software so it is required to overcome this problem while developing a software. The risk can arise by different reasons and some of them are: imperfection in time estimation, resources are improperly allocated, budget estimation issues, communication gaps for providing responsibilities and roles, improper concatenation of modules, changes in market development or changes in government policies and like this there are different reasons which will discuss in further sections of this paper [1]. The main objective of this paper is to get the knowledge of various ways to reduce the risk factors which gives the negative impact on the software development and summarize the methods for different risk factors. Risk identification of hidden risk and then risk analysis are the two phases of Risk Management Process [1].

To reduce the risk, the risk assessment plan will be made if some problem is there. We can take one example here, as we all are aware about the usage of software in medical field for different purpose. In medical field, it is more important to maintain the software and reduce the complexity and risk. For this, risk management and analysis come into action. One of the researches [6] is done at a hospital in southern Sweden in which the risk management team observed in risk identification is the necessity of making assumptions on components which were depend on analyzed system because the wrong assumption will lead to wrong risk estimations and failures in identification of risk. The other observation is that the risk will take differently for different kind of definitions.

This paper is structured as: The section II explains the different models. The Section III describes various risk factors in software development. In Section IV, there is discussion about different methods to manage risk and Section V, VI discuss risk management methods to overcome the risk factors and conclude the results.

II. RISK MANAGEMENT IN DIFFERENT MODELS

With the increment in the software, the process for risk management is also come into action. Barey Boehm first introduce the risk management in software engineering by proposing the risk-driven spiral model and shows the various concept for the management of risk while developing a software [3]. The researches on risk management in different model is done only to improve the management techniques and get the advancement in risk managing field. The improvement in controlling the areas where risk is present requires planning to reduce the risk during software development process. In this section, we will find the risk in different models.

1) *Waterfall Model*- The waterfall model is used in software development process as its process is move in a downward like a waterfall and at every phase there is different process to do. This model [9] works as: firstly, it needs all the user requirement and then it will move for the software requirements. After completing these two phases, then according to this model it is required to design the architecture and start implementation. With all these, it is required to test the implementation and process of the software and then deployment of the model will happen. The

mentions steps explain the way of process to develop a software but during the time of development while keeping in mind all these steps, some risk will arise there and it might be possible that the bad behavior or some failure will show in software. It is required to go through risk management process while working on the model so that risk will not affect the software.

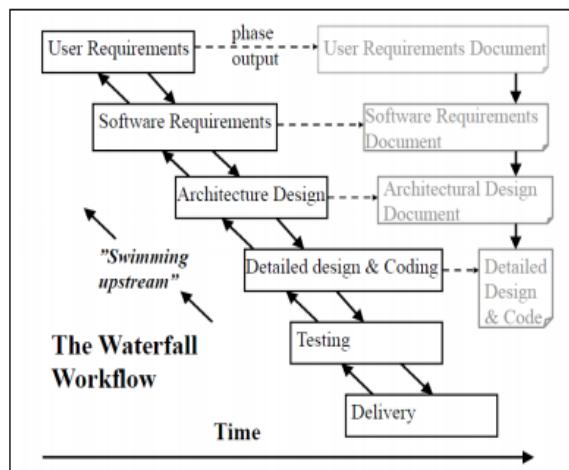


Fig 1. Waterfall Model

Risk can be occurred by above discussed parameters and one of them discussed about the frequent change in the requirements. In waterfall model, the risk that can occur while developing the software is only due to the frequent change in requirements and working environment which will cause because of the improper distribution of roles and responsibilities and this risk will puts its wrong impact on the software. Here, the risk management is required by identifying and analyzing the risk during the development of the software.

2) *Agile Model*- Now-a-days, the agile model is widely used in most of the IT companies for the software development process because of its functionality [9]. This model is fast and the chances of the risk in this model is less. As this model name "agile" represents "fast change", helps the developers to develop the software easily. In this model, the regular checking of the requirements and meeting will be held regularly which reduces the risk to occur. Because of the interaction, this model will work over the changes in requirement, cost estimations and some other factors too. Traditionally, the agile model has no risk management process but now there are different researches done which tells about the different methods through which it is possible to work on risk management techniques. It is important to create the risk management process because of the lack in risk management techniques in agile model.

We will discuss the risk management methods for agile model in further section as PRINCE2 and SCRUM. The risk in agile model will be shorten by arranging standup calls regularly and will meet the changes and requirements during the development only. The reevaluation can be done by planning meeting every day or within 2-3 days. This model is designed in such a way that it reduces the variety of risk during development.

3) *Spiral Model*- The Spiral model is as iterative waterfall model because of the spiral shape and some advancements in the model [9]. The planning, risk analysis, engineering and evaluation are the four different phases of the spiral model. This model includes the risk analysis as a phase in this model. This model is iterative so the software will pass through these phases iteratively. The base of the model contains the planning, requirement gathering and risk assessment. The development of software and testing is come under the engineering phase of the model. The evaluation phase gives the output and customers will evaluate the complete development before moving to the next spiral. The risk is happening during the development but as risk analysis is there at every phase which provides the spiral model as the best model to handle the risk regularly.

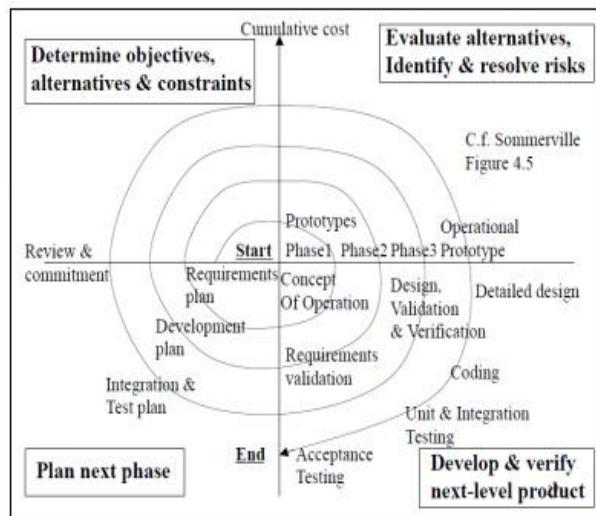


Fig2. Spiral Model

According to the Barry W. Boehm the spiral model includes determine objectives, identify and resolve the risk, development and test, planning of next iteration as the four different phases of the model which shows the coordination between the requirements and designs helping in reduction of risk there. But sometimes this consistency will lead to some errors which affect the software, so for this, risk analysis phase required after every iteration which will reduce the risk if any is present there.

4) *Incremental model*- The incremental model is created as multi-waterfall models as it is divided into some small modules [9]. The requirement gathering, designing, implementation and testing are the phases for every module and this phase will come into action until the completion of the software.

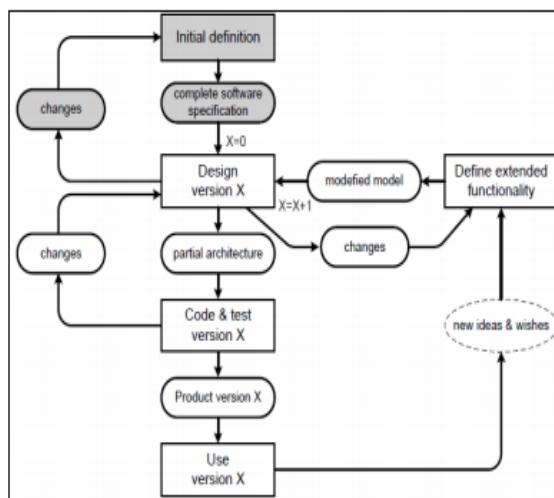
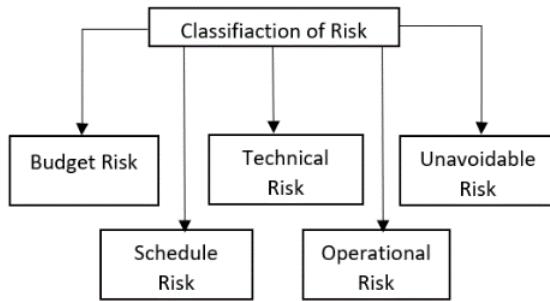


Fig3. Incremental Model

The main advantage of this model is that it provides an environment which generates the software fast within the lifecycle of the software and it more flexible and less costly. The only thing is required – planning, design and clear description of the whole system and if this is not properly done then it will lead to risk and then this risk management can be done only by identification, analysis and mitigation of risk.

III. RISKFACTORS

Risk factors will negatively affect the cost and quality of the software if it is ignored or not mitigated properly. With this, it will show bad impact by presenting some serious threats to the software.

*Fig4. Risk Classification*

A. Risk in Software Development- As we briefly discussed about reasons of risk in software development, the risk will arise manually or technically [2].

1) *Budget Risk*- During the software development, it is required to estimate the proper budget by keeping all the requirements and uncertainties in mind. But if this estimation will go wrong then it will put wrong impact on the budget for the development that will arise issues like budget overruns, imperfection while tracking the budget, budget handling will be mismanaged, expansion in project scope.

2) *Schedule Risk*- The problems like imperfectly estimating time, improper way to allocate the resource, failure in completion and identification of functions, regularly expansion in project scope is caused only due to only following reasons:

- i. if there is unfamiliarity about the time period to complete the task.
- ii. if allocation of resources is not in a proper manner which will affect the productivity of the software as well as vanishes the team's experience.
- iii. if team is not properly aware about the functions complexities which leads the less involvement of technical knowledge.

3) *Technical Risk*- Functionality and performance of the software is come into consideration with the technical risk. If there will arise frequent or regular changes in the requirements for developing the software is one of the technical issues which affects the performance of the software. Like this, there are some other problems that occurs as technical risk which affects the performance and functionality are given as:

- i. if there is no proper knowledge (less skilled employee) about the advanced or previously used technology will increase the software level issues during development.
- ii. if different modules will not properly integrated.

4) *Operational Risk*- The improper process implementation is one the reason for operational risk. There are some reasons like resources are not complete, communication gaps between the employees to provide proper and complete information regarding task, responsibilities and roles are not properly distributed, improper planning, less trained employees. The mentioned issues explain various operational activities while developing a software which means operational risk will occur from these activities which lead to problems as risk are: lack of knowledge for project management, due to confliction of priorities, due to lack of understanding of project goals which gives output as failure of project.

5) *Unavoidable Risk*- These risks are not in our control like: changes in government policies, changes by the customers for the software, fast incrementation in market development. These are some points which we can't avoid during the development so it is required to handle such risk according to the requirement [2].

IV. DIFFERENT METHODS TO MANAGE RISK

For the management and analysis of risk while development of the software, there are some basics steps that is taken to manage the risk in software which are: identify the risk, risk impact evaluation, risk management plans creation. With all these are some strategies are also present which help in risk management while developing software which includes: risk mitigation, avoidance, control, acceptance. These responsibilities will also be taken as in different methods to manage risk.

A. PRINCE2- PRINCE2 (Projects IN Controlled Environments) is one of the risk management methodologies which provides an effective management and puts good impact on software [4]. Now-a-days, most of researches done on

PRINCE2 and implementation of PRINCE2 in different software as well as with different techniques. The PRINCE2 method contains some basic steps or phases for risk management and each step has its own significance. The recommended phases are: identify, assess, plan, implement, and communicate. The above figure represents “complete” step will run parallelly with every step. In this methodology, the two roles are defined as risk owner and risk actionee in the implementation step and both having a specific function. The first one deals with the management and monitoring of the risk and the later one will response actions of the risk. It is designed in such a way that we can save time, effort and money. This method provides a consistent approach and can be easily controlled at every step of the productivity.

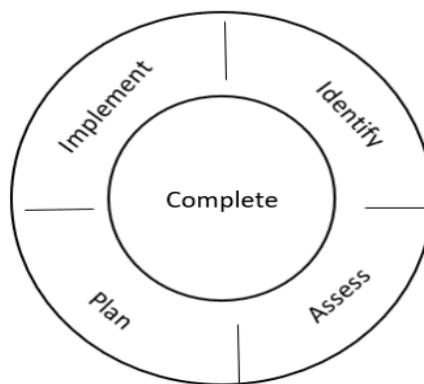


Fig 5. Steps in PRINCE2

At what time the involvement is required of the management and stakeholders is also defined by this methodology. With all these points it provides some other points like flexibility in decision making, providing good communication, learning phases which all represents that how this methodology is now used in various organization and helps in risk analysis and management.

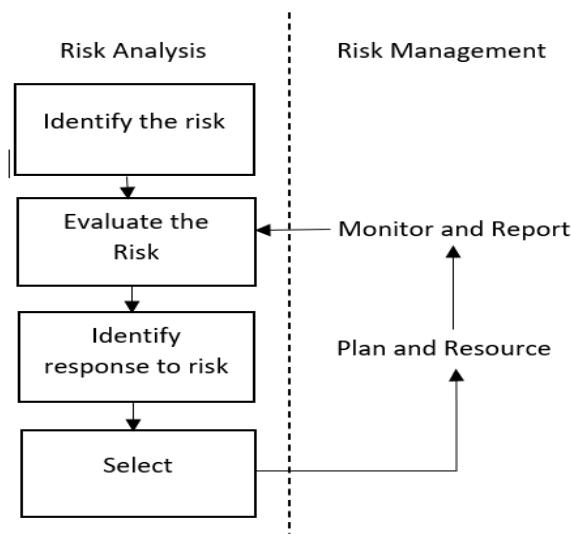


Fig 6. PRINCE2 - Risk Management Cycle

The risk management and risk analysis include the steps that are given in fig3. Risk identification will be the first step which lead to the process of risk analysis and after identifying the risk, evaluation, identification of response will be done. The risk management with PRINCE2 helps to reduce the cost and increase the quality of the software.

B. SCRUM- The SCRUM methodology is also used for agile risk management process. The risk management and analysis can be done by looking into different types of risk and SCRUM is designed which will work for different risk in a specific management process for managing the risk [4]. Whenever the software is created that is based on finances so it is required to look into different phase like, scope, resources but with the help of SCRUM, it is possible to skip or remove this phase. SCRUM is designed as it will perfectly defines the roles and provide the responsibility according to the requirement.

The SCRUM model is simply defining as SCRUM values also which mainly work on courage, focus, commitment, respect, openness which defines a strategy which enhances the team support and also gain the interest in work. The risk

can be managed in SCRUM by using scrum events, artifacts. It will lead to experiments having low-cost. The iterative development, self-organization, collaboration, value-based prioritization are some SCRUM principles. The risk management and analysis will reduce by starting implementing on these steps for getting a good software with proper management and maintenance.

C. Fishbone Analysis- From different researches, it is analyzed that most of the risk can occur from root of the software development process and this fishbone analysis methodology will remove the root cause of different risk factors of software development. It is designed as a fish bone structure which found helpful for giving the name as Fishbone analysis. The sample design of fishbone analysis [2] defines the various cause and categories which is given as:

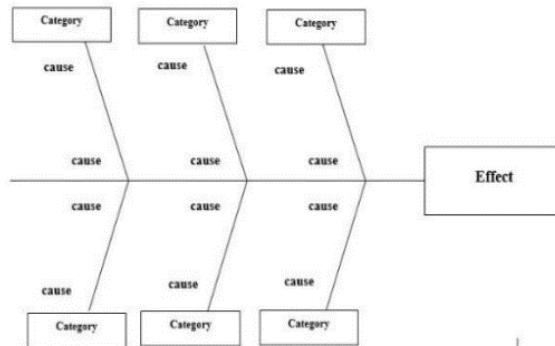


Fig 7. Sample of Fishbone Analysis

One of the surveys that is done in a research in which they arrange a questionnaire containing five risk classification and each risk having some root cause which was sent through LinkedIn. At every step they asked them some tasks like identification to find the root cause. The survey shows the probability of risk and got different results for this model. With the analysis they came to the point that this methodology helps to overcome the problems fast and this method is able to detect the root cause of the risk.

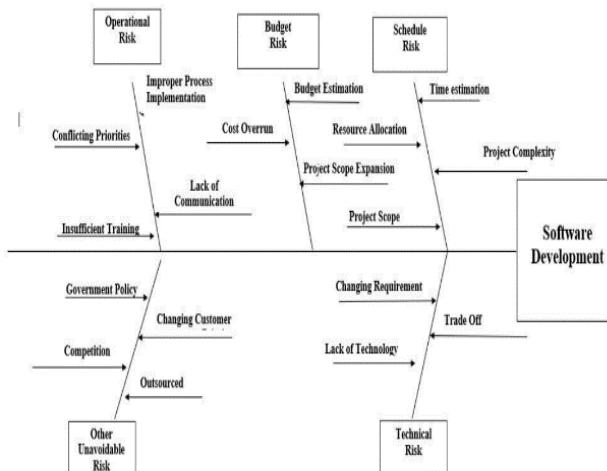


Fig 8. Fishbone Analysis

The above figure [2] represents the complete process of this method which represents that for different types of risk in software development, this model is reaching towards the root of that risk type which help to reduce the risk of the model by using this method of reduction. The models like waterfall model, incremental model requires the risk management process for the development of software with the reduction in risk by looking into the root cause in it. The structure of fishbone analysis is like skeleton of the fish helping in developing the software by reducing the complexity and maintenance of the software.

V. SUMMARIZATION OF RISK FACTORS BY RISK MANAGEMENT METHODOLOGIES

As we already discussed risk management methods in above section which describes the working and importance of risk management methods like PRINCE2, SCRUM, and Fishbone Analysis. In this section, we will discuss various risk occurring points in different models and how these risk management methods overcome the risk factors which explains the PRINCE2, SCRUM, Fishbone analysis best suited for what kind of risk.

A. Analysis with PRINCE2- PRINCE2 risk management methods deal with the variety of risk which is having both threats as well as opportunities. The description of model is discussed in section IV. There is various risk that are handled by PRINCE2 but the risks that is effectively managed or resolved by PRINCE2 will going to discuss here. The risk that is present within the risk register will require pre-developed plans which defines that the risk like lack of communication, lack of planning, lack of skilled employees, lack of resources. The PRINCE2 method deals with such risk which shows that this risk management method is best to handle risk factors including- Schedule Risk and Operational Risk. The research shows that this method deals with Budget and Technical risk factors also but with less effectiveness.

Risk Factors	PRINCE2
Budget Risk	partial
Schedule Risk	✓
Technical Risk	partial
Operational Risk	✓
Unavoidable Risk	✗

Fig9. PRINCE2 Analysis

B. Analysis with SCRUM- SCRUM risk management method is defined as method which handles all types of risk. This method is best to most of the risk factors but before discussing about the risk factors, we will discuss some risk can will easily managed by SCRUM like incomplete requirements, improper planning, communication lack, time related issues, issues like data loss. SCRUM will not able to handle risk which is not handled by the team members also. The above information gives the knowledge that most of the risk will handled by SCRUM risk management method. So, the risk management method which handles the risk factors efficiently are: Budget Risk, Schedule Risk, Operational Risk and Technical Risk. The unavoidable risk is come under the category which cannot be resolved by team members itself, therefore, SCRUM is also not able to handle unavoidable risk factor.

Risk Factors	SCRUM
Budget Risk	✓
Schedule Risk	✓
Technical Risk	✓
Operational Risk	✓
Unavoidable Risk	✗

Fig10. SCRUM Analysis

C. Analysis with Fishbone analysis method- Fishbone analysis is one the risk management methods which deals with the root cause of the risk. The above section discussed the fishbone analysis which works with each category of the risk and handles the risk by finding the root cause that is “cause from previous cause”. The fishbone analysis effectively manages the risk including estimation of proper budget, lack of communication, improper planning, less resources and requirements, lack of proper knowledge etc. which represents the risk factor like budget risk, schedule risk, technical risk, operational risk. Fishbone analysis identifies the main cause of the risk. The fish bone skeleton like structure of this risk management analysis represents the analysis from the root. The above discussion is representing that fishbone analysis is used to analyze the root cause of the risk in risk management method.

Risk Factors	Fishbone Analysis
Budget Risk	✓
Schedule Risk	✓
Technical Risk	✓
Operational Risk	✓
Unavoidable Risk	✓

Fig11. Fishbone Analysis

VI. RESULTS AND CONCLUSION

Risk management and analysis in software development is required to reduce the complexity and failure issues during the development. In this paper, we discussed different risk factors which represents the reasons of failure in software while developing. There are different software development models and methods to manage risk are defined by some

researches and there are number of SDLCs with their own challenges and risks in software development is major concern for some models while development. This paper includes the study on few SDLCs and found that not a single SDLC can be regarded as best for all the organizations, it is not a one-size-fits-all concept but keeping in mind the customer's demand as well as risk factors of each SDLC we need to choose the best cycle for the software development and work according to the work culture and requirements. We see that most basic waterfall model has been enhanced by incremental model, so when working on multiple projects it would be beneficial to use incremental model, as compared to Waterfall one, however, there is agile model which is in high demand but has its's own risk factors, but before finalising any SDLC, we should consider looking at the methods of risk management for each SDLCs, Fishbone analysis, SCRUM being a great method to eliminate risk software models and strengthens its pillars, whereas there are other methodologies that can be considered for other models and this paper discussed few of them. We would like to give emphasis on use of all of them depending on various factors by looking into different risk management techniques as risk identification, estimation, monitoring. These methods will manage the risk and enhance the productivity of the software by using different models for development.

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Plant Leaf Disease Detection Using Machine Learning

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Paper ID-113

ABSTRACT: The new generation of convolutional neural networks (CNN) has achieved impressive which lands up within the world of image classification. This paper cares with a replacement approach for the event of disease identification model, which supported leaf image classification, by the use of deep learning technique. It is a different way of coaching and thus the methodology used facilitate a quick and easy system implementation in practice. The developed model is in an exceedingly position to acknowledge three types of diseases of 1 plant and pesticides and/or fertilizers are advised per the severity of the diseases. The sort of green leaf diseases is recognized by CNN. After recognition, the predictive remedy is commonly recommended which could help agriculture related people and organizations to need appropriate actions against these diseases.

KEYWORDS—Green leaf diseases, Classification, Training, Disease Detection

I INTRODUCTION

The primary occupation in India is agriculture. India ranks second in the agricultural output worldwide. Farmers cultivate a great diversity of crops. Many factors such as climatic conditions, soil conditions, various disease, etc. affect the production of the crops. The existing method for plants disease detection is simply naked eye observation which requires more man labour, properly equipped laboratories, expensive devices, etc. Detection of improper disease may lead to inexperienced pesticide usage that can cause development of long term resistance of the pathogens, reducing the ability of the crop to fight back. The disease detection in plant leaf can be done by observing the spot on the leaves of the affected plant. The type of green leaf diseases is by Convolution Neural Network and K-Nearest Neighbours. After recognition, the predictive remedy is suggested that can help agriculture related people and organizations to take appropriate actions against Bacterial, Viral and Fungal diseases.

II RELATED WORK

M. Reyalat (2017),"Fast and Accurate Detection and Classification of Plant Diseases". Here, experimentally evaluate a software solution for automatic detection and classification of plant leaf diseases. It provides faster and more accurate solution. Mainly consists of four main phases. In the first step, identify the mostly green colored pixels. Next, these pixels are masked based on specific threshold values, then those mostly green pixels are masked. This technique is a robust technique for the detection of plant leaves diseases. The developed algorithm's efficiency can successfully detect and classify the examined diseases.[1]

Smith J S(2009),"An algorithm based on image processing to automatically identify visual symptoms of plant disease ". Here, an image-processing based method that identifies the visual symptoms of plant diseases, from an analysis of colored images. The primary colors of the image are red, green and blue. Because of the range, it is hard to implement the application using RGB. Therefore convert RGB to gray pictures. Detection of disease by some automatic technique is beneficial as it reduces extensive monitoring work in large crop farms and distinguishes the side effects of the illness itself at very early stages .M. Reyalat presented a survey on different techniques of classification.[2]

Tapas kanungo, David Mount,(2002)- "Efficient k means Clustering Algorithm: Analysis and Implementation." .We establish the practical efficiency of the filtering algorithm in two ways. Initially, we present a data-sensitive analysis of the algorithm's running time, which shows that the algorithm runs faster as the separation between clusters increases. Second, we present a number of empirical studies both on synthetically generated data and on real data sets from applications in color quantization, data compression, and image segmentation .[3]

K Padmavathi (2016),"Implementation of RGB and Grayscale Images in Plant Leaves Disease Detection –Comparative Study", Digital image processing is used various fields for analyzing different applications such as medical sciences,

biological sciences. Then examined and analyzed the Grayscale and RGB images using image techniques such as pre processing, segmentation, clustering for detecting leaves diseases. In detecting the infected leaves, colour becomes an important feature to identify the disease intensity. [4]

C M Procopius (2002), “clustering algorithm exact and approximate”. Subspace is an evolving methodology .It aims at finding clusters in various overlapping or non-overlapping subspaces of the high dimensional dataset. Finding clusters in high dimensional data is a challenging task, and high dimensional data comprises hundreds of attributes. Many applications of clustering are characterized by high dimensional data where each object is described by hundreds or thousands of attributes.[5]

III. PROPOSED ALGORITHM

Description of the Proposed Algorithm

Algorithm used: CNN Algorithm

Input Layer:

Input layer in CNN should contain image data. Image data is represented by three dimensional matrix .Initially, need to reshape image into a single column. If we have image of dimension $28 \times 28 = 784$, we need to convert it into 784×1 before feeding into input. And we have “n” training examples then dimension of input will be $(784, n)$.

Convo Layer:

Convo layer is also called as feature extractor layer because features of the image are get extracted within this layer. Here, a part of image is connected to Convo layer to perform convolution operation.

Relu Layer:

ReLU activation function is the abbreviated form of “Rectified Linear Activation Function”. It computes the function $f(x) = \max(0, x)$, in simpler words it is thresholding at 0. This function helps to introduce non-linearities into the model.

Pool Layer:

Pool layer is used between two convolution layer. It is used to reduce the spatial volume of input image after convolution.

FC Layer:

This layer takes the output of its preceding layer, i.e., either the Relu layer or the Pool layer, as its input. Primarily this layer takes an input volume and gives out the N dimensional vector as its output, where N is the number of classes.

IV. PSEUDO CODE

Pseudo code for training

```

if collect dataset = true
Display related dataset collected
Do
Read bacterial, viral, fungal
If details are verified
Else
Display appropriate error message
end if
end if

```

```
else  
display training is done module is created  
End session
```

Here, we collected the dataset. if dataset=true, then it displays the dataset collected. which read the bacterial, viral and fungal, here if details are verified then it display appropriate error message else display training is done module is created.

Pseudo code for training

```
if already model built =true  
Display  
Do  
input image pass  
if no disease is present displays status as healthy  
Else  
display the status as unhealthy and type of disease detected with remedies  
end if  
end if  
display testing is done module is created  
End session
```

Here, In this training, if already model built=true , it displays. Then need to pass the image. If no disease is present displays status as healthy else display the status as unhealthy and type of disease detected with remedies , after that which display the testing is done module is created.

Pseudo code for remedies

```
if input leaf image image is healthy  
else  
image is unhealthy  
do  
it will print disease as bacteria and remedies  
else  
it will print disease as leaf blaster and remedies  
end if  
Display the leaf image is healthy or unhealthy with remedies  
end session
```

Here, if we input leaf image then it shows image is healthy else image is unhealthy. After it will print disease as bacteria and remedies else it will print disease as leaf blaster and remedies, then it will display the leaf image is healthy or unhealthy with remedies.

V. RESULTS AND DISCUSSION

Training the dataset:

```
C:\Windows\System32\cmd.exe - python train.py
Microsoft Windows [Version 10.0.18363.1379]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Admin\Desktop\PROJECT_FINAL_YEAR\50%>activate plant

(plant) C:\Users\Admin\Desktop\PROJECT_FINAL_YEAR\50%
(plant) C:\Users\Admin\Desktop\PROJECT_FINAL_YEAR\50%>python train.py
100%[██████████] 4000/4000 [01:01<00:00, 64.92it/s]
C:\Users\Admin\AppData\Local\conda\conda\envs\plant\lib\site-packages\numpy\core\_asarray.py:136: VisibleDeprecationWarning:
Creating an ndarray from ragged nested sequences (which is a list-or-tuple of lists-or-tuples-or ndarrays with different lengths or shapes) is deprecated. If you meant to do this, you must specify 'dtype=object' when creating the ndarray
    return array(a, dtype, copy=False, order=order, subok=True)
```

Figure : Training the dataset

Figure shows the Training the dataset Where leaf images of Sunflower and Roses are trained. The leaf images have been taken from Kaggle website nearly 4000 images have been trained.

Dataset of Sunflower and Rose leaf images

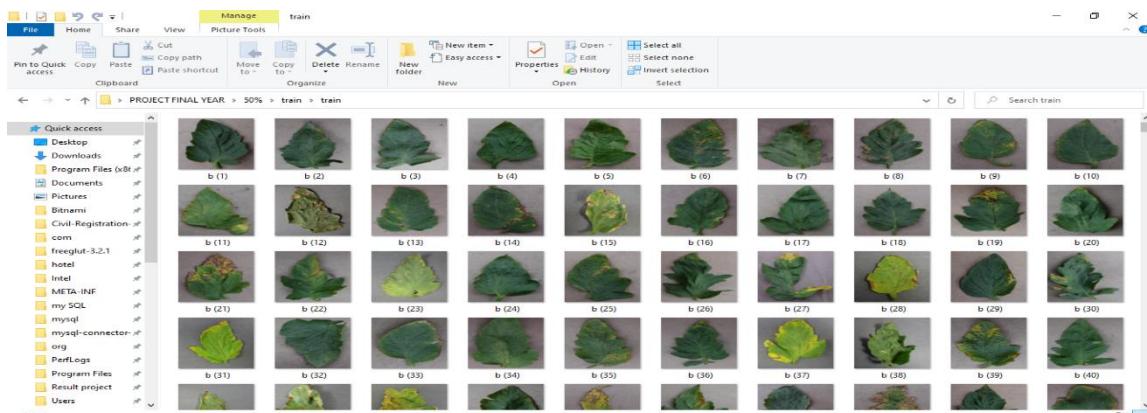


Figure : Dataset

Figure shows them dataset of Sunflower and Rose leaf images. The leaf images have been taken from Kaggle website nearly 4000 images have been trained.

Models are generated:

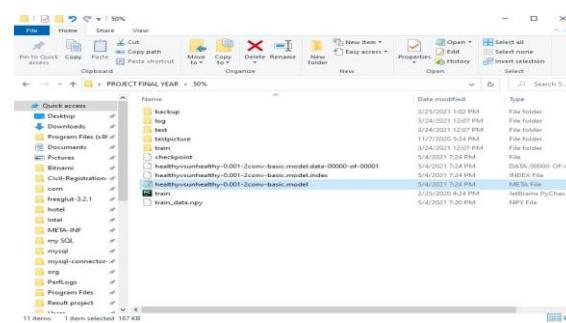


Figure: Models are generated

Figure shows the related models have been generated for leaf images of Sunflower and Roses which we have trained.

Choosing the leaf image for testing the disease:



Figure : Choosing the image for testing disease

Figure shows the Choosing the leaf image for testing disease such as Bacterial,Viral and Fungi.

Analyzing the leaf image for detecting the disease:

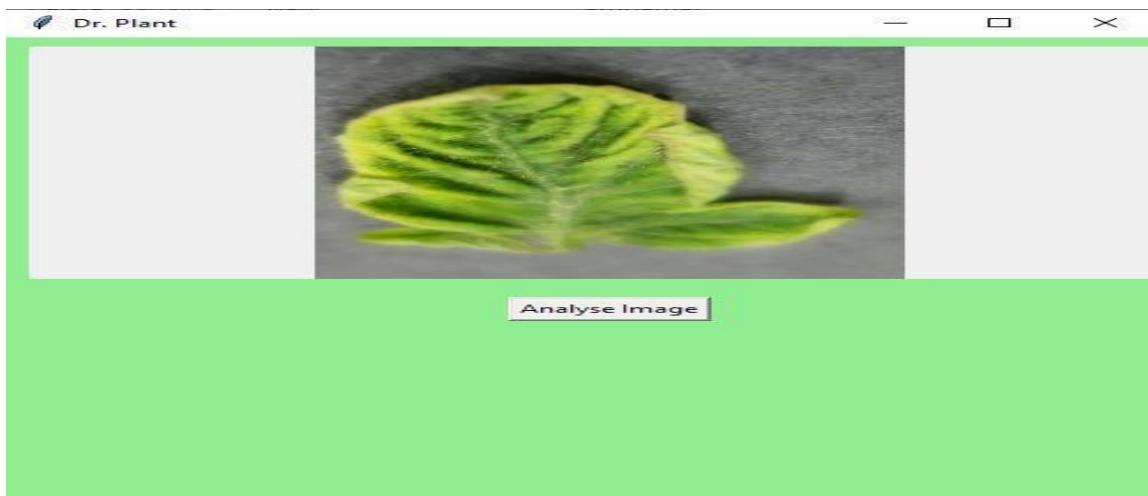


Figure : Analyzing the leaf image for detecting the disease

Figure shows analyzing the leaf image for detecting the disease such as Bacterial, Viral and Fungi.

Displaying the result after analyzing the leaf image:

**Figure: Displaying the result after analyzing the leaf image**

Figure displays the result after analyzing the leaf image for detecting the disease such as Bacterial, Viral and Fungi. Here the result shows status as unhealthy and the type of disease is Yellow leaf curl virus followed by remedies can be obtained by clicking the Remedies button below.

Displaying the remedies for the disease:

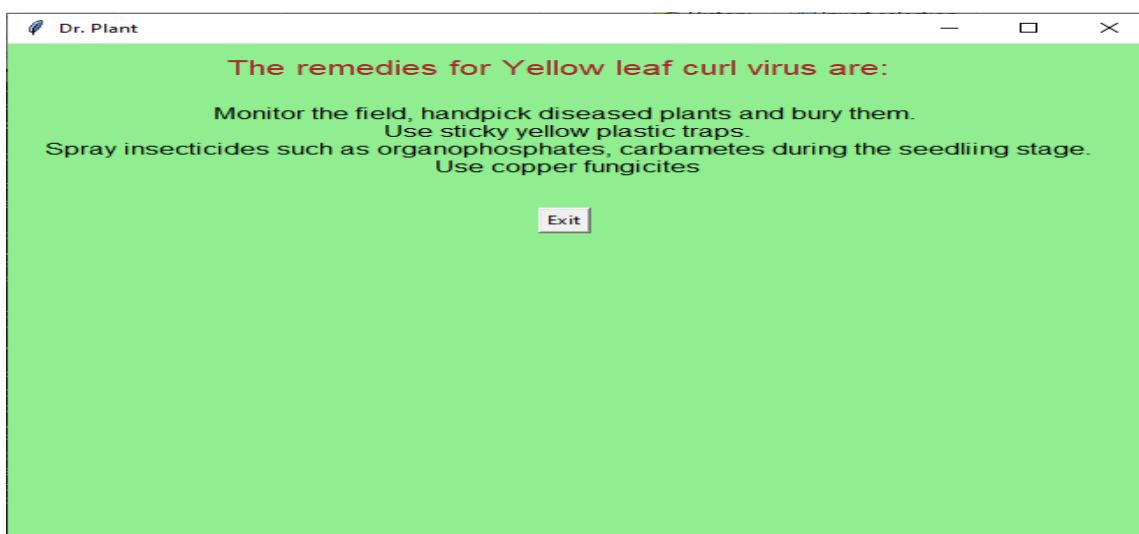
**Figure: Displaying the remedies for the disease**

Figure displays the remedies for the disease. Here the remedies are provided for the type of disease detected using CNN algorithm.

VI CONCLUSION

The plant leaf disease detection system will be developed taking in mind the benefits of the farmers and agricultural sector. The system can detect disease in plants and also provide the remedy that can be taken against the disease. The remedy can be taken for improving the health of the plant. The proposed system is based on python and gives accuracy.

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A Novel Approach For Skin Cancer Prediction With Image Segmentation On Cloud Infrastructure Using Machine Learning Models

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ABSTRACT: As indicated by world disease Research reserve 30,000 individuals are influenced by skin cancer each year. Skin disease the unusual development of skin cells, frequently creates on skin presented to the sun. Be that as it may, this normal type of malignancy can likewise happen on spaces of your skin not customarily presented to daylight. There are two significant kinds of skin cancer are Melanoma, Benign. Mechanized conclusion of different skin lesion illnesses through clinical dermoscopy pictures is as yet an exceptionally difficult undertaking. In this work, an incorporated model for division of skin lesion limits and arrangement of skin lesion is proposed by falling novel deep learning networks. In the main stage, a novel full goal convolutional networks (FrCN) is used to section the limits of skin injuries from dermoscopy pictures. At that point, the segmented Lesion are passed into a deep residual network for grouping.

KEYWORDS: Deep learning, convolutional neural network, malignant, melanoma.

I INTRODUCTION

Skin malignant growth is one of the significant kinds of tumors and its frequency has been expanding ridiculous many years. Deep learning designs can assist us with staying away from the progression of manual element extraction. This can save time and can alert the patient if there is a suspicious sign. We have attempted to assemble a vigorous and precise deep learning model that will help dermatologists in identifying skin malignant growth and will assist with making important moves absent a lot of postponement. By taking care of the prepared deep learning models with skin lesion picture information, the specialist can know the kind of lesion and choose whether it holds the possibility to metastasize later on or not. There are higher odds of restoring, if the disease is recognized in its beginning phases, the fix rate can be about more than 90% [2]. Skin malignancy determination is led utilizing visual assessment of the lesion and afterward the clinical examination is directed if there is a doubt. Picture based classification utilizing deep learning, specifically, have as of late shown impressive exactness in clinical picture classification.

II RELATED WORK

The software product produced is an application by name "Design and implementation of Skin Cancer Predictor system using Machine Leaming Algorithms over Live cloud infrastructure". According to world cancer Research fund 30,000 people are affected by skin cancer per year. [2] Skin cancer the abnormal growth of skin cells, most often develops on skin exposed to the sun. But this common form of cancer can also occur on areas of your skin not ordinarily exposed to sunlight. There are two major types of skin cancer are Melanoma, Benign. Automated diagnosis of various skin lesion diseases through medical dermoscopy images is still a very challenging task. In this work, an integrated model for segmentation of skin lesion boundaries and classification of skin lesions is proposed by cascading novel deep learning networks. In the first stage, a novel full resolution convolutional networks (FrCN) is utilized to segment the boundaries of skin lesions from dermoscopy images. Then, the segmented lesions are passed into a deep residual network for classification. To develop a Computer Aided Diagnosis (CAD) System to detect and classify various skin lesions by deep leaming Techniques. Skin tumor disease is one of the most commonly diagnosed cancers in the world. Indeed, melanoma (i.e., malignant skin tumor) usually starts when melanocyte cells begin to grow out of control. Detection of skin lesion with correct diagnosis in its earliest stage is highly curable and increases the survival rate. In clinical practice, dermoscopy has become a gold standard imaging device which assists dermatologists to improve the screening of skin lesions through visualizing prominent features present under the skin surface. In spite of that dermoscopy screening provides better visualization of skin lesions and improves the sensitivity and specificity compared to visual inspection, dermatologists still encounter difficulties of achieving higher performance of lesion diagnosis. Technology plays a central role in our everyday life. Technology assistance at various stages of skin lesion processes can significantly enhance the segmentation and classification using deep learning. Proper learning of deep learning networks demands a huge number of training samples. However, a limit on the size of medical image dataset, especially a limit on reliable annotated ground-truths, is one of the challenges in adopting such deep learning approaches. We have applied different augmentation operations to the training datasets to enlarge the amount of training data, reduce the overfitting problem, and accelerate the convergence. Skin Lesion Boundary Segmentation via FrCN and Skin Lesion Classification via ResNet-50 are the two new approaches for segmentation and

classification of skin lesion respectively, the full resolution convolutional network (FrCN) is an end-to-end supervised deep network which is trained via mapping the entire input image to its corresponding ground-truth masks with no loss, leading to result better segmentation performance of skin lesion boundaries. A deep residual network (i.e., ResNet) is one of the deep learning classification models which has been used in many image recognition applications. ResNet has the ability to address the vanishing gradient problem when deep networks go deeper (i.e., increasing network depth by stacking layers). In other words, instead of passing the learned features directly through the stacked layers, ResNet enables these layers to fit a residual mapping leading to optimize the network easier than the unreference mapping. Implement the machine learning model using Python programming language for analysing the skin lesions Train the model using thousands of training data for enabling the model to self-learn Test the model on the given data for the accuracy rate Improve the model to achieve more accuracy than any of the existing systems Implement the Web services using Java/J2EE to make this solution integratable with other applications Deploy the web services over the public cloud to make the solution available to the public across the world.

III. METHODOLOGY

Existing System:

The current system from last two decades have witnessed a lot of efforts that attempt to provide CAD systems capable of distinguishing between melanoma and non-melanoma. However, these early investigations relied on applying low-level hand-crafted features including color, shape, and texture representations. Recently, deep learning convolution neural networks (CNNs) have been getting significant consideration in the domain of medical image diagnostics and particularly in dermoscopy image analysis towards melanoma recognition, and they presented a hybrid approach for melanoma recognition which combined of sparse coding, deep learning, and support vector machine (SVM). The deep descriptors of Res-Net were aggregated with the statistical fisher vector to generate more global representations which were utilized to classify the skin lesions using SVM. This method showed an improvement in the skin lesion diagnosis with an overall accuracy of 86.81%.

Proposed system:

Technology plays a central role in our everyday life. Technology assistance at various stages of skin lesion processes can significantly enhance the segmentation and classification using deep learning. Proper learning of deep learning networks demands a huge number of training samples. However, a limit on the size of medical image dataset, especially a limit on reliable annotated ground-truths, is one of the challenges in adopting such deep learning approaches. We have applied different augmentation operations to the training datasets to enlarge the amount of training data, reduce the overfitting problem, and accelerate the convergence. Skin Lesion Boundary Segmentation via FrCN and Skin Lesion Classification via ResNet-50 are the two new approaches for segmentation and classification of skin lesion respectively, the full resolution convolutional network (FrCN) is an end-to-end supervised deep network which is trained via mapping the entire input image to its corresponding ground-truth masks with no loss, leading to result better segmentation performance of skin lesion boundaries. A deep residual network (i.e., ResNet) is one of the deep learning classification models which has been used in many image recognition applications. ResNet has the ability to address the vanishing gradient problem when deep networks go deeper (i.e., increasing network depth by stacking layers). In other words, instead of passing the learned features directly through the stacked layers, ResNet enables these layers to fit a residual mapping leading to optimize the network easier than the unreference mapping.

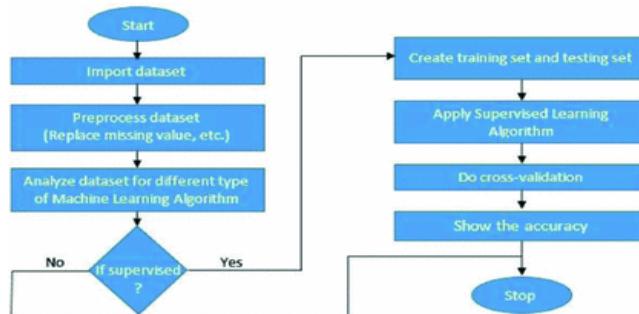
Merits

Solutions is been made available over the cloud using as-a-service model thus extending the availability of the solution across the globe. Most accurate. Simple and computationally light weight thus saving time and server memory.

Motivation

To enable early detection of skin lesion and to increase the chances of survival, and to determine certain conditions or health risk much faster with higher accuracy and to reduce chances of misdiagnosis and to capture unforeseen patterns with complex datasets and to create health risk predictions based on existing data and analyzing the data and loop it back in real time to aid the doctors in detecting medical condition faster and use this as tool to improve ongoing care.

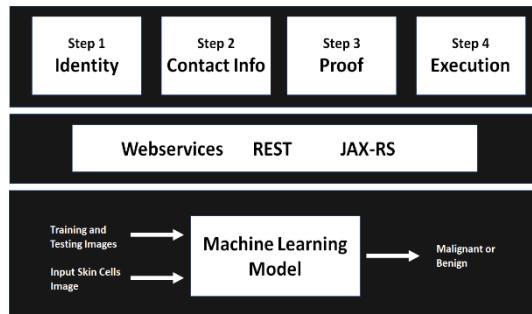
Proposed system model



System Architecture:

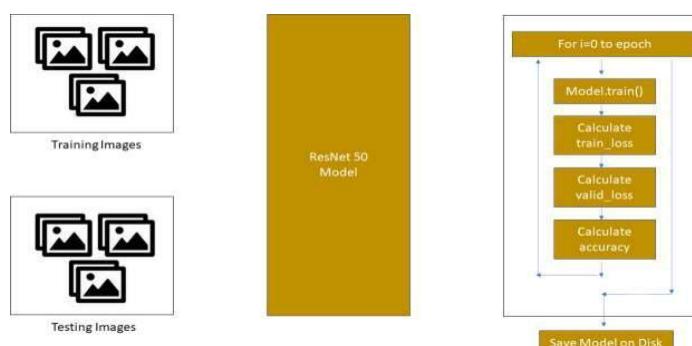
Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could see it as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into a single approach to product development," then design is the act of taking the marketing information and creating the design of the product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user. Until the 1990s systems design had a crucial and respected role in the data processing industry. In the 1990s standardization of hardware and software resulted in the ability to build modular systems. The increasing importance of software running on generic platforms has enhanced the discipline of software engineering. The design will contain the specification of all these modules, their interaction with other modules and the desired output from each module. The output of the design process is a description of the software architecture. The design phases are:

- High Level Design
- Detailed Level Design



1. Module Implementation – Training, Testing, and Saving the model.

This module implements the Sequential algorithm and ResNet50 libraries for developing the machine learning model to predict the skin cancer from a given input image of a cell. This model uses numerous training images for learning purpose. ResNet, short for Residual Networks is a classic neural network used as a backbone for many computer vision tasks. This model was the winner of ImageNet challenge in 2015. The fundamental breakthrough with ResNet was it allowed us to train extremely deep neural networks with 150+layers successfully. Prior to ResNet training very deep neural networks was difficult due to the problem of vanishing gradients.



2. Model Implementation - Loading the model to work on new dataset.

In this module, the model which is saved on local disk in the previous module will be loaded back into the processor memory. Once the model is created on the processor, we then load the saved weights into the ResNet50 model so that would not require the training and testing process again which in turn saves a really lot of time during prediction of skin cancer disease on a new images. What we get after loading the trained model is the component which already have the intelligence to predict the skin cancer. This model is then provided with an input image to analyse for the skin cancer. By this approach of loading and saving the model to and from the local disk, we save a really lot of time when processing the real time images.

3. Web service Implementation.

In this module, we implement the web services to expose the model to the outside world. We expose an HTTP post API against which the user can upload an input image and request for executing the model. The webservice API upon receiving the request from the client, will store the uploaded image inside the '/home/ubuntu/input' location of the amazon EC2 machine and then it invokes the skincancer.py program by specifying this input folder. The output image will be stored inside '/home/ubuntu/output' location inside amazon EC2 machine. To download this image into user's machine, the webservice will provide another URL as a response by clicking on which the image gets downloaded to the client's machine.



4. Third party application.

In this module, the sample third party application has been implemented to demonstrate the usage of the web services to the customers. In this application, we implement four steps

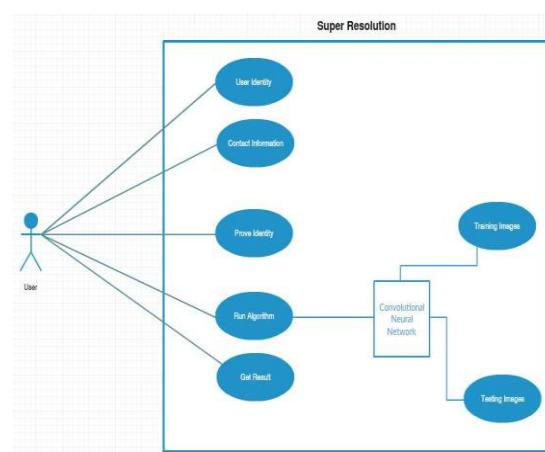
Step 1: User Identity: We collect the user's first name and the last name

Step 2: Contact Information: We collect the email ID and mobile number of the client

Step 3: Proof: We will send an OTP to customer and ask them to enter it to prove the identity

Step 4: Execution: User uploads an input image here and clicking on Run button will invoke the web service implemented in the previous module. The downloadable image link will be displayed back to the client once the result is available.

Use Case Diagram



External objects that interact directly with the system are called **actors**. Actors include humans, external devices and other software systems. The important thing about actors is that they are not under control of the application. In this project, user of the system is the actor. To find use cases, for each actor, list the fundamentally different ways in which the actor uses the system. Each of these ways is a use case.

IV. TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the software system meets its requirements

and user expectations and does not fail in an unacceptable manner. The system has been verified and validated by running the test data and live data.

Levels of Testing

- Unit Testing
- Integration Testing
- System testing
- Validation Testing
- Output Testing
- Test data and Output
- User acceptance Testing
- GUI Testing

Steps	Test Action	Results
Step 1	Enter the URL http://192.168.56.101:8080/SCP	Index page loaded successfully
Step 2	Click on Get Started	Step 1 Page loaded successfully
Step 3	Enter your first name and last name and click on Next	Step 2 page loaded successfully
Step 4	Enter your email ID and password and click on Next	Step 3 page loaded successfully
Step 5	Look for the OTP in your mobile	OTP received successfully
Step 6	Enter the OTP in step 3 and click on next	Step 4 page loaded successfully
Step 7	Upload the sample image and click on Run	Algorithm Started
Step 8	Wait for the result	GIF image shown
Step 9	Check for the result	Algorithm results are available
Step 10	Click on Download	Download Successful
Step 11	Verify if the result is correct	Yes it is correct

Table for Test Case of a Project

V. SIMULATION RESULTS

The Skin Cancer Prediction System using numerous Machine learning algorithm, viz. with a prediction result that gives the state of a user leading to diagnostics. Due to the recent advancements in technology, the machine learning algorithms are evolved a lot and hence we use multiple algorithms in the proposed system because of its efficiency and accuracy. Also, the algorithm gives the nearby reliable output based on the input provided by the users. If the number of people using the system increases, then the awareness about their current heart status will be known and the rate of people dying due to skin cancer will reduce eventually.



Fig 1: Some of the example images for malignant and benign

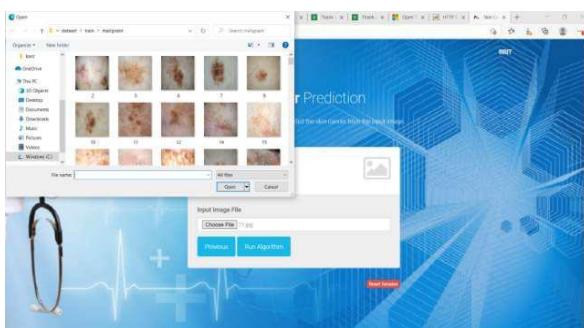


Fig 2: Inserting an image page



Fig 3: Displays Malignant or benign (result page)

VI CONCLUSION AND FUTURE WORK

The Skin Cancer Prediction System using numerous Machine learning algorithm, viz. with a prediction result that gives the state of a user leading to diagnostics. Due to the recent advancements in technology, the machine learning algorithms are evolved a lot and hence we use multiple algorithms in the proposed system because of its efficiency and accuracy. Also, the algorithm gives the nearby reliable output based on the input provided by the users. If the number of people using the system increases, then the awareness about their current heart status will be known and the rate of people dying due to skin cancer will reduce eventually. In Future, we aim to work on other disease prediction algorithms like heart disease detection, retinopathy diabetes prediction, etc so that all the health related diagnostic can be obtained under a single platform.

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A Review Model of Uber Data Analysis Using Data Science

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ABSTRACT: Urban liveability is a key concept in the New Urban Agenda (NUA) adopted by the United Nations (UN) in 2016. The UN has recognized that effective benchmarks and monitoring mechanisms are essential for the successful implementation of the NUA. However, the timely and cost effective collection of objective international quality of life urban data remains a significant challenge. Urban liveability indexes are often complex, resource intensive and time consuming to collect, and as a result costly. At the same time, competing methodologies and agendas may result in subjective or non-comparable data. Historically, transit has been a central organizing factor around which communities have been built. This paper explores the use of Uber data as a simple real-time indicator of urban liveability. Using data from the Uber Ride Request (URR) API for the Brazilian city of Natal, our preliminary findings suggest that Uber Estimated Time to Arrive (ETA) data is strongly correlated with selected quality of life indicators at a neighbourhood and region level. Furthermore, unlike other urban liveability indicators, our findings suggest that Uber ETA data is context-sensitive reflecting daily and seasonal factors thereby providing more granular insights. This preliminary study finds strong evidence that Uber data can provide a simple, comparable, low cost, international urban liveability indicator at both city and neighbourhood level for urban policy setting and planning.

KEYWORDS: Uber Data Science, Urban liveability indicators

I. INTRODUCTION

For nearly five decades, liveability has been referenced as a key attribute for community and urban planning worldwide. More recently, it has been firmly placed in the global policy lexicon by its inclusion in three of the principles and commitments of the New Urban Agenda (NUA) adopted by the UN in 2016 . The NUA is notable as it represents a significant international policy commitment in support of the Sustainable Development Goals (SDG), and more specifically SDG11, and what some have referred to as a pro-urban future. SDG11 sets out a goal for the international community to “make cities inclusive, safe, resilient and sustainable”. While it is clear that the authors of the NUA perceived liveability as playing a role in eradicating poverty , and as an indicator of both social inclusion and cohesion and sustainable urban transport and transit systems , nowhere within the NUA or supporting documents the concept of liveability is defined . This is not entirely surprising. Indeed, authors have commented on the widespread use of the term, despite the ambiguity in meaning in policy documents and scholarly articles .

According to Newton, liveability can be defined as a set of attributes of a place, encompassing housing, neighbourhood and region aspects that contribute to residents' quality of life and well-being. A recent review of the literature on relevant indicators of liveability suggests a broad range of contributory indicators across policy domains (the natural environment, crime and safety, education, employment and income, health and social services, housing, leisure and culture, food and other goods, public open space, transport, social cohesion and local democracy), although the relative importance of each is unclear. Ruth and Franklin suggest that a “liveable city” requires the needs of the inhabitants of the city to be aligned with “built infrastructures and ecosystems that provide the goods and services on which lives and livelihoods in the city depend.” They note that it is difficult to arrive at a generally acceptable definition of liveability because globalization, urbanization, new technologies and environmental constraints are impacting the expectations of the inhabitants.

II. RELATED WORK

Two distinct sources of related works are of interest to this study - publications related to urban liveability indicators and those related to using Uber data. The Economist Intelligence Unit (EIU) Global Liveability Index and the Mercer Quality of Living Ranking are two indices referenced widely in policy, media and academic literature. The EIU Global Liveability Index is an annual rating of 140 cities for relative comfort based on 30 qualitative and quantitative factors across five broad weighted categories (stability, healthcare, culture and environment, education, and infrastructure) constructed using a combination of external data points and the judgment of a group of in-house and external analysts . It is primarily used for employee mobility. Similarly, the Mercer Quality of Life Ranking evaluates living conditions in 450+ cities worldwide based on 39 factors, grouped in 10 categories - political and social environment, economic environment, socio-cultural environment, medical and health considerations, schools and education, public services and transportation, recreation, consumer goods, housing and natural environment. Scores are weighted to reflect their importance to expatriates. Like the primary focus is to support decisions in relation to employee mobility. It should be noted that Mercer do also offer services to municipalities to assess factors that can improve their quality of living ranking.

III. METHODOLOGY

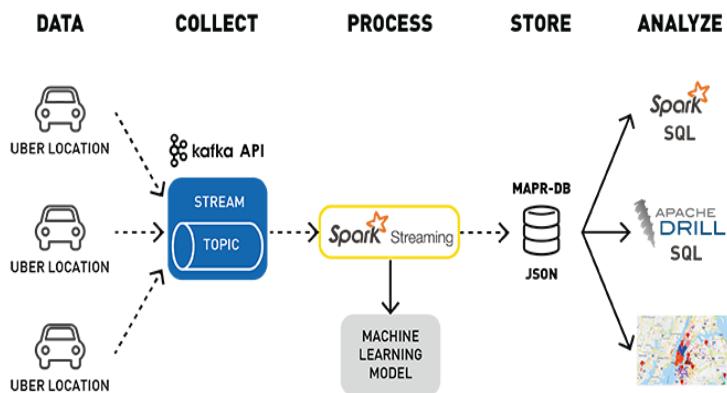


Fig 3.1 : Uber event data to detect and visualize popular Uber locations

Uber trip data is published to a MapR Event Store topic using the Kafka API. A Spark streaming application subscribed to the topic, Ingests a stream of Uber trip data Uses a deployed machine learning model to enrich the trip data with a cluster ID and cluster location Stores the transformed and enriched data in MapR Database JSON The Spark KMeansModel class is used to load a k-means model, which was fitted on the historical Uber trip data and then saved to the MapR XD cluster. Next, a Dataset of Cluster Center IDs and location is created to join later with the Uber trip locations. In order to read from Kafka, we must first specify the stream format, topic, and offset options. The next step is to parse and transform the binary values column into a Dataset of Uber objects. A Scala Uber case class defines the schema corresponding to the CSV records. The parse Uber function parses a comma separated value string into an Uber object. A VectorAssembler is used to transform and return a new Data Frame with the latitude and longitude feature columns in a vector column.

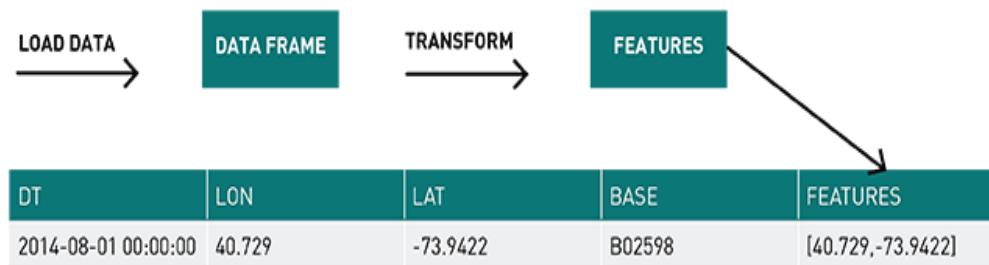


Fig 3.2 : Data Frame

The k-means model is used to get the clusters from the features with the model transform method, which returns a Data Frame with the cluster ID (labelled predictions). This resulting Datasets joined with the cluster centre Dataset created earlier to create a Dataset of UberC objects, which contain the trip information combined with the cluster Centre ID and location. The final Dataset transformation is to add a unique ID to our objects for storing in MapR Database JSON. The createUberId function creates a unique ID consisting of the cluster ID and the reverse timestamp. Since MapR Database partitions and sorts rows by the id, the rows will be sorted by cluster ID with the most recent first. We have now set up the enrichments and transformations on the streaming data. Next, for debugging purposes, we can start receiving data and storing the data in memory as an in-memory table, which can then be queried. The MapR Database Connector for Apache Spark enables you to use MapR Database as a sink for Spark Structured streaming or Spark Streaming. One of the challenges when you are processing lots of streaming data is where do you want to store it? For this application, MapR Database JSON, a high performance NoSQL database, was chosen for its scalability and flexible ease of use with JSON. Now we can query the data that is continuously streaming into MapR Database to ask questions with the Spark Data Frames.

IV. DATA QUALITY ANALYSIS

A critical stage in data analysis is to identify and characterize missing data in the target data set. By identifying missing data and taking it into account, awareness of data quality issues can guide the data handling strategy for further and deeper analyses.

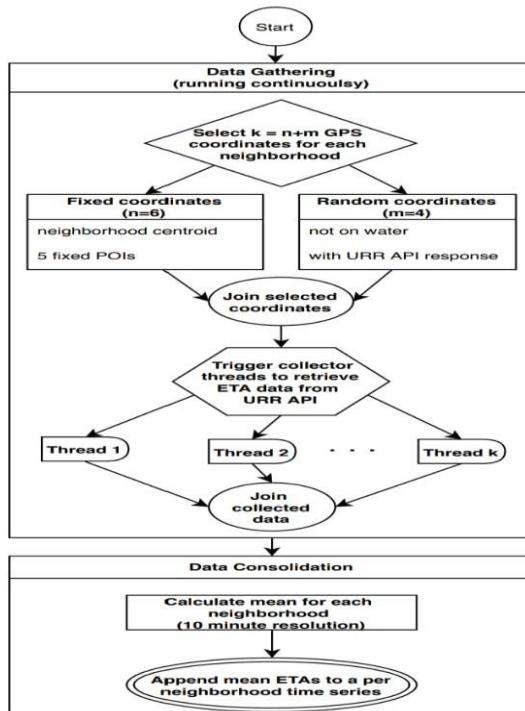


Fig 4.1 : Data collection and consolidation processes.

A missing data accounting and visualization toolset comprising the Python language libraries missingno and matplotlib was used to provide a quick visual summary of the completeness (or lack thereof) of the target data set. Figure 4.2 shows a nullity matrix manifesting missing entry count and dispersion over ETA data.



Fig 4.2 : Nullity matrix indicating missing data dispersion .

This missing data summary revealed a small incidence of missing values in the target data as a whole. Absences of about 2% and 5% can be identified for Uber X and Uber Select ETAs, respectively, with a well-dispersed data absence pattern for both variants. This suggests that the data collection and consolidation procedures operated adequately and work on a more sophisticated handling strategy (such as imputation or sub-sampling) for further analysis is not a strong requirement.

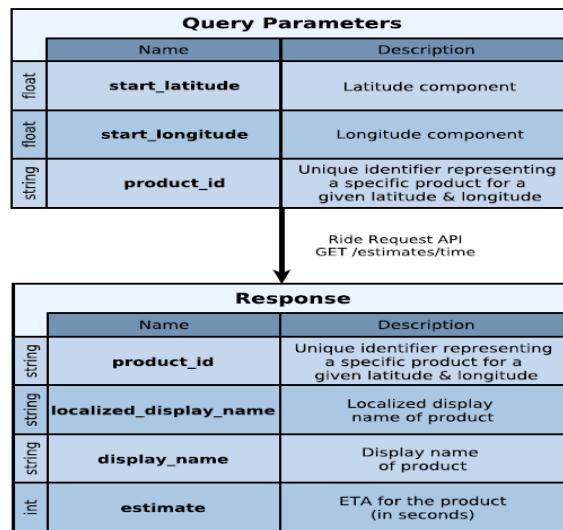


Fig 4.3 :Uber Ride Request API parameters.

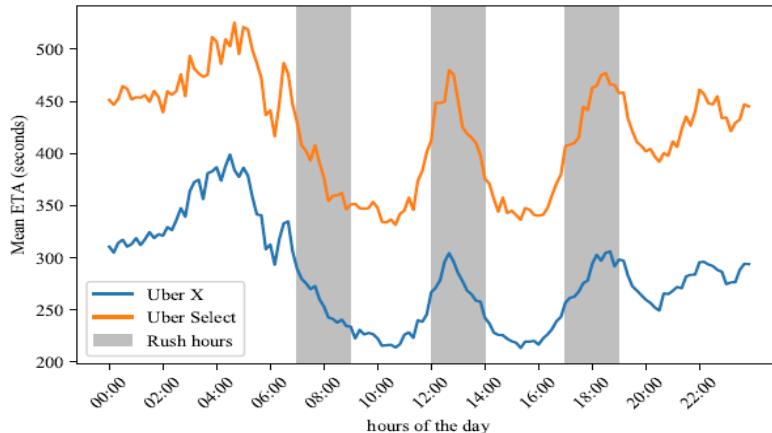


Fig 4.4: Time series plot of mean ETA over the hours if the day.

V. RESULTS

Our study makes a number of contributions and presents a number of potential avenues for urban liveability research. This is the first study that uses Uber data as an indicator of urban liveability. Notwithstanding this, only one Uber metric is used, ETA. Other Uber data may provide additional insights e.g. ride pricing, ride times, etc. A more formal and robust methodology is required to validate the use of Uber data as a liveability index. This may include qualitative research and could include other data sets and examine other real-time web service APIs. This may indeed, result in a wider indicator set, an integrated indicator, or composite indicator in the future. Furthermore, Uber data was used as a general indicator of urban liveability, partly due to the availability of the ULQI analysis on Natal. Clearly, due to the inherent nature of Uber, it has greater relevance and validity in the transport planning domain. Increasing the number of data sets, and the volume and variety of data, will enable a wider range of techniques to be used, providing greater utility and insights.

VI CONCLUSION

The principal purpose of Data Science is to find patterns within data. It uses various statistical techniques to analyse and draw insights from the data. The goal of a Data Scientist is to derive conclusions from the data. Through these conclusions, he is able to assist companies in making smarter business decisions. An overwhelming expansion of data archives posed a challenge to various industries, as these are now struggling to make use of such enormous amount of information. Almost 90% of all data ever recorded worldwide has been created in the last decade alone. This clearly suggests that administrations and companies that adopt contemporary data science analysis can expect business expansion and higher revenues.

For instance, data scientists calculated that the U.S. healthcare system could save \$300 billion annually through an adequate implementation of data science principles. Today, it is the mandatory precondition for all stakeholders to analyse data and use those conclusions to generate growth. Data science is attracting more and more young minds, so we've decided to give you a first-hand overview of the most important lessons learned from data science projects.

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Augmented Reality For Artistic Interpretation

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ABSTRACT: Art is an expression of emotions, thoughts and ideas .It can be characterized by a love of beauty involving a concern with pure emotions towards art. Any art we see in the art gallery, museum, story bookstore on the street conveys a message through the art. Augmented reality is a technology that overlays computer-generated image on a user's view of the real world, thus providing information that of the life-like appearance in art and in another proportion to the art. Artist strives to convey some messages through his artwork. Artists try to put their ideas, emotions to the paintings. These can be achieved only when the user's understand the art. When a person is studying the picture, and these messages can be interpreted in a different way by different people. To avoid the different theory that is being told, this project aims at conveying the message in a digital way through smart phones.

KEYWORDS: Augmented Reality, RANSAC, Unity, Zapper, Vuforia.

I. INTRODUCTION

Art is the meaning of giving life to the art. Art is the widest sense , it is a form of communication . It means artists intend to convey messages as well as the ideas and feelings through their painting. Art is an act of expressing feelings, thoughts and observation. It is a beautiful way of expressing our behaviour and nature in it. Different colours have different types of thoughts in them and they can give the messages to the viewers. Augmented reality emphasizes a version of the real world that is achieved through the use of visual elements. Its goal is to highlight the specific and unique features of the physical world . Augmented reality continues to develop and to spread a wide range of applications. For example we see many paintings in art galleries, museums and so on. Artists overlay their creative ideas and emotions through paintings. He tries to convey messages through his artwork, by studying the picture the messages can be interpreted in different ways to different people. So to avoid the different theory to different people the augmented reality technology is used to convey messages through smart phones. Where the people download the AR applications in their smartphones and when they scan the image the picture comes with physical world where the users experience the art in real world with the effects of audio and video through AR.

We have used four domains in our project i.e. storybook, newspaper, art gallery and graffiti(street art). The system we are implemented where the normal picture comes to real life and digital with effects of audio and video. The software requirements that is used in this project Augmented reality which is the software development kit, RANSAC is used for identifying the outliers of the targeted image in the vuforia database, unity is cross platform for game engine ,zappar is used as a augmented reality toolkit and vuforia works as a database in unity to store the images.

II. RELATED PAPERWORK

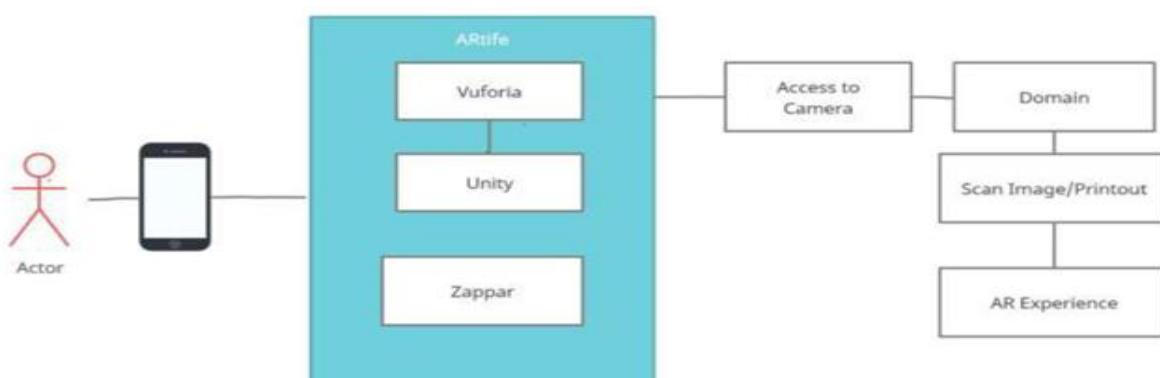
We referred around four papers with respect to our project that is augmented reality .[1] The first paper we referred to is Augmented reality for cultural heritage education published on September 2019. It is published by 6 authors. There paper contain about the history of the culture picture and art gallery lab testing they also formed the augmented reality in 2D and 3D animation. A app was created with respect to there art gallery. It was user friendly application.

[2] Design and implementation of an augmented reality application for rock art visualization in Cova dels Cavalls (Spain) published in the year 2019. It is also related to the Augmented reality in the field of rock art visualization. The author designed and implemented according to the need of user need they implemented the geolocation, hunting, tracing and the AR app to scan the image and find the relevant information of the picture which tell the history of it. The author also had the review for the application which he built.[3] Augmented Reality Storytelling Narrative Design and Reconstruction of a Historical Event in situ was published in the year 2020. The author here uses the Omaha beach landing which is a field of military warehouse. The author designed and implemented related to the military information the scanning of the picture and display the related information about the picture and a video is displayed related to it. It also displayed about the land whereabouts and information of the land and also included the tracking in it.[4] The Impact of Augmented Reality on Art Engagement: Liking, Impression of Learning, and Distraction was published in the year 2018. The author designed and implemented the augmented reality scan the image which is displayed on the wall and they contain the parent layer and children layer which also gives the information about the art which is exhibited. They also created the sample profile to get

the review of the visitor to the art gallery. They also added the interest, liking, learning and emotional connection to art they made surveys about the post and present in their paper and also about the objective knowledge gained per in each condition graph. From these papers we are going to implement some of these ideas in our project.

III. PROPOSED FRAMEWORK

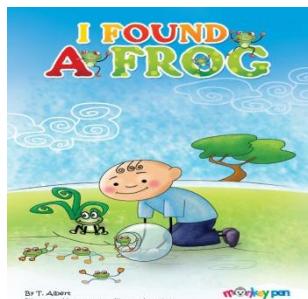
The augmented reality android app was designed to concentrate on enhancing artistic interpretation through visual overlays. The android app focuses on two main functions 1) augmenting the artwork, 2) asking permission to access the camera. The android application is a marker-based approach. The architecture of the project can be characterized into backend and front usage. Backend: the application is built using unity and vuforia, a software development kit (SDK) for AR. The front usage, which depicts the android app usage. Initially, it asks for permission to access the camera and provides a set of options to select the domain which includes a newspaper, art gallery, a storybook, and graffiti. The data is stored in the vuforia cloud which works along with unity. vuforia which helps image recognition with an inbuilt algorithm that locates the corner points and easily tracks the image which triggers the augmentation. The pictures were carefully selected which would match the vuforia image analyzer. Unity is a cross-platform that helps create interactive 3D/2D content more easily than with other platforms. Based on the feature extraction from the image by vuforia image analyzer a database is generated which is then loaded onto the unity engine. Concerning the app design, the user who uses the smartphone holds up to scan the image which he/she desires to view if the target image matches with the database in vuforia. The android app has a login page for each user, the smartphone would next ask for permission to access the camera and in which domain the user desires to experience an augmentation. The image scanned is sent to the vuforia database which scans through all the datasets and collects the exact image and augments the respective visual contents on top of the real-world image. The project also includes the implementation of zappar which is very similar to that of the project except the image target is a QR code. By scanning the QR code through zappar the user gets to see the multimedia which lies coded within the zapcode. With the implementation of unity, vuforia, and zappar the project adds a new dimension of visual art surrounding the user with an interactive and delightful technology to create magic in and around the artwork.



IV. EXPERIMENTAL SETUP

(a) We are using this story book domain to help with the experience of the children from the real world to the AR Experience. As the image target is set to the camera the story will be started and they can experience reading, watching the video and downloading the video. The fig(a) will tell about the story of the man for his present old age when he gets a glance of his childhood and he had experience of seeing the growth of frog from tadpole to the frog and share his experience with his mother. (b) As we all know, coronavirus is spreading all over the world and people cannot survive in this new atmosphere. It took many lives during this pandemic so to avoid and survive coronavirus The news INDIAN EXPRESS newspaper left a article. So many people and for childrens by seeing coronavirus picture and reading articles they do not know what exactly is so in our project we showed a clear view of the picture through a video and audio by using their smartphones. (c) There are many art galleries and museums around the world. Many people visit the museum. Artists try to put their ideas, emotions to the paintings. These can be achieved only when the user's understand the art. When a person is studying the picture, and these messages can be interpreted in a different way by different people. So to avoid this AR applications is used where they will scan the picture in their smartphones and understand the video with effects of AR which keep the people engaging and playful in the museum. (d) We see a lot of art on the street walls which is also called

graffiti. The artist who drew the picture put the ideas and emotions to the art so many of them will ignore the art so by using augmented reality application this can be achieved and keep the users engaging . fig(d) shows that humans are destroying themselves by cutting the trees so people will not understand the background of the picture so here we tell the story of the picture where humans are destroying nature for their own use and they are not only destroying nature but also themselves.



(a)



(b)



(c)



(d)

V. CONCLUSION AND FUTURE WORK

The Artife android app which is a marker based augmentation implementation built using unity and vuforia. The project aimed at enhancing the interaction with art works, by just holding up a smartphone to see the visual overlays. With other technologies trending, augmented reality is a best fit in the field of classical art, which helps in retaining the freshness and the authentic value of the art. With the project being implemented in four domains, being art gallery, newspaper, storybook, and graffiti. The project can lead to a world where the artist gets to express his/her thoughts, ideas through augmented reality and enhance the viewers' experience. This would attract more of the younger generation and helps in engaging and increasing curiosity in knowing more about classical art. To conclude, the project enables classical art to gain life through augmented reality which adds a new spectrum of importance. With the emerging advancement in the technology, the project would get better in handling the loopholes in the current technology.

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Survey On De-Duplication Of Cloud Amalgamated Data Using Fuzzy Logic

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ABSTRACT: Data de-duplication has played a critical role in ensuring data quality for enterprise applications. Naturally, there has been extensive research in this area, and many data cleaning algorithms have been translated into tools to detect and to possibly de-duplicate in certain classes of duplication. Since different types of duplicates may coexist in the same data set, we often need to run more than one kind of algorithm or tools or methods. The paper investigates use of fuzzy duplicate records which is a fundamental part of the data cleaning process. The vagueness and uncertainty involved in detecting fuzzy duplicates make it a niche, for applying fuzzy reasoning. Although uncertainty algebras like fuzzy logic are known, their applicability to the problem of duplicate elimination has remained unexplored and unclear, until today. This paper investigates the different methods followed so far to remove the duplicates in the cloud computing world. The experimental findings on the removing duplicates detected by various algorithms are considered for review. The coverage of each method is well analyzed and the order in which multiple algorithms can be run also makes a big difference. The paper proposes to bring out the gap in existing methods as most of the methods are efficient for a specific set of data.

KEYWORDS: De-Duplication, Cloud, Fuzzy Sets, Constant Distance.

I INTRODUCTION

A. Internet usage

Web clients have expanded significantly in the previous few years. An ever increasing number of individuals are coming on the web. It's anything but a significant piece of their day by day daily routine and associated with their social experiences. Additionally, in view of this COVID pandemic, the manner in which we connect with the web has essentially changed. We are utilizing innovation to do things we have never done. More prominent number of occupations, organizations, instructive foundations are taking advantage of innovation to complete the work even in such tough situations. The progressions it has brought are staying put, yet such headways in innovation additionally open it to some genuine security dangers which conveys digital intimidations one of the greatest worldwide dangers. In the previous few weeks of pandemic online dangers have ascended as much as multiple times. Assailants attempt to take or alter our information and can even assume responsibility for our frameworks. We have instances of worldwide scale assaults like ransom ware and a few assaults on the zoom stage. There has been gigantic development in utilization of PCs, data, online applications, versatile registering lately. This has come about into dramatic development of client base and their information across the globe. Always expanding information and extra room needed for putting away that information has become an excellent concern. Individuals convey their information to far off capacity because of restricted stockpiling limit, overhead and support and in this manner less monetary henceforth distributed computing turns out to be more famous. According to International Data Corporation (IDC Report, 2020) report, Global Data sphere is the blend of information produced, caught or imitated through the advanced substance from everywhere the world. IDC predicts that the Global Data sphere will develop from 33 Zettabytes (ZB) (1 ZB = 1021 Bytes or 270 Bytes) in 2018 to 175 ZB by 2025. In Fig. 1 by Internet Minute Info graphic (2020), we can envisioned the utilization of distributed storage of different cloud applications.



Fig. 1. Internet Minute pie chart (2018–2020)

B. Cloud computing

Cloud computing is the capacity to get to a pool of registering assets possessed and kept up with by an outsider through the Internet. It's anything but another innovation yet a method of conveying figuring assets dependent on long existing advancements like worker virtualization. The "cloud" is made out of equipment, stockpiling, organizations, interfaces, and administrations that give the methods through which clients can get to the foundations, processing force, applications, and administrations on request which are autonomous of areas. Cloud computing as a rule includes the exchange, stockpiling, and preparing of data on the 'suppliers' foundation, which is excluded from the 'clients' control strategy.

Cloud computing has assumed a significant part in tackling the shortcomings issue in associations and increment the development of business along these lines assist the associations with remaining cutthroat. It is needed to improve and robotize the customary methods of working together. Cloud computing has been considered as an inventive method to further develop business. Generally, distributed computing empowers the associations to deal with their business productively. Pointless procedural, managerial, equipment and programming costs in associations costs are abstained from utilizing distributed computing. Despite the fact that distributed computing can give benefits however it doesn't imply that there are no downsides. Security has become the significant worry in cloud and cloud assaults as well. Business associations should be ready against the assaults to their distributed storage. Advantages and disadvantages of distributed computing in business will be investigated in this paper. A few arrangements likewise gave in this paper to defeat the downsides. It offers assortment of chances that assist the associations with working on their business and use innovation all the more effectively. Numerous associations have begun embracing distributed computing in their business. It is hard for the associations to make due in the customary manners and they can't contend with their rivals. Particularly in this aggressive climate, react rapidly to business requests is important. The associations are important to carry out essential plans to acquire upper hands. Distributed computing is an upgraded innovation and become a crucial innovation to run business. It's anything but a great mechanical apparatus that assists the associations with remaining serious as it very well may be considered as a creative method to build business esteem. It empowers the clients and buyers to coordinate and consolidate various administrations together that expands the imagination and efficiency.

Various kinds of administrations will be given by distributed computing to the endorsers through the Internet. Distributed computing is something that all applications and administrations moved into "cloud". "Cloud" can be characterized as far off climate according to Information Technology viewpoint [55]. In any case, [7] characterized cloud as an enormous pool where processing assets are put away. Typically, it's anything but a solitary, straightforward interface for the clients to utilize and shroud the design. Figure 1 shows the engineering of distributed computing.

C. De-duplication

Information de-duplication is one of the strategies which used to address the redundancy of information. The de-duplication methods are for the most part utilized in the cloud worker for lessening the space of the worker. To forestall the unapproved utilization of information getting to and make copy information on cloud the encryption procedure to scramble the information before put away on cloud worker. Distributed storage for the most part contains business-basic information and cycles; subsequently high security is the lone answer for hold solid trust connection between the cloud clients and cloud specialist organizations. Accordingly to conquer the security dangers, this paper proposes various distributed storage. Hence the normal types of information stockpiling, for example, records and data sets of a particular client is parted and put away in the different cloud stockpiles

The development in innovation is expanding the measure of capacity or correspondence and strategy gadgets. There are numerous information sources like cameras, mobiles, tablets and PCs and so on. In some cases one individual has more than one gadget and putting away information from every one of them or he/she needs to utilize his/her information on any gadget that have whenever. The old innovation was to interface the gadgets to one another actually and begin moving information between them. The requirement for new innovation that ought to be simpler and quicker shows up. The researcher and analysts begin thinking for arrangement until they discovered the distributed storage [7]. Numerous mists are offered from various brands. After the cloud become well known and utilized from a colossal number of clients numerous Problems are showing up again with cloud. A portion of these issues are outer and other inward. Security was one of the large difficulties of the cloud specialist co-ops. The Implement and applied calculations to keep the client's data secure [4]. The information duplication is one of the large difficulties in distributed computing [6]. The copied information consequences for the capacity and the presentation of the cloud. Past explores show that about 90% of the information that are put away in cloud reinforcement are copied [1]. The analysts begin reading for de-duplication methods to enhance the capacity [5]. There is more than one approach to de-duplicate the information. Either by investigating the information inside the transferring and see whether it matches whatever is put away, on the off chance that it coordinates simply overlook it or by transferring the information, apply a calculation to investigate and check if any information are coordinated with keep one and erase the others [1]. This investigation center around the principal procedure which disregard transferring the copied information. Hash calculation is utilized to check the information on the off chance that it is coordinated disregard the transferring else consider it an interesting and keep transferring to store it.

II. RELATED WORK

Wen Xia and Min Fu [1] clarified that cross-client repetitive information are emerging from copy documents. They scrambled utilizing strategy for focalized encryption. Its primary point is to reinforcement the Cloud stockpiling, performs de-duplication to save space and organization transfer speed. The arrangement is to accomplish least extra room contrasted and existing. So client mindful of concurrent key encryption and staggered key administration has been done under this method. The exploratory outcome is to give better execution.

Jin Li, Xiao Feng Chen, Mingqiang Li, Jingwei Li, Patrick P.C. Lee and Wenjing Lou [2] presented the pattern approach where client simply keeps the expert keys. The proposed plot is utilized for productive and united key administration. They utilize various limitations to accomplish its objective utilizing proposed Dekey. Because of Dekey client need not deal with the key by own. The general consequence of this trial is the joined keys are appropriated across numerous workers. Consequently it has been in part prevailing in key administration.

MihirBellare, sriram Keelveedhi and Thomas Ristenpart [3] expressed about message bolted encryption for to determine the duplication of documents. This encryption is utilized to give increment the solid privacy of reevaluated document and assurance. They took care of it with capacity plain content by knowing its design and size. In Cloud it is utilized to give an ideal answer for the proposed work. Pasquale Puzio, RefikMolva and MelekOnen [4] publish additional encryption activity and access control system. They will probably get security and protection challenges. They propose Clouded up to deal with various imperatives. They used to lessen the extra room and save the extra room. The consequence of this trial had being somewhat succeeded.

Dimitrios vasilopoulos and Melek Onen [7] they gave confirmation of retrievability MLE. Consequently the information utilized is indistinguishable. It is performed on the arrangement stage with transferred material. It presents new encoding calculation ML encode. Be that as it may, it falls flat due to current POR. Dipti Bansode and Amar Buchade [8] the investigation of Deduplication method depicts how to get the information on Cloud. This framework has two parts front end and back end. It proposed utilizes application mindful file structure. The aftereffect of these examinations accomplishes unwavering quality in Deduplication. In future need to zero in on information access and erasure.

Xinyi Huang, Shaohua Tang and Yang Xiang [9] their first endeavor to formalize the idea of conveyed solid deduplication framework. They proposed new circulated deduplication in which information disseminated across various Cloud workers. It shows that the caused overhead is exceptionally restricted in reasonable conditions. Pyla. Naresh, K. Ravindra, Dr. A. Chandra Sekhar [10] they deal with the threat of information amassing the information security just as information trustworthiness and information deduplication on Cloud. They proposed structure of D-Cloud .It make hash gauge prior to moving, inspecting, respectability of information put into Cloud.

Himshai Kamboj and Bharati Sinha [1]. This paper presents a deduplication framework named "DeDup App" that sudden spikes in demand for administration equipment. At front end, DeDup App has a UI. At back end, HDFS is being utilized as capacity framework and fast ordering. Essentially, there are two issues to be tended to. First and foremost, recognizing the duplication in information records and also dealing with the proprietorship challenge for that information document. For above issues, we are utilizing MD512 calculation for making finger impression of every information record being transferred for introductory checking of copied documents and 256-bits AES for Encryption decoding.

Shunrong Jiangy, Tao Jiang and Liangmin Wangy [2]. In this paper, we propose a safe information deduplication conspire with effective PoW measure for dynamic possession the executives. Uniquely, our plan upholds both cross-client record level and inside-client block level information deduplication. During the document level deduplication, we develop another PoW plan to guarantee the label consistency and accomplish the shared possession check. Additionally, we plan a languid update system to accomplish effective proprietorship the executives.

P.Priya ponnusamy, Dr. R. Vidhyapriya, S. Uma Maheswari [3]. This paper proposes a looking through technique over the scrambled information, which supports multi-keywords positioned looking and dynamic capacities on the assortment of documents. We have summed up various types of scanning strategies for scrambled cloud information. A concentrate on the information security and usage issues are covered here for various searching procedures. A portion of the significant issues, effectively result positioning, inquiry protection and so forth. A portion of the looking through methods centers around the information security and some on the information usage.

Vishalakshi N S and S. Sridevi [12] they utilized united key encryption to scramble information prior to re-evaluating. In which they address the issue of approved information de-duplication and follows technique not the same as other conventional deduplication framework. They carries out model of approved copy check plot. Vishalakshi N S and S.Sridevi [13] they proposed Clouded up its objective is to give secure, effective capacity administration and information classification. It presented extra encryption activity with joined keys and access control system.

Shweta D. Pochhi, Prof. Pradnya and V. Kasture [14] in this they proposed the information pressure procedure. To ensure the rethought information it encode before information put into Cloud and backing approved copy checking. They utilized LFSR (straight criticism shift register) for to diminish concurrent key encryption shortcoming. K.Kanimozhi and N. Revathi [15] here they implements secure verification of proprietorship. In which the keys are gotten from substance of information itself for focalized key encryption. Also, it utilizes hash working so the document where it is found is obscure to other people.

Kwon et al. [34] recommended a de-duplication framework at the server-side for the encrypted data. It permits the Cloud Server to control the access to the outsourced data even while the ownership altered dynamically with the secured ownership group key distributions and exploited randomized CEs. It can avert data leakage to the revoked users though they formerly owned the data and even to the cloud storage. The system assures data integrity like the tag inconsistency attack. The efficiency estimation results corroborated that the scheme was almost as effectual as the former framework, while the extra overhead in computations was insignificant.

Yuanet al [35] developed a primitive termed and a fully randomized framework (R-MLE2). It comprises of '2' schemes: i) static and ii) dynamic, where the latter one permitted tree adjustment by elevating specific computation cost. The primary trick of the framework was to utilize the interactive protocol centered on dynamic or static decision trees. The security and performance analyses evinced that the frameworks were Path-PRV-CDA2 secured which attained multiple orders of magnitude and high-level performance for the data equality tests, more than the R-MLE2 framework, when the count of data items was comparatively large.

Han et al. [36] propounded a multi-bit secret channel in the cloud storage service, and also recommended a framework that attained good security and high-level data transmission rate. In the recommended algorithm, the data upload was simplified via multi-bit file depiction. It eradicated the need to upload "0" to diminish the number of uploaded files, thereby made it hard for the attacker to spot the covert channel and also effectually ameliorated the security of cloud user data upload. Tawalbeh et al. [37] reconsidered the security and privacy for cloud and fog environments with the case study of health care systems using fog simulator and enhanced the performance and trust among the end-users. Similarity and emergence centered indexing for high-performance deduplication of data was introduced by Zhanget al [38]. Which provides quick responses to fingerprint queries. Houet al [39]. Suggested to check the truthfulness of cloud data beneath the condition that the remote server stores only a single copy of the same file from different users.

Deduplication has confirmed to achieve great space and cost investment, and a higher number of distributed storage suppliers are currently embracing it. Deduplication can weaken capacity needs by up to 90–95% for corroboration [40]. As more users outsource their data to remote server storage, the latest data breach occurrences make end-to-end encryption increasingly desirable. Enhanced Secure Threshold Data Deduplication Pattern for remote storage helps to maintain end-to-end encryption [41]. A flexible admission control tool called Proxy re-encryption (PRE) has been recently hosted. PRE is an effective tool for creating cryptographically imposed admission control systems [42]. These schemes show competence in computational cost and cipher text size.

A confidentiality-preserving deduplication technique for remote storage in public cloud services is discussed in [43]. The authors have proposed a secure file deduplication mechanism on the encrypted file, supporting public reliability and auditing in the deduplication of the cloud storage system. A chaotic fuzzy transformation method is projected to provision protected fuzzy keyword indexing, storage, and query for fog systems that aid in raising the privacy and confidentiality of the end-user data and also by saving the resources of the mobile user devices [44]. A comprehensive study on various security problems associated with outsourced data on the cloud and their existing solutions is described using access control models for the cloud computing environment [45].

A framework to mine structures statically and dynamically from malware that imitates the performance of its code, such as the Windows Application Programming Interface (API) classifies malware with high accuracy and low false alarm rates [46]. The public-key-based schemes obviate the security vulnerability inherent to symmetric-key-based μ TESLA-like schemes. But their signature verification is time-consuming [47].

We have inspected the proposed solutions output for the more modest informational index/preparing dataset to set our edge boundary esteems for similarity score and standardized alter distance. Then, at that point we have executed proposed algorithms to the almost core datasets and we can recognize the lacks records that are close to copies. The exhibition of the proposed pair savvy rule generalization technique is discovered well than that of the earlier techniques. The level of compatibility system to the designated issue, checked against various dataset is called as the effectiveness of the framework. A significant part of the progressive bunch consolidating stage is deciding when to stop the groups from being blended further, with the goal that the leftover bunches can be accounted for as gatherings of referent records. Execution is the proportion of accomplishment of the specific undertaking verified against the past fulfillments. The performance of the proposed strategy is compared with the exhibition of the existing techniques.

III. CONCLUSION

The above papers directly indicate that the further study should focus on the analysis of big data by applying multiple layers of soft computing techniques. The presence of “big data”, or this massive amount of increasing data, offers both an opportunity as well as a challenge to researchers. A lot of progress has been made in developing the capability to process, store, and analyze big data: In addition to the big data computing capability (in terms of processing and storing big data in a distributed fashion on a cluster of computers), the rapid advances in using intelligent data analytics techniques—drawn from the emerging areas of artificial intelligence (AI) and machine learning (ML)—provide the ability to process massive amounts of diverse unstructured data that is now being generated daily to extract valuable actionable knowledge. This provides a great opportunity to researchers to use this data for developing useful knowledge and insights. Amalgamation of clouds leading to duplicate tuples poses a great threat to analysis and indicates that it is so important that some of the researchers would like to be using de-duplication as a pre-processing step and some recommend it as a cleaning process before analysis. The prime aim of the proposed system should be to evolve with a soft computational optimization technique that can address the issues of data mining over large and unstructured Big Data in cloud environment after de-duplicating when data is from more than one cloud. The secondary aim of the study is to adopt Neural Network, Fuzzy Logic and Genetic Algorithm as the techniques to overcome the challenges in de-duplication of cloud. In order to accomplish the proposed system it is necessary to have an in-depth review of literature for the purpose of analyzing various prior techniques used in de-duplication of data. It needs an effective approaches to verify check duplicate storage and data ownership with secure challenge and big data support. The security and assessment of performance of the proposed scheme with the analysis is needed. The Capacity reduction ratios advertised by many hash-based de-duplication vendors are best-case scenarios based on overly optimistic assumptions geared to small to midsize enterprises which may not lead to generalization of results. A de-duplication work to perform benchmarking of the proposed system with the most standard and significant existing study.

The above literature analysis clearly indicates that much work needs to be done in identifying the duplicates records in a big database. The problem is more rampant in big data where data is merged from different corners of database. It is needed to identify similar data in terms of concept also. This needs special treatment in analysis to understand the features to be understood. It is observed that fuzzy logic plays an important role in identifying similar data. The similarity index can be generated and based on which supervised identification of similar data can be considered.

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Medkit For Blind.

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ABSTRACT: In spite of the fact that the medical services society is delayed in receiving IoT (Internet of Things) than different fields, IoT in the field of medication is bound to keep individuals protected and solid where the principal design is to diminish the expense of medical care in the coming years. A shrewd federal medical care framework has been proposed here, which contains a knowledge medication box related with sensors and application for standard wellbeing observing. This shrewd medication box with remote web network assists the patients with getting customary medical services and make simple correspondence among specialist and patient without meeting actually. The proposed medication box assists the patient with taking the perfect medication at the perfect time alongside an email which will assist the patient with taking the medication. An application is used where point by point data about specialist and patient are put away alongside solution and arrangement date.

Both specialist and patient have IDs' and secret phrase for getting to the information in the applicaton. Likewise, the information of drug and temperature of patient are put away on the server for specialist's simplicity. The Doctor can change the patient's medicine if important, which will likewise be informed through email. In addition, the specialist can make prompt strides if there should be an occurrence of a crisis.

KEYWORDS: Internet-of-Things (IOT), smart medicine box, server, remote observation, Health- IoT.

I. INTRODUCTION

Human life expectancy has been enhanced due to the advances in medicine. Even, the diseases that were thought to be incurable can now be treated effectively by one or more drugs. For most of the cases patients have to take drugs for one or more time a day and they forget to take the drug. With most medicines, does have to be taken at a regular interval or for a certain time of the day. In this field the patients sometimes forget to take it and as a result the expected remedy becomes hard. The problem becomes acute for the patient of elderly people or patients with inadequate skills or knowledge to follow a medicine or cognitively impaired patients. This segment of the people needs to take a lot of medicines daily and for them taking medicines on time is an important thing. In-home healthcare can keep an important role to reduce the expenditure on medical care or treatment. It is needed to develop advanced and practical health related technologies and apply them directly in the house so that people can get health services easily. IoT in healthcare is a hope because medical centres can be more functional and patients can get better treatment. There are unparalleled benefits of this technology which can improve quality the health of patients like real-time monitoring can save lives in event of medical emergency. A study indicates that there was a 50% reduction in 30-day readmission rate because of remote patient monitoring on heart failure patients. Different IoT wearable devices are keeping role in the field of medical. mIoT is a critical piece of the digital transformation of healthcare and it enables a change in work process and cost management. Wearable IoT devices and the mobile apps are now helping in support fitness, health education and in disease management. Not only this, by the help of IoT medical equipment and drug monitoring has become easy and selling of counterfeit medicine has also been reduced more than 10%. As in China alone, at least 200,000 people die each year due to wrong medication. Patient information management has become easy as even patient's family medical history can be kept and reference can assist the doctors to develop treatment programs. Many countries have taken the initiative to upgrade their infrastructure though optimizing medical resources and increasing the use of home healthcare. Different researches and projects had been proposed to help people. Microcontroller based, IoT and RFID based project has been done which will give alerts to patients to take their medicine in right time. One of the researches on iHome system which consists different sensors and combining them a home healthcare system has been proposed which will offer a solution for the medication noncompliance problem by reminding the user and dispensing a certain amount of medicine by the help of RFID. Also, a smart medicine reminder system has been designed which has alerting system and display to remind about the medicine.

II. ARCHITECTURE OF THE PROJECT

In this undertaking, the canny medication box will help a patient to remind him/her about his/her drug when it is time to take. For instance, if a patient requirement to take medication at 6 a.m. Toward the beginning of the day the case will remind him by making sound and furthermore by sending a caution. On the off chance that he forgets the genuine season of taking medication and goes to take medication at any time the medication box won't open as a servo engine will make the crate bolted. While it's the ideal opportunity to take the medication then the case will make sound and will give notice until the client takes medication or open the cabinet. Additionally, in the event that the client is outside of the home, the medication box will utilize the Wi-Fi module to send warning to the client's fixed email address. The framework contains likewise a temperature sensor to quantify the temperature of the client as temperature can be an imperative component of the

observing patient's ailment. The temperature and taking medication information will be put away in application which can be gotten to by both patient and specialist so when the time has come the specialist can survey the medication and can change if necessary. Additionally, it will be useful for specialist.

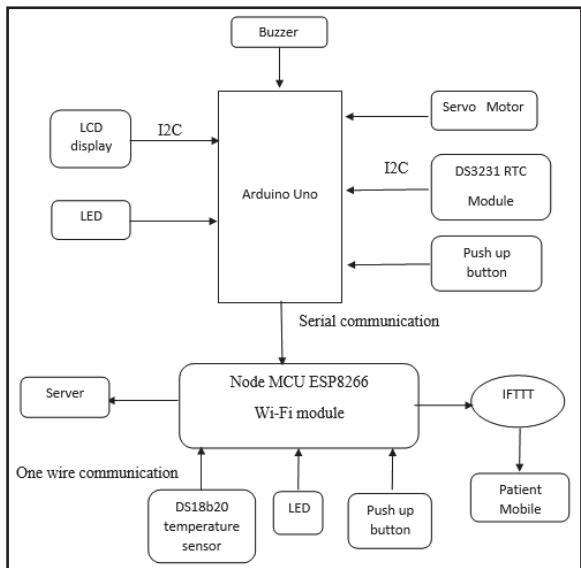


Fig. 1. Block Diagram of the connections.



Fig 2. Medkit

A. Framework Configuration:

Arduino UNO and NodeMCU Wi-Fi module are the principle two parts of this undertaking and associated with each other through sequential correspondence. Arduino predominantly controls three compartments of the medication box and NodeMCU is utilized for controlling temperature sensor, sending email to patients versatile and putting away drug time information, temperature information to the application. Every one of the sensors and gadgets identify with Arduino UNO and a 20×4 LCD show is associated with the I2C LCD connector. For moving email to the patient telephone for cautioning him/her to take medication the Wi-Fi module will utilize a mail moving convention has been made utilizing IFTTT [22].

IFTTT or If This Then That is a free electronic help which grants clients to make chains of straightforward restrictive explanations which are designated "Applets". An Applet is a little application that performs on a particular errand that upholds a bigger program. IFTTT is a free online assistance that helps us to make some particular errand programmed. It helps the client to trigger explicit activities on applications like Gmail, Facebook, Message and so forth Normal programming rationale is utilized to permit certain applications.

B. Control Algorithm

To control the shrewd medication box, a client needs to include the clinical subtleties and when to take them. As there are three compartments so the client can keep 3 kinds of medication as indicated by specialist management. In our framework, the control calculation is displayed in figure. A constant clock is produced utilizing the RTC module. The drug time or caution tone is set in the code assembled for this undertaking. In the event that the created genuine time clock coordinates with the drug time, then, at that point, a caution will be made, the Buzzer will ring and an email will be shipped off patients portable as warning, the LED light of that compartment will sparkle, and the medication name will be shown on the screen. In the event that the patient doesn't take medication or then again misses any warning, then, at that point the light of the compartment will gleam and name will be shown on the screen. After taking the medication from the compartment the LED will off. Estimating the patient's internal heat level and putting away estimated temperature information for the specialist's perception is another component of this task. A temperature sensor is coordinated with this task for estimating the patient's body temperature. This deliberate information is put away in the application. In application the deliberate information will be utilized for specialist's perception. The specialist can get data from a patient's internal heat level. The patient will put the sensor in his body like a thermometer and a press button is squeezed and a LED bulb will gleam which shows the sensor will understand information for 60 seconds. The Wi-Fi module separates the greatest esteem from the penusing and showed it on the LCD screen. Following 60 seconds the separated greatest information will be shipped off the application to assist the specialist with checking the patient distantly.

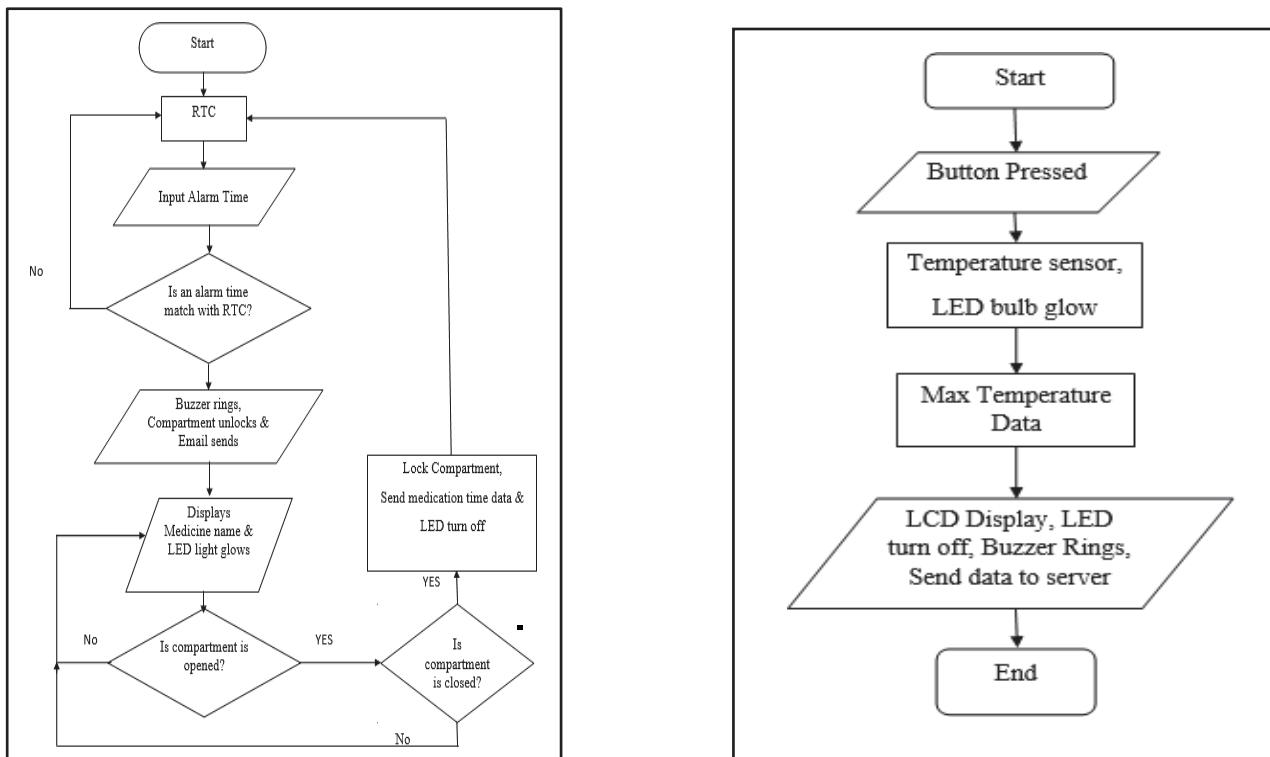


Fig. 4. Flow chart of medication process.

For the opening and shutting component, when the servo engine is in 90° point, then, at that point the compartment is bolted and while the caution rings at prescription time the servo will turn at 180° the compartment is prepared to open. The servo will turn back at 90° when A contacts C, after B contacting D as displayed underneath. Here A, B are info, and C and D are ground. Figure 5 shows the underlying condition of the servo engines when the compartment is shut, and figure 6 addresses when the compartment is prepared to open. Figure 7 shows the opened condition of the compartment and in conclusion figure 8 shows the shut condition of the compartment subsequent to taking the medication.

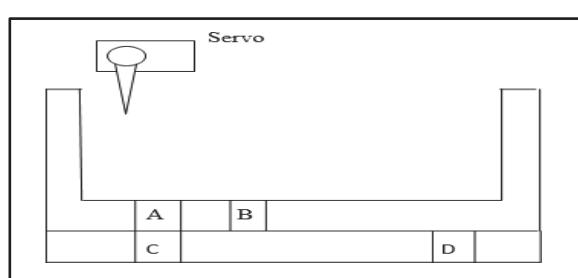


Fig. 5. Initial state of servo motor.

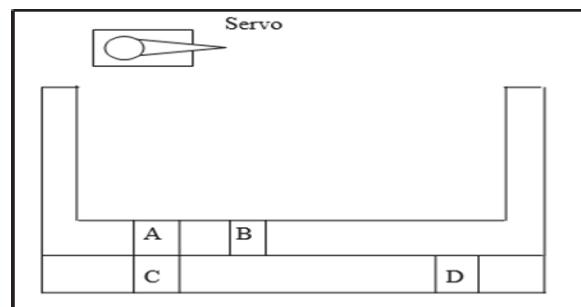


Fig. 6. Compartment is ready to open.

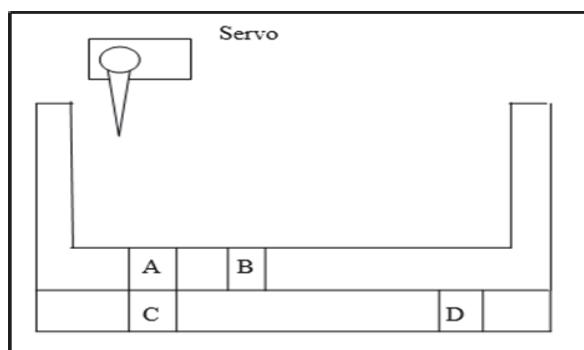


Fig. 7. Compartment is opened.

C. Sign-In and Homepage of the Application:

An application has been made to store a wide range of data about specialist and patient, drug time information furthermore, internal heat level information. Flutter is used to develop the application. Application contains specialist and

patient login alternative. A wide range of point-by-point data of specialist and patient, drug time information and temperature information are displayed on the smart phone. The application constrained by the clinic director. The accompanying figure is the landing page of the application. Both specialist and patient will discover their sign in page which contains an ID and secret key alternative. Subsequent to signing in to cut off with ID and secret word both specialist and patient can access their pages and discover data identified with medicine.

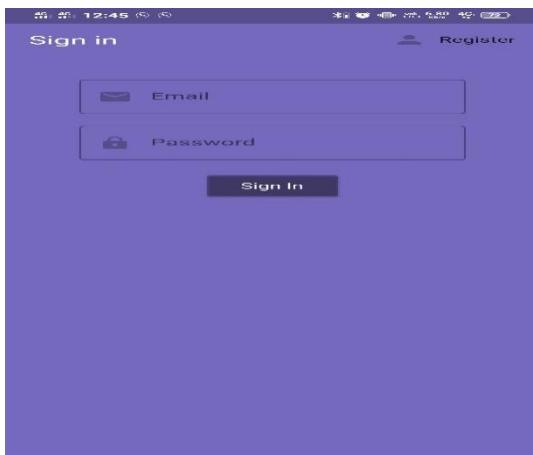


Fig 8: Sign in page

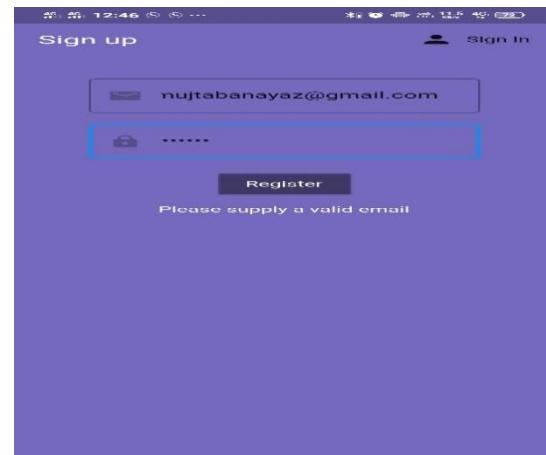


Fig 9: Sign up page

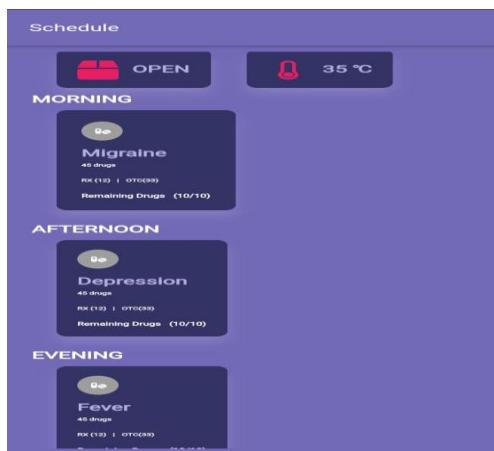


Fig 10: Homepage

III. EXPERIMENTAL STUDIES

In this paper, we put away medicine time information of a patient. As there are three compartments and these compartments contains an alternate sort of medication. For every compartment, there are medicine time information put away in the application. The specialists can undoubtedly see whether his patient is taking his medication appropriately or not. In the wake of noticing the medicine time specialist can make essential strides for his patient. For explore we three drugs are endorsed by a specialist for a patient and prescriptions are kept in three compartments of the box. Medication 1 kept in the principal compartment needs to take 3 times each day for 20 days, where medication 2 put away in compartment 2 requirements to take 2 times each day for 7 days and the third compartment containing medication 3 requirements to take 2 times each day for 7 days. We have plotted by the assistance of MATLAB to address the time (changed over into month).In the plot the red line addresses when the patient expected to take the medication and the blue line addresses at the point when the patient took the medication. It shows us whether the patient had taken the medication on schedule or made a deferral in taking the medicine. We utilize an advanced temperature sensor DS18b20 for estimating patient's internal heat level.The patient must place this sensor on his body like putting a thermometer in the mouth or in the arm. Then, at that point the patient should press a catch for beginning temperature estimation.Following 1 moment of estimation a signal will ring which shows the end of information estimation.

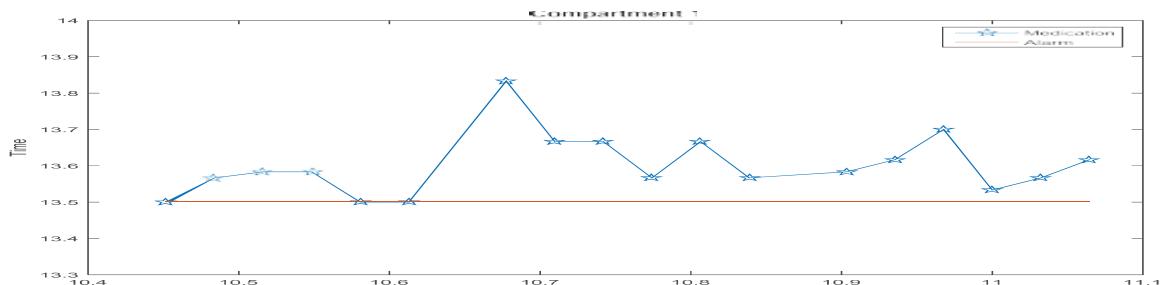


Fig. 12. 1st medication time data for 20 days of medicine kept in compartment 1

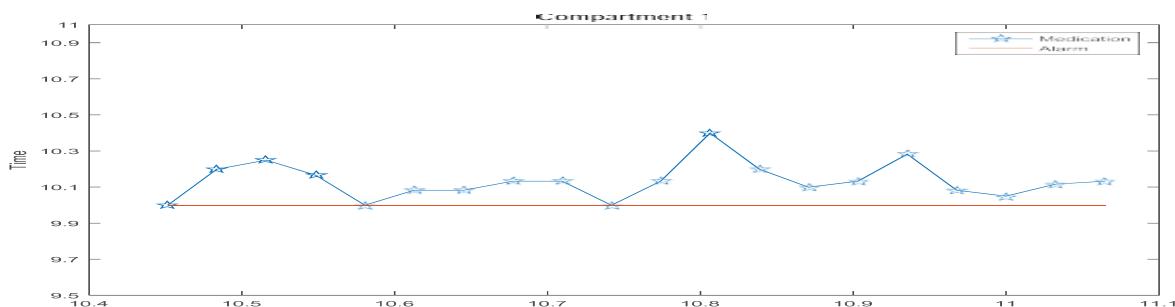


Fig. 13. 2nd medication time data for 20 days of medicine kept in compartment 1

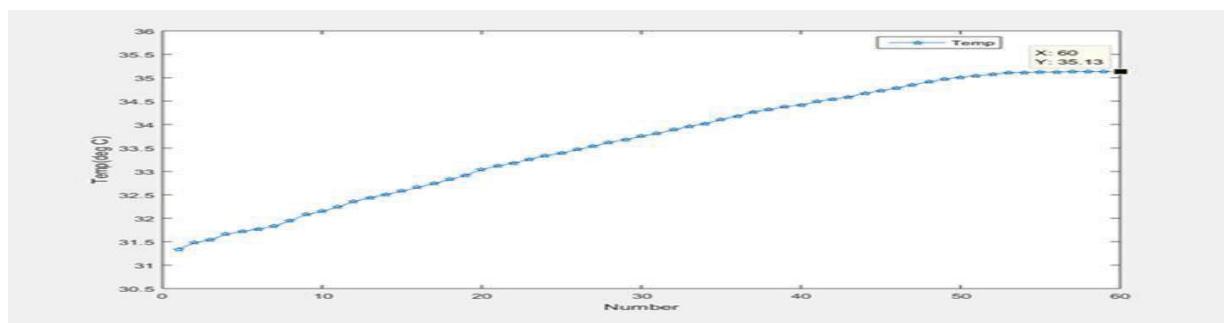


Fig. 15. Temperature data measured in 1 minute.

Alatrol 1+1+1			
Medication Time			
Date	Time1	Time2	Time3
14/10/2018	10:00 AM	01:30 PM	09:30 PM
15/10/2018	10:12 AM	01:34 PM	09:35 PM
16/10/2018	10:15 AM	01:35 PM	09:35 PM
17/10/2018	10:10 AM	01:35 PM	09:35 PM
18/10/2018	10:00 AM	01:30 PM	09:30 PM
19/10/2018	10:05 AM	01:30 PM	09:40 PM
20/10/2018	10:05 AM	09:40 PM	
21/10/2018	10:08 AM	01:50 PM	09:30 PM
22/10/2018	10:08 AM	01:40 PM	10:00 PM
23/10/2018	10:00 AM	01:40 PM	09:40 PM
24/10/2018	10:08 AM	01:34 PM	09:32 PM
25/10/2018	10:24 AM	01:40 PM	09:30 PM
26/10/2018	10:12 AM	01:34 PM	09:42 PM
27/10/2018	10:06 AM	09:36 PM	
28/10/2018	10:08 AM	01:35 PM	09:32 PM
29/10/2018	10:17 AM	01:37 PM	09:35 PM
30/10/2018	10:05 AM	01:42 PM	09:45 PM
31/10/2018	10:03 AM	01:32 PM	09:35 PM
01/11/2018	10:07 AM	01:34 PM	09:33 PM
02/11/2018	10:08 AM	01:37 PM	09:32 PM

Body Temperature	
DATE	TIME
2018-10-21	09:58:22
2018-10-22	10:21:22
2018-10-23	10:30:22
2018-10-24	10:42:22
2018-10-25	21:33:55
2018-10-26	21:12:33
2018-10-27	10:22:44
2018-10-28	10:15:35
2018-10-29	10:14:12
2018-10-30	10:25:33
2018-10-31	09:44:22
2018-11-01	09:25:33
2018-11-02	09:55:11

Fig. 16. Stored time data of consuming medicine from Fig. 17.: Stored time and temperature reading data of patient compartment 1.

The figure shows the estimated temperature information for 1 moment. In one moment, the sensor estimated temperature for multiple times consecutively in the 60 seconds. The X hub shows the quantity of estimating temperature information in 1 moment and in Y hub addresses estimated temperature information in 1 moment. Increment of the patient's internal heat level from 0th second to 60th second. Put away drug time information for a medication and it has been seen from the application. By noticing the line of that figure specialist can without much of a stretch see the precise drug time for that medication. Specialist can notice at the point when his patient missed the medication from the lines of that table. In this figure at 20/10/2018 and at Time 3 segment there is clear. Noticing the clear specialist can say patient did not take that medication at the time. Doctor can without much of a stretch know about a patient's internal heat level.

IV. CONCLUSION AND FUTURE WORK

As of late medical care framework is changing everywhere on the world. IOT based use of shrewd medical services framework has made another component of prescription and medical care in emergency clinics. The goal of his task is zeroing in on legitimate prescription of a patient. More seasoned individuals who need normal checking of their drug will be profited through this project. Application for putting away medicine time and other data, mail moving convention, temperature sensor or for appropriate checking of patient internal heat level has been incorporated in this undertaking.

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Convulsion Identification Using Electromyography Signals

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Paper ID-120

ABSTRACT: Epilepsy is a chronic neurological issue with a few distinct sorts of seizures, some of them portrayed by compulsory repetitive spasms, which incredibly affect the regular day to day existence of the patients. A few arrangements have been proposed in the writing to distinguish this sort of seizures and to screen the patient; be that as it may, these methodologies need ergonomic issues and in the appropriate combination with the wellbeing framework. This examination makes an inside and out investigation of the principle factors that an epileptic recognition and observing apparatus ought to achieve. Besides, we present the design for explicit epilepsy location and observing stage, satisfying these variables. Extraordinary consideration has been given to the piece of the framework the patient should wear, giving subtleties of this piece of the stage. At last, a fractional execution has been conveyed and a few tests have been proposed and done to settle on some plan choices.

L INTRODUCTION

Epilepsy is a chronic neurological disorder characterized by involuntary recurrent convulsions. There are around 65 million individuals influenced from one side of the planet to the other, with a high and sensational effect on the patient's personal satisfaction, yet in addition on the expert tum of events and social conduct, the wellbeing framework spending plan is profoundly influenced also. Primary part of the anamnesis interaction is the place where the information is assembled. The fundamental piece of the writing manages compelled spaces, that is, research labs or clinic rooms, or even the patient's home, however without thinking about the ordinary regular daily existence. We claim that the information ought to be assembled in regular daily existence, permitting the patient to unreservedly choose what to do and how to do it. This is important because firstly, the data is gathered from normal activities performed before and after a seizure, and secondly, the analysis and procedures should adapt to this unconstrained world, making the whole detection process much more difficult. A careful in-depth analysis of the seminal papers concerning epilepsy monitoring platforms and Mobile Cloud Computing (MCC) let us conclude that the current available platform, either in the scientific literature or in the market, lacks several main features that are not comprehensibly integrated. This investigation means to address a portion of these restrictions; to do as such, an answer is proposed and an experimentation stage has been acted to remove the reasonable ends for the epilepsy checking stages. In the following area, the most applicable commitments in the writing are broke down and censured, giving extraordinary consideration to the distributed stages; the principle worries that stay inexplicable are incorporated too.

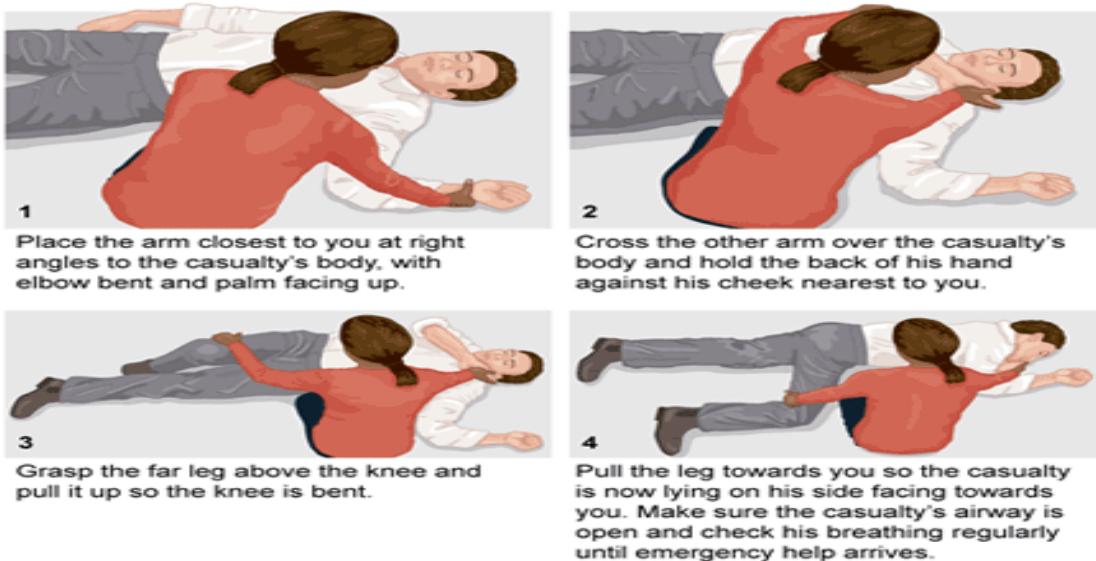
Epilepsy is a gathering of neurological illnesses portrayed by epileptic seizures that influences over 10% of the human populace worldwide and brought about 116,000 Sudden Unexpected Death in Epilepsy (SUDEP) over the most recent two years, particularly engine vehicle mishaps. In created nations, babies represent the greater part of the seizures. Around 5-10% of individuals more than 80 years of age have had a seizure. The current seizure discovery arrangements depend on manual examination, and the interest for robotized recognition is high, also the requirement for expectation. Utilizing on the web unaided Brain Computer Interface (BCI), location and observing the arrangement can at any rate help in distinguishing the seizure indications ahead of schedule to keep away from deadly results. In any case, the constraints in the recognition time are a test.

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The present status-of-the-craftsmanship structures either require an ideal climate to work, inclined to commotion, have limits with expectations, or require an amazing computational force just as a ton of wiring on the patients, and in a large portion of the cases, they don't give a shut circle forecast and identification frameworks nor simple specialist admittance to choices instruments, which can cost the patient's life. In this investigation, we propose an early indicator of epileptic seizures that is based on artificial immune systems (AIS).

The framework utilized a dispensable wearable non-obtrusive sensors set on a headband that speaks with an advanced mobile phone or any ICU observing gadget through a Bluetooth (BT) association innovation.

The proposed framework of our system utilizes negligibly a non intrusive wearable EEG, with a sign handling chip joined to it, which is set behind the patient's ear and associates through a BT to an outside checking gadget, or to an ICU staff or specialist's shrewd handheld gadget.

**Recovery position**

II. LITERATURE SURVEY

Title: "Detection of generalized tonic-clonic seizures by a wireless wrist accelerometer: a prospective, multicenter study"

Author: S. Beniczky, T. Polster, T. W. Kjaer, and H. Hjalgrim,

Description:

This is mostly a research study focused only on the detection of tonic-clonic epileptic seizures. A WD without wireless communication stored data and some machine learning methods were performed for obtaining offline models.

Title: "Miniaturized wireless ECG monitor for real-time detection of epileptic seizures"

Author: F. Masse, M. V. Bussel, A. Serteyn, J. Arends, and J. Penders

Description:

This research details the design of an ad hoc epilepsy detection ECG wireless intelligent sensor, including several detection algorithms, linked to a local computer connected to a network. Several relevant factors were analyzed, the ergonomic issues and the battery life among them. The WD communicates with the local computer in order to deliver alarms, to receive configuration commands, or to start/stop HR recording to be downloaded to the computer. A very detailed explanation of the requirements and of the hardware decisions is included.

Title: "Identification of brain regions of interest for epilepsy surgery planning using support vector machines"

Author: Joshua A. Dian; Sinisa Colic; Yotin Chinvanun; Peter L. Carlen; Berj L. Bardakjian

Description:

In patients with intractable epilepsy, surgical resection is a promising treatment; however, post surgical seizure freedom is contingent upon accurate identification of the seizure onset zone (SOZ). Identification of the SOZ in extra temporal epilepsy requires invasive intracranial EEG (iEEG) recordings as well as resource intensive and subjective analysis by epileptologists. Expert inspection yields inconsistent localization of the SOZ which leads to comparatively poor post surgical outcomes for patients. This study employs recordings from 6 patients undergoing resection surgery in order to develop an automated and scalable system for identifying regions of interest (ROIs). Leveraging machine learning techniques and features used for seizure detection, a classification system was trained and tested on patients with Engel class I to class IV outcomes, demonstrating superior performance in the class I patients. Further, classification using features based upon both high frequency and low frequency oscillations was best able to identify channels suited for resection. This study demonstrates a novel approach to ROI identification and provides a path for developing tools to improve outcomes in epilepsy surgery.

Title: "Brain state evolution during seizure and under anesthesia: A network-based analysis of stereotaxic eeg activity in drug-resistant epilepsy patients"

Author : Robert Yaffe; Sam Burns; John Gale; Hyun-Joo Park; Juan Bulacio; Jorge Gonzalez-Martinez; Sridevi V. Sarma

Description:

Epilepsy is a neurological condition with a prevalence of 1%, and 14-34% have medically refractory epilepsy (MRE). Seizures in focal MRE are generated by a single epileptogenic zone (or focus), thus there is potentially a curative procedure -

surgical resection. This procedure depends significantly on correct identification of the focus, which is often uncertain in clinical practice. In this study, we analyzed intracranial stereotaxic EEG (sEEG) data recorded in two human patients with drug-resistant epilepsy prior to undergoing resection surgery. We view the sEEG data as samples from the brain network and hypothesize that seizure foci can be identified based on their network connectivity during seizure. Specifically, we computed a time sequence of connectivity matrices from EEG recordings that represent network structure over time. For each patient, connectivity between electrodes was measured using the coherence in a given frequency band. Matrix structure was analyzed using singular value decomposition and the leading singular vector was used to estimate each electrode's time dependent centrality (importance to the network's connectivity). Our preliminary study suggests that seizure foci may be the most weakly connected regions in the brain during the beginning of a seizure and the most strongly connected regions towards the end of a seizure. Additionally, in one of the patients analyzed, the network connectivity under anesthesia highlights seizure foci. Ultimately, network centrality computed from sEEG activity may be used to develop an automated, reliable, and computationally efficient algorithm for identifying seizure foci.

Title: "A sparse Laguerre-Volterra autoregressive model for seizure prediction in temporal lobe epilepsy"

Author: [Pen-Ning Yu](#); [Shokofeh A. Naiini](#); [Christi N. Heck](#); [Charles Y. Liu](#); [Dong Song](#); [Theodore W. Berger](#)

Description:

This A sparse Laguerre-Volterra autoregressive model has been developed as feature extraction from subdural human EEG data for seizure prediction in temporal lobe epilepsy. The use of Laguerre-Volterra kernel can compactly yield an autoregressive model of longer system memory without increasing the number of the coefficients. In 6 sets of seizure, we used a sparse Laguerre-Volterra autoregressive model with 6 coefficients and the decay parameter of 0.2 and obtained the 10-fold cross-validation prediction results of high Matthews correlation coefficients (0.7-1) and low prediction errors (<15%). These results demonstrate that the sparse Laguerre-Volterra autoregressive model is effective in the feature extraction for seizure prediction. Finally, this sparse Laguerre-Volterra method can be easily adapted to a potentially more powerful nonlinear autoregressive model as the feature extraction rather than linear autoregressive model that we are currently using.

Title: "Pre-Ictal Entropy Analysis of Micro-wire Data from an Animal Model of Limbic Epilepsy"

Author: [Mitushi Mishra](#); [Britta Jones](#); [Jennifer D. Simonotto](#); [Michael D. Furman](#); [Wendy M. Norman](#); [Zhao Liu](#); [Thomas B. DeMarse](#)

Description:

Epilepsy is a common neurological disorder that can have damaging effects in the brain including over 50% loss of neuronal activity in the hippocampus regions of the CA1 and CA3. The pre-ictal period was studied in an animal model of limbic epilepsy using Shannon entropy and correlation analysis. The primary aim was to uncover underlying relative changes in signals between the Dentate Gyrus and CA1 areas of the bilateral hippocampus. Preliminary entropy analysis results included dynamical changes between channels in the Dentate Gyrus and channels in the CA1 region at and around the time of the seizure.

Title: "Myepipal, Mobile application for managing, monitoring and predicting epilepsy patient,"

Author: N. A. Marzuki, W. Husain, and A. M. Shahiri

Description:

MyEpiPal is an app that monitors the patient, simplifies the intercommunication between the caregiver and the patient, and allows the self-management. This means that although it makes use of the sensory within the Smartphone, the main goal is to give support to the patient in everyday life. It is not an epilepsy detection platform itself, although the measurements can help in the prediction of the occurrence of a seizure, which is the reason that it is included in this comparison

III IMPLEMENTATION

A number of tests are used to determine whether a person has a form of epilepsy and if so, what kind of seizures the person has. So, methods may be based on embedded systems along with Sensors, image processing and blood test in our project we are using

Image processing

Embedded system

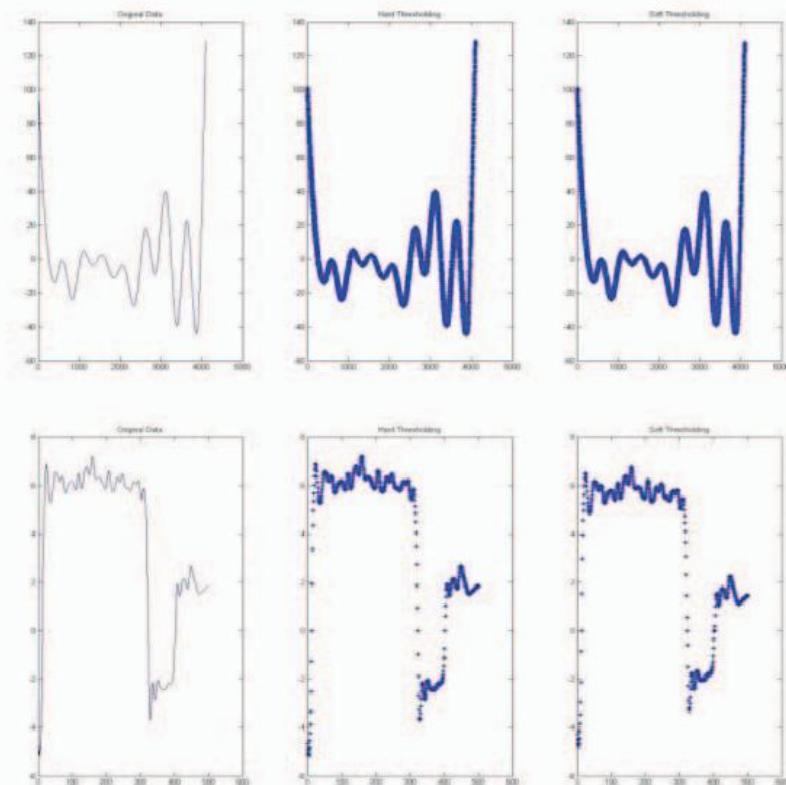
Image Processing:

Image Acquisition: Images utilized for look acknowledgment are static pictures. To take the pictures of articulations of individuals we utilize a Panasonic camera (Model DMC-LS5) with focal length of 5mm is utilized. The configuration of pictures is 24 digit shading JPEG with goal of 4320x 3240 pixels. The distance between the camera and individual was four feet and pictures of six essential articulations of every individual were taken.

Image Preprocessing: The picture preprocessing methodology comes as a vital advance in the look acknowledgment task. The goal of the preprocessing stage is to take pictures which have standardized force, uniform size and shape, and address just a face communicating certain feeling. The preprocessing strategy ought to likewise lessen the impacts of brightening and

lighting. Articulation portrayal can be sensitive to interpretation, scaling, and turn of the head in an image. To fight the impact of these inconsequential changes, the facial picture might be mathematically standardized before arrangement.

Feature Extraction: In creating exact look acknowledgment framework include extraction is the main stage. Natural facial pictures hold immense measures of information and highlight extraction is needed to diminish it to more modest arrangements of information called highlights. Highlight extraction change pixel data into a raised sum portrayal of shading shape, movement, surface, and spatial setup of the face or its highlights. The isolated portrayal is used for additional articulation arrangement. Highlight extraction usually diminishes the data's dimensionality space. The decrease system should keep up fundamental information having high isolation power and high security.



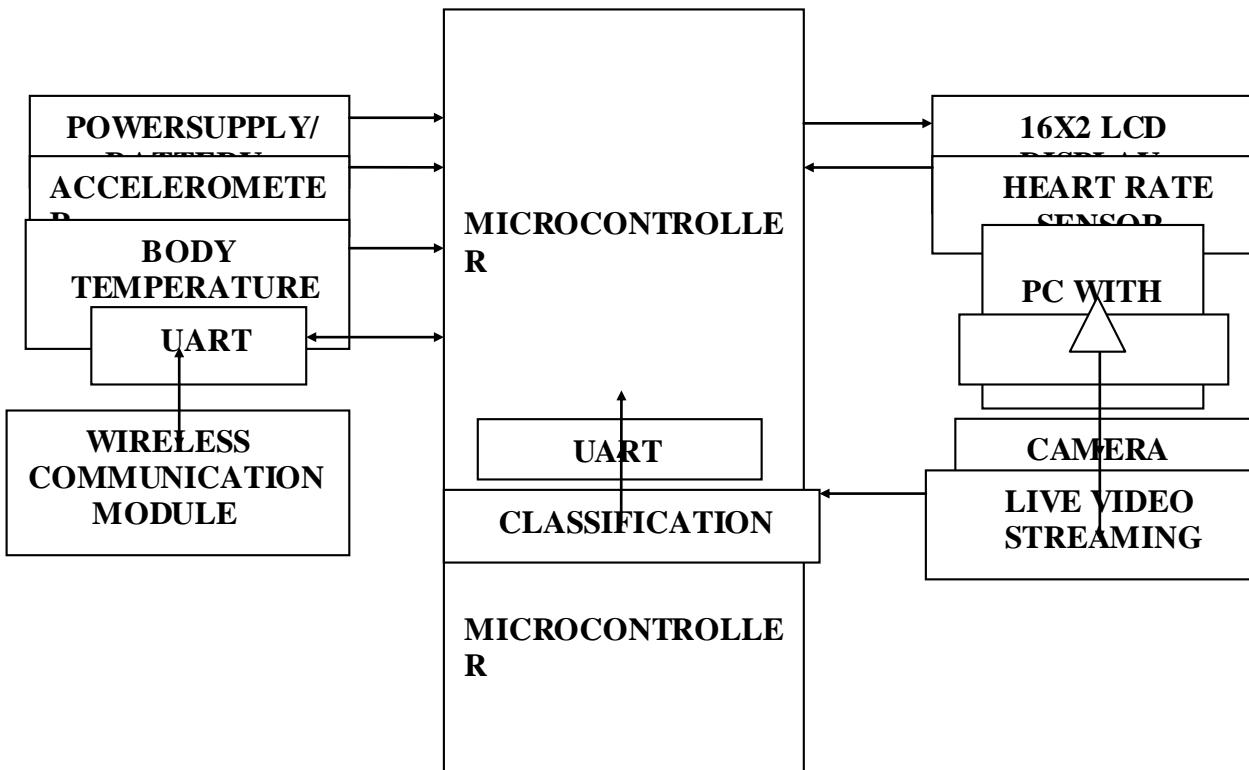
Feature Selection: Feature selection is worried about picking of a subset of highlights totally important to play out the characterization task from a bigger arrangement of up-and-comer highlights. The element determination step affects both the computational intricacy and the nature of the order results. It is fundamental that the data contained in the chose highlights is satisfactory to accurately check the information class. Such a large number of highlights may pointlessly raise the intricacy of the preparation and grouping errands, while a poor, deficient choice of highlights may detrimentally affect the characterization results. The way toward choosing a sub arrangement of highlights improves the proficiency of classifier and diminishes execution time.

Classification: The last advance of Facial Expressions Recognition frameworks is to perceive look dependent on the removed highlights. Characterization alludes to an algorithmic methodology for perceiving a given articulation as one of the given number of articulations. We use Support Vector Machine classifier for characterization. When the order is done characterized data will be given to regulator by means of UART to advise the worry people versatile App through Wi-Fi.

Embedded system:

Second method of detecting the epilepsy is utilizing sensors with controllers, generally EEG is utilized recognize the brain waves through this neurological signs can be recognized however this isn't sufficient to distinguish the epilepsy, in our tasks we will focusing on look and body boundaries like temperature his head or body movements utilizing MEMS innovation and pulse of the individual, through this order should be possible and educated to concern individual utilizing Wi-Fi.

System architecture:



IV. PROPOSED SYSTEM

Epilepsy is a gathering of neurological sicknesses portrayed by epileptic seizures that influences more than 10% of the human populace worldwide and brought about 116,000 Sudden Unexpected Death in Epilepsy (SUDEP) over the most recent two years, particularly engine vehicle mishaps. In created nations, babies represent the vast majority of the seizures. Around 5-10% of individuals more than 80 years of age have had a seizure. Victims have an expanded possibility of encountering a subsequent seizure, and ordinarily epilepsy can't be relieved. Seizures can likewise happen to infants, sluggish, or critical engine impeded patients, particularly in Intensive Care Units (ICU). The circumstance can be much more extreme when clinical work force are not qualified for EEG signal investigation, which is an exceptionally regular case. The current seizure location arrangements depend on manual examination, and the interest for mechanized identification is high, also the requirement for expectation. Utilizing on the web unaided Brain Computer Interface (BCI), recognition and checking the arrangement can in any event help in identifying the seizure side effects right on time to stay away from deadly results. Notwithstanding, the limits in the recognition time are a test.

V. ALGORITHM

- Step 1: Press the switch
 - If switch is pressed go to Step 4
- Step 2: Indoor mode
 - Image processing mode
- Step 3: Find the human expression
 - If Expression changed go to Step 8
- Step 4: Outdoor navigation
- Step 5: Read the status of the temperature sensor
 - If > Threshold , Go to step 8
- Step 6: Read H.B sensor
 - If > Threshold , Go to step 8
- Step 7: Read Muscular sensor and if there is variation , Go to step 8

Step 8: Alert through Buzzer and display on LCD and update through Wi-Fi

VI OUTCOME

First, the entirety of the past work and the proposed work surpass the exhibition of the irregular supposition which makes them a specific possibility for future execution. We have seen the lower execution that we get with PT3, as there were more bogus positive forecasts and bogus location than the mean qualities. Accordingly, we read the EEG for that particular case in more subtleties, and it turns out an uncommon patient's condition and age. Be that as it may, there are a few downsides in the proposed framework at this stage. The first issue is the unusual antiquities that typically exit with a few babies who experience the ill effects of seizure. Baby Spasm Syndrome and Febrile Seizure, which normally happen in kids matured 3 months to 5 years. Be that as it may, such cases are viewed as uncommon (for example 2% to 5% of the multitude of youngsters). The second issue is that there is as yet a generally short forecast time. In any case, we accept that the advances in neurosciences can bring us more pieces of information and EEG signal markers that we can concentrate to anticipate a superior example for a more exact forecast. Despite the way that EMG is a significant clinical device for diagnosing, checking and overseeing neurological issues, unmistakable challenges related with EMG investigation and understanding which impede alters wide spread acknowledgment in our undertaking is zeroing in on both picture handling and inserted framework to track down the look of the individual and body boundaries. SVM is utilized for grouping which is precise than past strategies.

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Reaping Perpetual Benefits By Integrating Biological And Information Sciences As The New Paradigm Of Bioinformatics

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Paper ID-121

ABSTRACT: Early research in computational biology and evolutionary biology inspired the early scientists to conduct enough biological research findings to the information science and this gave rise to finding the nuances of computational biology using information science, computer programming and database management. The progress in plant and animal breeding to achieve food security world over supports this view supplemented by ongoing research on different Bioinformatics platforms. The evolution of this branch of science enthused more research to be carried out, this present intellectual discourse aptly tries to view Bioinformatics as an interdisciplinary science that encapsulates the basic tenets of modern computational biology with huge application of data science, mathematics, statistics and database management techniques that augured well for this relatively new branch of science. This paper also discusses the future of Bioinformatics as can be illustrated by the example of combating Novel Corona virus outbreak caused by genomic manipulation. Potential applications of Bioinformatics in other branches of modern human intellectual discourse like cancer research, protein sequencing and nucleic acid polymerisation techniques that abundantly use large sample data and discover new ways to correlate them into therapeutic and prophylactic findings by using advanced computational techniques. A meta-analysis and empirical research done in this concept paper concludes with the observation that given its journey through integration of numerous computational and biological discourse, Bioinformatics is poised for exponential growth as research output and industrial applications.

KEYWORDS: *information sciences, computational biology, neural networks, genomics, cybernetics*

I. INTRODUCTION

There is an increasing technological convergence occurring between biology and computer science. We are constantly hearing about genetic algorithms, DNA chips, neural networks, etc. These words are jargon from separate disciplines merged into hybrid, compound terms. Much like with businesses, the biological research world is becoming truly inseparable from the information systems needed to support scientific research and technological development. While these developments are exciting and promising, they also provide the scientific community with serious challenges. The intersection between computer science and biology has been described as bioinformatics (Baxevanis and Oullette, 1998). It is this bioinformatics that must deal with the challenges and deliver the paths that will allow the new century of biology to bear fruit. Bio Informatics is an interdisciplinary field where software tools and methods are developed for understanding large and complex biological data. Bio Informatics combines biology, computer science, information engineering, mathematics and statistics to analyse and interpret the biological data. Scientific research conducted by means of computer modelling or computer simulation (*in silico* analysis) is used in Bioinformatics to analyse biological queries. Computer Programming is an integral part of their Bio Informatics methodology, especially in the field of genomics which is a branch of molecular biology dealing with mapping of genomes. A better understanding the genetic basis of disease can be done using Bio Informatics science by studying unique adaptations of genes, which are the hereditary unit of life. In modern agricultural science, desirable properties of cultivated crops and the differences between populations of inter and intra-species interactions can be studied more systematically using Bio Informatics. This branch of science offers huge scope of breakthrough research by understanding biological organisational principles within nucleic acid and protein sequences as building blocks for specific scientific discourse termed as “proteomics”. Bio Informatics has now become an important part of many areas of modern biological research. The basic understanding of gene mutations has helped us identify previously unknown diseases, like today’s Covid-19 that has afflicted humanity drastically. Lockdowns imposed by countries due to Covid-19 outbreak paralyzed the world economy, created joblessness, chaos and confusion of unthinkable magnitude. Interestingly, there are many US and European Conspiracy Theorists who claim that Covid-19 is a laboratory designed virus, a biologically potential weapon of mass destruction (WMD), released from the military lab in the Wuhan city of China. The scientific community is still trying to produce an effective vaccine to cure this disease, which if discovered and approved by World Health Organization (WHO), can offer great relief to the mankind. In this critical juncture of our time, Bio Informatics as a science offers huge scope to saving the humanity, by integrating biological science and information technology and thereby identifying the symptomatic from the asymptomatic in a population through valid testing and screening methods. IIT Delhi Professor of Biological Sciences Department Dr Biswajit Kundu and his team has developed PCR technique-based quality and affordable Covid-19 test kits as a diagnostic tool approved by ICMR. As a cutting-edge application of Bio Informatics, smart phones with installed app by government of India named Arogya Setu are playing a

crucial role in this process by integrating the biological data of India's affected citizens and for further analysis to contain the spread of this debilitating viral ailment called Covid-19. Bioinformatics successfully integrates the revolutionary works of Gregor Johann Mendel (Father of Genetics) and Charles Darwin (the proponent of Theory of Evolution) and forms also the basis for Structural biology. Humanity today is blessed that as an amazing branch of modern science, Bio Informatics has successfully steered the knowledge management process and is poised to usher in a new world free from economic, social, technological and human crises that have resulted due to old pandemics like Spanish Flu, Plague, Small Pox and Ebola and the recent Novel Corona virus (Covid-19) pandemic outbreak.

II. JUXTAPOSITION OF BIOINFORMATICS & DATA SCIENCE

Bioinformatics uses computation to better understand biology. Bioinformatics and computational biology involve the analysis of biological data, particularly DNA, RNA, and protein sequences. Analysing biological data to produce meaningful information involves writing and running software programs that use algorithms from graph theory, artificial intelligence, soft computing, data mining, image processing, and computer simulation. The algorithms in turn depend on theoretical foundations such as discrete mathematics, control theory, system theory, information theory, and statistics. Databases are essential for bioinformatics research and applications. Many databases exist, covering various information types, like DNA and protein sequences, molecular structures, phenotypes and biodiversity. Software tools for bioinformatics range from simple command-line tools, to more complex graphical programs and standalone web-services available from various bioinformatics companies or public institutions. Many free and open-source software tools often act as incubators of ideas, or community-supported plug-ins in commercial applications, for assisting with the challenge of bio information integration. Web services in bioinformatics include SOAP- and REST-based interfaces that have been developed for a wide variety of bioinformatics applications allowing an application running on one computer in one part of the world to use algorithms, data and computing resources on servers in other parts of the world. A bioinformatics workflow management system is used to compose and execute a series of computational or data manipulation steps in a Bioinformatics application to provide an easy-to-use environment for individual application scientists to view their results in real-time.

III. TRANSCENDENTAL IMPACT OF BIOINFORMATICS ON BREEDING

Breeders sell modified organisms that they tailor to meet specific requirements set forth by farmers and consumers. Breeding is thus a real-time information management project, in which variant organisms are produced, evaluated, and their fate decided with respect to the next generation. As breeders' tools for evaluation of their material have become more precise the need for integrated data management has become more and more obvious. Information systems for public breeders have been developed as independent efforts across organisms and types of information relevant to the breeders' needs (Sobral et al., 1999). Even in the private sector, many of the information system resources were developed over long periods of time using various proprietary technologies. This development process has resulted in unnecessary constraints to utilization of the information and its transformation into knowledge and products. The problem of using information housed in different databases providing different types of access is a computer science research and application area that is being tackled by businesses and other organizations daily. It is known as the heterogeneous database problem. Various technologies and approaches can be leveraged from experiences of these organizations in nonbiological domains. However, in biological information management, researchers suffer from two levels of heterogeneity: one is across different systems housing the same types of information, and a second is across different types of data that need to be related and available for analysis through a single interface. Private and federal funding for plant biology has increased significantly over the last few years, led by changes in biological research brought about through genomics. Genomics embodies the technology of high-throughput engineered laboratories acquiring data on populations of cellular components.

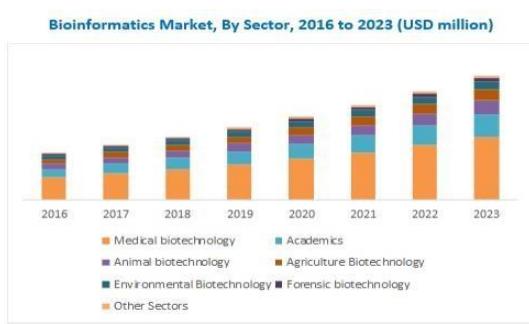
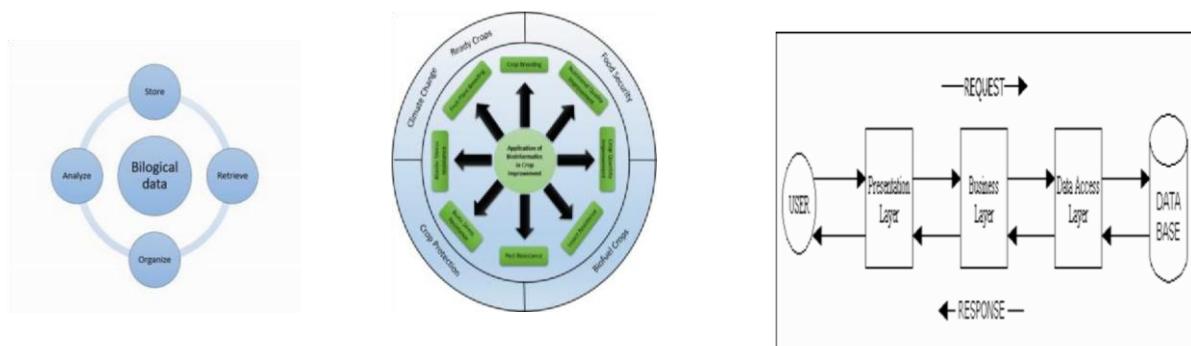
Whatever the new words we create for our new approaches, two interesting points emerge from being able to develop technologies to provide increasingly detailed snapshots of complex biological systems, as they respond to environmental or structural changes. One is that biological data management becomes increasingly needed as an integral part of the research effort at the outset. Integral, in the sense that it is necessary to model the system users, understand relationships among data, and generate and evolve data models to make biological information systems useful today and tomorrow, in an ever-changing research environment. Thus, there are social adjustments to be made in the way biological research projects are developed, implemented, and funded. The other point is that from the capacity to analyse parts with increasing detail, the necessity arises to integrate data to provide a framework for its comprehension and consumption by varied specialists, including breeders. And this data integration can only be done inside the computer (i.e., *in silico*). More and more we should expect advances in scientific knowledge, as well as downstream products of breeding, will depend on geographically distributed groups of research specialists that pool their efforts and knowledge in analysing biological information. Thus, there is a need to provide real-time data management to geographically distributed research collaborators. Fortunately, there is the Internet, developed in the ARPA days precisely to support collaborative scientific research (Hafner and Iyon, 1998).

IV. EVERCHANGING DYNAMICS OF BIOINFORMATICS

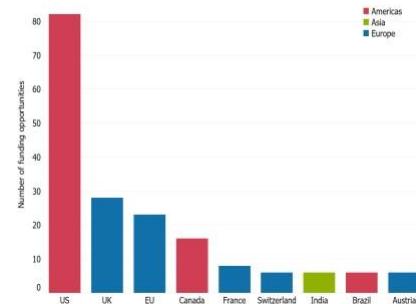
On the laboratory technology front, the challenge will continue to be to devise more efficient and cost-effective technologies for identifying and scoring all types of genetic variants in a given genome, with the human genome taking the lead (Chakrabarti, 1999). Outside structural data domain, continued development of new ways to assay molecular responses of

living organisms to environmental changes will occur. Of special interest, the development of hightthroughput methods to monitor and analyze responses at the level of regulatory and biochemical networks, will allow enhanced understanding of genetic control. The shift in emphasis from data accumulation to data interpretation has already begun and will continue to expand. Integration of data types, provision of unified interfaces to complex biological data sets and provision of distributed data acquisition, storage and analysis is a current focus of many public and private efforts in the broadly defined field of bioinformatics (Sobral et al., 1999). However, there will be continued chaos in terms of appropriate balancing of raw data production and its interpretation and transformation into generally useful public reference sets for use by different types of science and technology consumers. Further refinement of strategy and goals in public-private research and technology is needed, to reduce the redundancy of data production and increase the collaborative efforts to generate and sustain funding for public reference sets of high quality.

Biological information systems need to be able to find, summarize and interpret large amounts of multidimensional data. It is from these requirements that the future of biological databases need to extract their vision. Import of extemal data into biological databases will be required to enable complex queries, isolate from dependence on remote resources, increase performance, and provide security in a rapidly evolving environment. Data warehousing is one possible approach to integrate information from distributed information resources (Anahory and Murray, 1997). A prototype system was developed and tested using a virtual database for the prototype phase (Ritter, 1994). Once information from different sources are integrated into a “warehouse”, it is possible to use On-Line Analytical Processing (OLAP) systems as tools to explore and package the information further so it can be delivered in the form(s) needed (Dhar and Stein, 1997; Thomsen, 1997). The goal of data warehousing is to provide a decision support infrastructure for OLAP servers. The goal of OLAP servers is to provide views of the data that allow varying perspectives along many dimensions. Entry points can be provided based on the characteristics of the data themselves (Dhar and Stein, 1997)



Countries that published the most COVID-19 research funding opportunities
Science/Business COVID-19 research funding database



V. INDUSTRIAL APPLICATION OF BIO INFORMATICS RESEARCH

To study how normal cellular activities are altered in different disease states, the biological data must be combined to form a comprehensive picture of these activities. Therefore, the field of bioinformatics has evolved such that the most pressing task now involves the analysis and interpretation of various types of data and development of new algorithms (mathematical formulas) and statistical measures that assess relationships among members of large data sets. Bioinformatics now entails the creation and advancement of databases, algorithms, computational and statistical techniques, and theory to solve formal and practical problems arising from the management and analysis of biological data. Over the past few decades, rapid developments in genomic and other molecular research technologies and developments in information technologies have combined to produce a tremendous amount of information related to molecular biology. It led to proliferation of research and

development of numerous players in Bio Informatics industry and the growth trajectory given below can summarize its promising future.

VI. BIOINFORMATICS GROWTH STORY IN INDIA

The India bioinformatics market registered CAGR of 15 percent during the beginning of the year 2000. This rise was attributed to factors such as increase in public funding towards research and development (R&D) from the Government of India, decline in costs of human genome sequencing, increase in R&D investments by companies, and increase in the number of orders for contract research activities. India currently has close to 10 percent of the global professional and skilled bioinformatics specialists.

There is a lot of demand for skilled and semi-skilled work force in this space in India as the job market for bioinformatics in western market has dropped. Because of the changing market trends, the bioinformatics companies have been operating as integrated outsourcing partners by offering services and solutions. Few others offer a spectrum of products for computer-aided molecule discovery, bio- and chemo-informatics, and structural biology services. Looking at the opportunities, companies such as Strand Life Sciences and Ocum BioSolutions have established operations outside India mainly in the USA. However, due to global financial crisis and rise in the outsourcing of drug development activities, these companies have been forced to rethink their strategies. The fragmented bioinformatics market will see a growth in the coming years because of government's spending on R&D in addition to increase in private funding.

VII. COMBATTING CORONA THROUGH BIOINFORMATICS

Countries are reporting testing data with an enormous range in testing coverage. In Iceland there have been more than 100 tests per thousand people – far more than in any other country. In Indonesia, testing coverage is very low – only 0.1 tests per thousand people.

More testing means more reliable data on confirmed cases, providing us with a larger ‘sample’ of people for which their infection status is known. Secondly, countries with a high capacity for testing do not need to ration tests as much but where the capacity for testing is low, tests may be reserved (or ‘rationed’) for particularly high-risk groups. Such rationing is one of the reasons that tested people are not representative of the wider population. Hence Bioinformatics has become the saviour of mankind after Novel Corona virus outbreak.

VIII. CONCLUSION AND FUTURE WORK

The capacity to essentially acquire data from living organisms in real time, suggests that management of organisms bred for consumption will likely change radically. It would certainly be feasible to essentially “wire” some number of “reporter” organisms in the field or lot and then use real-time analysis of uploaded data and highly automated management environments to control administration of chemical or increasingly bio-chemical resources to increase productivity. Such systems are the beginning of a much more explicitly cybernetic future, where humans and their information systems as a whole become ever more integrated, dependent and, why not, co-evolving. Bioinformatics is a science that amalgamates modern biological and data science for biological computation, but it’s distinct from computational biology because it uses computation to better understand biology by better analysis of biological data. The field of bioinformatics experienced explosive growth, driven largely by the Human Genome Project and rapid advances in DNA sequencing technology. Meaningful information are derived by writing and running software programs that use algorithms from graph theory, artificial intelligence, soft computing, data mining, image processing, and computer simulation. The algorithms in turn depend on theoretical foundations such as discrete mathematics, control theory, system theory, information theory, and statistics. Hence Bioinformatics as a bridge between Computational Biology and software driven data science becomes the new age research field for the benefit of mankind. Whatever the future holds for the promised “Century of Biology”, it is very likely that only through the convergence of disciplines, will the opportunity to understand the inherent complexity of biological systems occur. It certainly is an exciting time to be a part of this convergence.

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Speech Recognition Using CNNART

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Abstract: Increasingly people are trying to conduct their online activities in a more voice based manner as listening and speaking come naturally as modes of communication and gathering information. Because of this, many are now heading to more voice based web browsing rather than using text only. The results of a case study that was conducted while developing an automatic speech recognition system for web browsing are presented in this work. A generalized coding technique is used to adapt the system to new samples without having to change the code. A generalized coding is done to make the system compatible for n' number of samples without any change in basic coding. Speech data is collected from independent speakers and pre-processed to extract the features needed in this research. Feature extraction is carried out using Mel Frequency Cepstrum Coefficient (MFCC) technique. In [1], it was demonstrated that MFCC outperforms than other feature extraction techniques. After the training session, the acoustic vectors extracted from input speech of a speaker provide a set of training vectors. The centroid based neural network Adaptive Resonance Theory (CNNART) approach is used for mapping vectors from a large vector space to a finite number of regions in that space. For comparison purpose, the distance between each test codeword and each codeword in the master codebook is computed. The difference is used to make recognition decision. The prototype can recognize the word as well as sentences by concatenating the words stored in the database to form a sentence. The recognition accuracy of the system is 85% in speaker dependent environment while 70% in speaker independent environment. Also, system provides 70% accuracy for sentence recognition while for isolated word, recognition accuracy is 80%.

Keywords: Speech quality, Voice conversion, Speech synthesis

LINTRODUCTION

Speech is a natural mode of communication for people. Human beings learn all the relevant skills during early childhood, without instruction, and continue to rely on speech communication throughout lives. It comes so naturally that they don't realize how complex a phenomenon speech is. Yet people are so comfortable with speech that they would also like to interact with computers via speech for applications such as web browsing, language translation rather than having to resort to primitive interfaces such as keyboards and pointing devices. One of the major challenges with existing browsers is to provide a simple navigation framework that demands user-friendly interaction. For people who usually use computer may face with a bad healthy syndrome called Carpal-Tunnel Syndrome. Carpal-Tunnel Syndrome is an uncomfortable feeling on body especially on hand and fingers after doing any particular job or activity repeatedly. So, by implementing speech in using computer became more efficient rather than just using keyboard and mouse alone. By combining these tools, accessing activities became more efficient. Browsers with Speech capability provide simple and effective user interaction, which can be rightly called as hands-free browsers. The ultimate goal is to ease the user interactivity with browser while surfing the net. Here the user instead of traversing the web pages by clicking on hyperlinks, he/she reads out the hyperlink and the corresponding page automatically gets loaded.

II.SPEECH RECOGNITION MODULE

The General scheme for Speech Recognition is shown in Figure 1. Test and reference patterns (feature vectors) are extracted from speech utterances statistically or dynamically. At the training stage, reference models are generated (or trained) from the reference patterns by various methods. A reference model (or template) is formed by obtaining the statistical parameters from the reference speech data. A test pattern is compared against the reference templates at the feature matching stage. The comparison may be conducted by probability density estimation or by distance measure. After comparison, the test pattern is labelled to a speech model at the decision stage. Different stages are explained as follows.

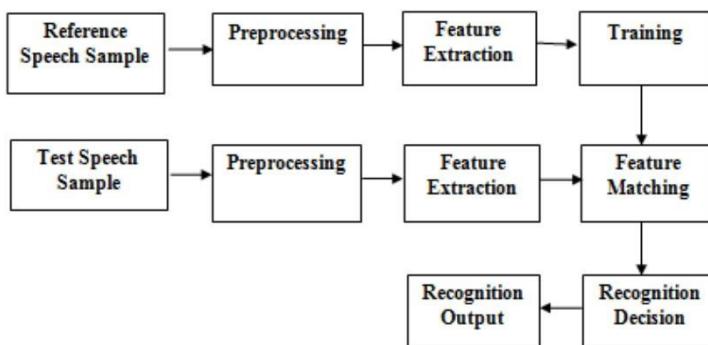


Figure 1: Speech Recognition Module

1)Speech Input from the User:

The speech signals are recorded in a low noise environment with good quality recording equipment. The signals are sampled at 11kHz. Reasonable results can be achieved in isolated word recognition when the input data is surrounded by silence.

2)Pre-processing:

Various approaches exist for the creation and administration of large corpora of data to be used for Speech Signal Processing (SSP). Such data include speech files, pitch files, spectrogram files, text files and the like. Once the speech is recorded, then for the further processing it is required to be stored in the computer memory. While the speech is recorded the speech file may be stored in many different formats i.e. .wav, .mp3, .mp4, .mp6, .midi, .au, .voc, .wma etc. and many more. Pre-processing is the important step which makes the signal suitable for further processing. Once a speech signal is digitalized in both time and in amplitude, it can be stored and processed by a computer.

2.1 Feature Extraction:

The goal of feature extraction is to represent speech signal by a finite number of measures of the signal. In non-metric spectral analysis, Mel frequency Cepstral Coefficients (MFCC) is one of the most popular spectral features in ASR [2]. Feature extraction involves the mining of useful amount of information required to describe a large set of data accurately. When captured by a microphone, speech signals are seriously distorted by background noise and reverberation. Fundamentally speech is made up of discrete units. The units can be a word, a syllable or a phoneme. Each stored unit of speech includes details of the characteristics that differentiate it from the others. Apart from the message content, the speech signal also carries variability such as speaker characteristics, emotions and background noise. A method of generating feature signals from speech signals comprises of the following steps:

1. Receive the speech signal which is in analog format and stored as a .wav file.
2. Convert the .wav file to a data file for further processing.
3. Eliminate the background noise using End Point Detection.
4. Subdivide the speech sequence into frames and form the frequency domain representation of the said framed speech sequence.
5. Pass the said frequency domain representation through Mel-filter banks to generate Mel Frequency Cepstral Co-efficient (MFCC).

1. End point Detection:

After accepting the speech input from user, the next step is to process it. An important problem in speech processing is to detect the presence of speech in a background of noise. This problem is often referred to as the end point location problem. Endpoint detection, which aims at distinguishing speech and non-speech segments using signal processing and pattern recognition, is considered as one of the key preprocessing components in automatic speech recognition (ASR)

systems. The incorrect determination of endpoints for an utterance results in at least two negative effects [3]:

1. Recognition errors are introduced;
2. Computations increase.

To determine the end point of the speech signal, energy approach is considered, which considers both energy and frequency characteristics of the speech signal. It can be very effective when the speech signal is very weak but has frequency components different than background noise. Therefore, it is a very useful tool to locate the beginning and end point of an utterance.

2. Generating Mel Frequency Cepstral Coefficients (MFCCs):

Considering the known variation of the ear's critical band-width frequency, filters spaced linearly at low frequencies and logarithmically at high frequencies have been used to capture the phonetically important characteristics of speech. This suggests that a compact representation would be provided by a set of Mel- Frequency Cepstrum Coefficients (MFCC). These coefficients collectively make up an MFC (Mel Frequency Cepstrum). They are derived from a type of Cepstral representation of the audio clip (a nonlinear "spectrum-of-a-spectrum"). The difference between the cepstrum and the Mel-frequency cepstrum is that in the MFC, the frequency bands are positioned logarithmically (on the Mel scale) which approximates various approaches exist for the creation and administration of large corpora of data to be used for Speech Signal Processing (SSP). Such data include speech files, pitch files, spectrogram files, text files and the like. Once the speech is recorded, then for the further processing it is required to be stored in the computer memory. While the speech is recorded the speech file may be stored in many different formats i.e. .wav, .mp3, .mp4, .mp6, .midi, .au, .voc, .wma etc and many more. Pre-processing is the important step which makes the signal suitable for further processing. Once a speech signal is digitalized in both time and in amplitude, it can be stored and processed by a computer.

2.2 Feature Matching

The state-of-the-art in feature matching techniques used in speech recognition includes Dynamic Time Warping (DTW), Hidden Markov Modelling (HMM), and Vector quantization [10].

1. Dynamic Time Warping Algorithm

Dynamic Time Warping algorithm (DTW) is an algorithm that calculates an optimal warping path between two time series [5]. The algorithm calculates both warping path values between the two series and the distance between them. Suppose we have two numerical sequences $(a_1, a_2 \dots a_n)$ and $(b_1, b_2 \dots b_m)$. As we can see, the length of the two sequences can be different. The algorithm starts with local distances calculation between the elements of the two sequences using different types of distances. The most frequently used method for distance calculation is the absolute distance between the values of the two elements (Euclidian distance).

2. Hidden Markov Models

Until now this is the most successful and the most used method for pattern recognition. It's a mathematical model derived from a Markov Model. Speech recognition uses a slightly adapted Markov Model. Speech is split into the smallest audible entities (not only vowels and consonants but also conjugated sound like ou, ea, au). All these

entities are represented as states in the Markov Model. As a word enters a Hidden Markov Model it is compared to the best suited model (entity). According to transition probabilities there exists a transition from one state to another. E.g. the probability of a word starting with "xq" is almost zero. A state can also have a transition to its own if the sound repeats itself. Markov Model seems to perform quite well in noisy environments because every sound entity is treated separately. If a sound entity is lost in the noise the model might be able to guess that entity based on the probability of going from one sound entity to another.

3. Vector Quantization

The problem of speech recognition belongs to a much broader topic in scientific and engineering so called pattern recognition. The goal of pattern recognition is to classify objects of interest into one of a number of categories or classes. The objects of interest are generically called patterns and in this case are sequences of acoustic vectors that are extracted from an input speech using the techniques described in the previous section. The classes here refer to individual words. Since the classification procedure in this case is applied on extracted features, it can be also referred to as feature matching [11]. The patterns are then used to test the classification algorithm; these patterns are collectively referred to as the test set. If the correct classes of the individual patterns in the test set are known, then one can evaluate the performance of the

algorithm. Vector quantization (VQ) is a method of compressing vector data by partitioning the continuous vector space into non-overlapping subsets and representing each subset with a unique codeword. The set of available codewords is termed the Codebook. It is an efficient and simple approach for data compression [7]. The design of a codebook is the typical application in speech recognition based on vector quantization. The well-known k-means clustering algorithm is one of the most popular competitive learning vector quantization schemes. Although the k-means algorithm is simple and appealing, it has some inevitable problems. Intuitively, the mean square error (MSE) seems to monotonically decrease with an increasing k. However, the MSE may sometimes increase even when the value of k increases. Another problem is that the initial codebook strongly affects the performance of the k-means algorithm. Still another problem is that the algorithm may not converge towards an optimal solution. A variation of the k-means algorithm, known as the LBG algorithm, still suffers from these problems. The self-organizing feature map (SOFM) is one of the most popular competitive neural network algorithms. During the training procedure, the SOFM algorithm decides a winner neuron and updates the weights of both the winner and its neighbors. In order to obtain the best results from SOFM, the updated neighborhood, the learning rate and the total number of iterations for a given set of data should be chosen carefully.

III. SYSTEM FLOW

Initially a user pronounces a word. All the pronounced words are then compared with the pre-stored set of words in the database. If the match is found, those are concatenated to form a sentence. Then the corresponding web-page automatically gets loaded.

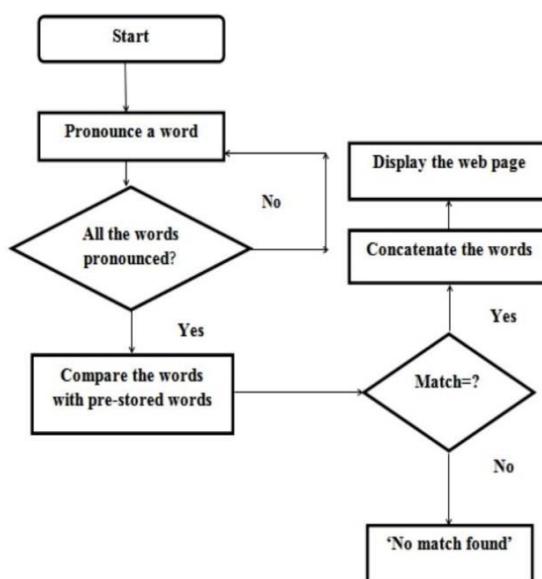


Figure 2: System Flow

IV. COMPARITIVE STUDY

A comparative study for determining the accuracy of the system based on speaker dependent vs speaker independent environment and an isolated vs continuous sentence gives the following results. Table I give the recognition accuracy for comparative study for speaker dependent vs speaker independent testing. It is observed that when testing is made in speaker independent environment, accuracy is less i.e. 70% compare to when testing is made in speaker dependent environment where accuracy obtained is 85%. Table II give the recognition accuracy for comparative study for isolated vs continuous sentences. It is observed that isolated word recognition gives best results on an average 80% than the continuous word speech recognition with 70%

(i) Comparative study based on the speaker dependent and independent testing:

1) Table I

Sr.No.	Testing	Accuracy%

1	Speaker Dependent	85
2	Speaker Independent	70

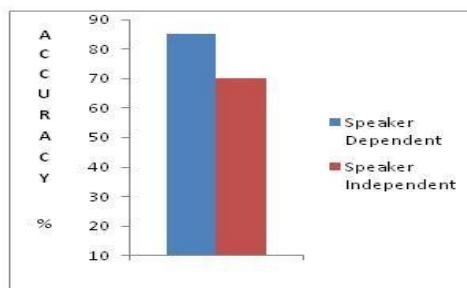


Figure 3: Comparison Graph for speaker dependent and independent environment

(ii) Comparative study based on the type of the Speech:

Table II

Sr. No	Speech Type	Accuracy%
1	Isolated Word	80
2	Continuous	70

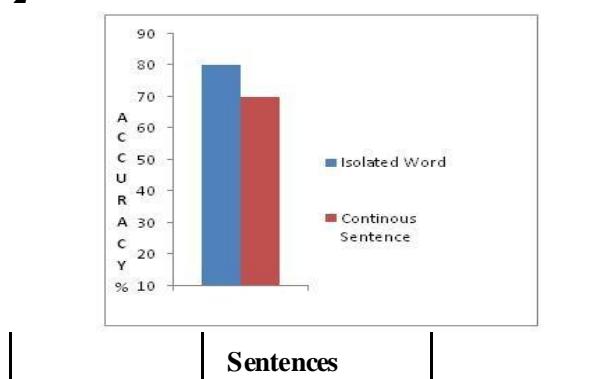


Figure 4: Comparison Graph for Isolated word Vs Continuous sentences

CONCLUSION

In order to make technology more familiar to the user its access should be made easier. As internet access experiences various limitations such as people who are physically handicapped cannot use keypads or touch screens for giving instructions. Above all these limitations today's generation demands to use internet independent of keyboards and also hands free access to it. For this, voice browsing is an intelligent idea. This allows user to access web even in situations like driving etc. where user operate web just speaking rather than typing. The speech recognition system contains two main modules (i) feature extraction and (ii) feature matching. Feature extraction is the process that extracts a small amount of data from the voice signal that can later be used to represent each speech sample. Feature matching involves the actual procedure to identify the known speech by comparing extracted

features from voice input with the ones from a set of known speech samples. In this project, a very efficient speech recognition system for web browsing is designed. A special care is taken at pre-processing stage, as most of the success of speech recognition systems lies in pre-processing stage. MFCC technique is used for feature extraction and feature matching is carried out using centroid based neural network approach. Then comparison is made based on isolated words and continuous words, and speaker dependent and speaker independent environment.

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Survey On Detecting COVID-19 Using Chest X-Ray Images On Deep Learning

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ABSTRACT: Chest X-ray (CXR) imaging is a widespread and essential examination approach used for suspected Cases of coronavirus disease (COVID-19). In profoundly affected or limited resource regions, CXR imaging is preferable as a result of its availability, low fee, and rapid results. However, given the unexpectedly spreading nature of COVID-19, such tests may want to restriction the efficiency of pandemic control and prevention. In response to this difficulty, artificial intelligence methods such as deep learning are promising options for computerized analysis due to the fact they have achieved state-of-the-art performance within the evaluation of visible facts and an extensive range of scientific photographs. A medical look at of COVID-19 inflamed patients has proven that these styles of patients are by and large inflamed from a lung contamination after coming in touch with this disease. Chest x-ray (i.e., radiography) and chest CT are an extra powerful imaging method for diagnosing lung related problems. Still, a huge chest x-ray is a decrease fee method in evaluation to chest CT. Deep learning is the maximum a success technique of machine learning, which gives useful analysis to take a look at a big amount of chest x-ray images that may critically impact on screening of Covid-19. In this work, we've got taken the PA view of chest x-ray scans for COVID-19 affected sufferers as well as healthy patients. After cleaning up the pics and making use of statistics augmentation, we have used deep learning to know primarily based CNN model.

KEYWORDS: Chest X-ray, Deep Leaming, COVID-19, Corona Virus, Radiological Imaging, Bacterial Pneumonia, Viral Pneumonia

I INTRODUCTION

Early prognosis of the coronavirus disease (COVID-19) is vital to lessen the spread of the virus and offer take care of preventing complications. The daily increments in COVID-19 cases worldwide and the limitations of the current diagnostic equipment impose challenges in identifying and handling the pandemic. Researchers worldwide are actively collaborating to discover powerful diagnostic processes and accelerate the improvement of a vaccine and treatments. As of the writing of this paper, 3 diagnostic methods are typically used: blood tests, viral assessments, and scientific imaging. Blood tests detect the presence of excessive acute respiratory syndrome coronavirus 2 (SARS-CoV-2) antibodies in the blood. Viral checks locate the antigens of SARS-CoV-2 the usage of samples from the respiratory tract. The fast diagnostic test (RDT) is a kind of antibody detection take a look at that is fast and may produce consequences in 30 min. However, the provision of RDT test kits is restrained, and its effectiveness relies upon at the sample high-quality and the time of onset of contamination. Furthermore, the take a look at can yield fake positive outcomes because it does now not distinguish COVID-19 from other viral infections; therefore, it isn't encouraged for diagnosing COVID-19. Another normally used viral test is opposite transcription polymerase chain response (RT-PCR). RT-PCR is the gold-trendy device used because the first-line display screening desire. However, big-scale studies have located that the check result sensitivity ranges between 50–62%. This implies that an initial bad RT-PCR result can be obtained. Therefore, to ensure the correctness of the take a look at end result for diagnosis, more than one RT-PCR checks are finished over a 14-day remark duration. In other phrases, an RT-PCR negative end result for a suspected case of COVID-19 is handiest considered as a proper negative whilst there are no fine RT-PCR outcomes after multiple tests have been taken over the 14-day statement duration. This can be frustrating for the affected person and costly for the healthcare government owing to the shortage of RT-PCR test kits in several international locations.

Because COVID-19 goals the respiration system, chest radiology scans are critical device for analysis and early control. Chest X-rays (CXR) have been used as a first-line diagnostic tool in various countries. The circumstance of the lungs may be efficiently detected the use of radiology scans along with the exceptional degrees of contamination or recuperation. Radiologists have recorded a selection of abnormalities discovered in the radiology scans of COVID-19 sufferers. CXR is an extensively available tool in maximum clinical settings; it is less time-eating in terms of affected person practise and instantaneous diagnosis. Consequently, CXR may be used for patient triage, figuring out the priority of patient treatments, and making use of clinical resources

In the medical imaging area, deep getting to know (DL) techniques have been used to improve the performance of picture evaluation extensively. For example, DL has been efficiently applied to microscopy pictures, brain tumor category, MRI pictures, and retinal snap shots.

The analysis of this accrued information is accomplished with the help of CNN, a machine learning getting to know tool. This work specially specializes in the use of CNN fashions for classifying chest X-ray pics for coronavirus inflamed

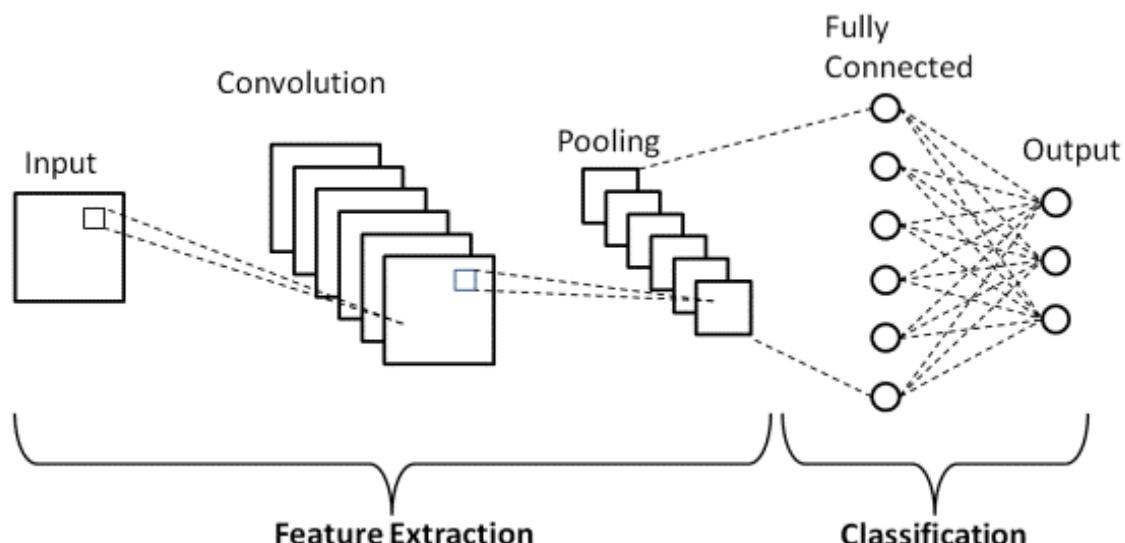
sufferers. We have attempted to draw a parallel to the preceding work within the discipline and look for capacity fashions of the challenge, which may be assessed similarly to show their usefulness in sensible scenarios.

II. RELATED WORK

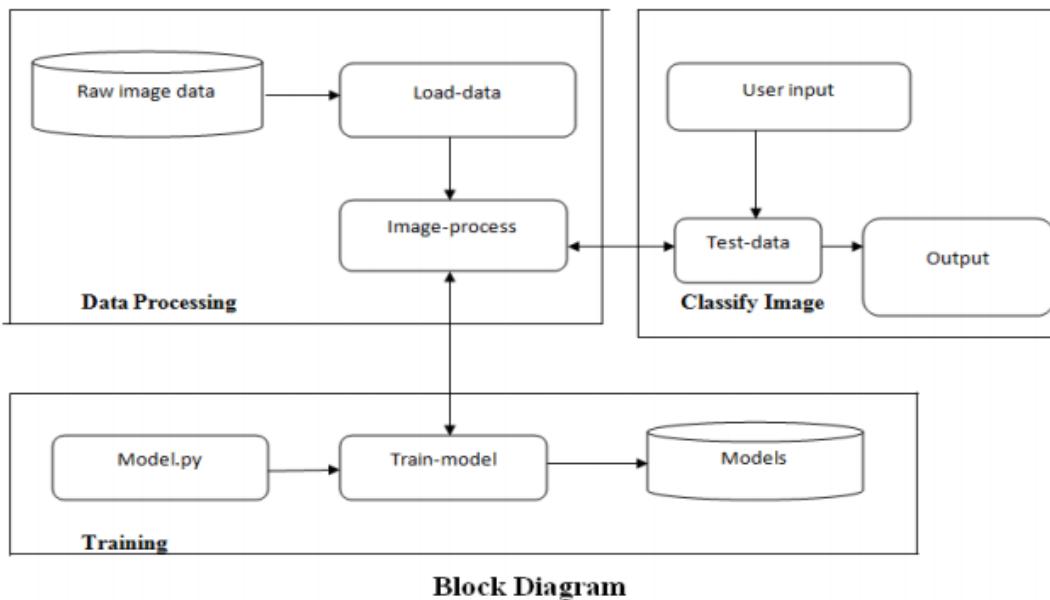
The evaluation and detection of COVID-19 were notably investigated within the previous couple of months. The first part of this section addresses problems related to COVID-19 detection based on deep-gaining knowledge of approaches the usage of CT scans and chest X-ray snap shots. The 2d part critiques the related literatures to evaluate future estimates of the range of COVID-19 confirmations, recoveries, and deaths. COVID-19 has now end up an international pandemic attributable to its speedy spread. It is very difficult to detect uncovered people due to the fact they do not display ailment symptoms straight away. Thus, it is important to find a technique of estimating the range of potentially infected people on an ordinary foundation to adopt the appropriate measures. AI can be used to have a look at someone for COVID-19 as an opportunity to conventional time-consuming and high-priced strategies. Although there are several studies on COVID-19, this observe focused on the use of AI in forecasting COVID-19 cases and diagnosing patients for COVID-19 infection via chest X-ray photographs. Several research regions have carried out AI (e.g. Disorder diagnoses in healthcare). One of the principle advantages of AI is that it is able to be implemented in a skilled version to classify unseen pictures. In this observe, AI turned into carried out to discover whether a patient is fantastic for COVID-19 the use of their chest X-ray picture. AI also can be used for forecasting (e.g., how the populace will growth over the subsequent five years) thru existing evidence. Thus, predicting opportunities in the on the spot destiny can help authorities to undertake the essential measures. Wynants et al. targeted on essential standards. The first idea worried studies associated with the prognosis of COVID-19, and the second one concerned research associated with the prediction of the quantity of individuals who might be infected within the coming days. The observe evaluation maintained that maximum of the existing fashions are negative and biased. The authors counseled that research-primary based COVID-19 records ought to be publicly available to inspire the adoption of more particularly designed detection and prediction fashions.

III. METHODOLOGY AND IMPLEMENTATION

Convolutional neural networks (CNNs) are commonly used for medical imaging they have numerous architectures and programs. Therefore, for the reason that first few months of the pandemic, Deep Learning approaches were extensively explored for diagnosing COVID-19 from radiology pics. In this paper, we review the trendy studies contributions of the application of Deep Leaming for the detection of COVID-19 from CXR pictures by using comparing the existing Deep Learning technologies, highlighting the challenges, and identifying the required destiny investigations.



Architecture of Convolution neural networks (CNNs) model



TRAINING PROCESS AND RESULTS

- Gather Dataset: The primary segment of building a deep learning network is to assemble our dataset. We need the actual images just as the marks related with each image
- Split Dataset: Split the dataset into training and testing set.
- Train Network: Through our training set of images, we would now be able to train our network. The objective here is for our network to figure out how to perceive every one of the classifications in our marked data.
- Evaluate: Need to assess our trained network .For every one of the images in our testing set, we present them to arrange and request that it to predict what it thinks the mark of the data is. We at that point organize the expectations of the model for an image in the testing set. Finally, model prediction is compared from testing set.



The above graph shows the training and accuracy

IV. CONCLUSION AND FUTURE WORK

The rapid spread of COVID-19 the world over and the growing variety of deaths require urgent actions from all sectors. Future prediction of ability infections will enable government to address the outcomes efficiently. Furthermore, it's far necessary to keep up with the variety of infected humans by means of appearing ordinary test-ups, and it's miles frequently crucial to quarantine inflamed people and undertake scientific measures. Additionally, attention must be given to numerous different elements to minimize the unfold of COVID-19, such as the environmental results and the similarities a few of the maximum affected regions, and cautious measures must be followed. In this paper, AI-based totally techniques had been proposed for the prediction and prognosis of COVID-19: Prediction fashions consisting of the PA, ARIMA, and LSTM algorithms have been used to expect the wide variety of COVID-19 confirmations, recoveries, and deaths over the following 7 days. PA introduced the quality performance. Meanwhile, investigation into greater state-of-the-art forecasting and prediction methods is a topic of a future paintings. A diagnosis model using VGG16 changed into proposed to locate COVID-19 the usage of chest X-ray pictures. The model allows the speedy and dependable detection of COVID-19, allowing it to attain an F-degree of 99% using an augmented dataset. In a future observe, we can recall diagnosing COVID-19 in chest CT experiment snap shots using the VGG-XX versions and evaluate their performances the usage of larger datasets. A in addition contribution of this examine is the evaluation of the COVID-19 unfold and its related statistical records primarily based on its worldwide nearby distributions. Thus, principles conclusions had been drawn using our AI-based evaluation: (i) the most exceptionally inflamed areas have similar traits, and (ii) the spread of the sickness in coastal areas is considerably better than that in other non-coastal areas. Therefore, extra care and interest ought to be given to coastal towns. In our destiny works, we can inspect the outcomes of temperature, humidity, and terrain on COVID-19 spread in towns and countries.

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Watch Your Driving: A Driver Health Monitoring System Using Raspberry Pi

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ABSTRACT: Road accidents continue to be a major issue in India and it ranks first in the number of road accidents deaths across 199 countries. It is important to monitor the driver health condition before driving. We propose a model that can monitor the driver health condition based on intelligent monitoring, analysis and predict whether the driver is fit to drive or not using accurate decision-making algorithms and based on the prediction the Car Ignition system is locked or unlocked. "Watch Your Driving: A Driver Health Monitoring System" is designed to continuously track and monitor driver's vital health parameters such as (BLOOD PRESSURE, BODY TEMPERATURE, SLEEP ACTIVITY, HEART BEAT AND ALCOHOL LEVEL). This system can monitor the state or condition of the driver which is the major reason for road accidents. In this system the analysis of vital health parameters is done before driving so that this information is used to alert the centralized controller installed inside the vehicle that controls the car ignition system. This project aims at reducing the reckless driving situations which leads to major accidents and to develop a reliable and cost-efficient system to avoid accidents and to safeguard human life.

KEYWORDS: Internet of Things; Centralized system; Decision tree algorithm; health monitoring; Alcohol detection

I. INTRODUCTION

As per the accident reports, a total of 4,49,002 accidents took place in the country during year 2019. Accidents not only occur due to poor road condition, speed or driver fault they fail to understand the health condition of driver. This driver health monitoring system provides the solution for the above problem by tracking and monitoring the driver health condition before driving. This system keeps track of driver's vital status such as sleep, heart rate, blood pressure, body temperature and alcohol content in the body. There will be a centralized controller along with alcohol sensor fixed inside the car which controls the car ignition system. Once the driver enters the car the driver's smart phone gets connected to the centralized controller which has access to the data that is tracked and monitored for the last 24 hours that is stored and processed in the application. The centralized controller checks all the vital health parameters, if found normal then the controller checks the alcohol level of the driver, if in permissible range then the car ignition system is unlocked.

II. RELATED WORK

Accident and Alcohol detection in Bluetooth enabled Smart Helmets for motorbikes (2018) et al [1] has proposed a mechanism that can detect if a person is wearing helmet, it also detects accidents and also detects the alcohol level in the body. This can help in preventing accidents by detection process by gathering data to provide an accuracy. Alcohol detection for car locking system (2018) et al [2] they made an attempt to develop locking system for cars and it will not unlock the car without checking alcohol level. Alcohol sensor is used for prediction. The main aim is to prevent the accidents by system developments. Safe Drive: An automatic engine locking system to prevent drunken driving (2018) et al [3] has proposed a model using Internet of things to avoid reckless driving. This system uses MQ3 sensor, location tracking, sobriety test and so on. Based on result obtained by alcohol detection, system determine whether driver is drunk or not before driver starts the car. Drunken driving detection and prevention models using Internet of things (2017) et al [4] has proposed a model based on IoT for drunk detection and drowsiness especially at night. This model includes analysis of alcohol concentration, eye blinking rate and for drunken or drowsy state detection it analyses the rate at which car is made to turn. This includes speed reduction, triggering, alarm, informing traffic control. Portable alcohol detection system for Driver Monitoring (2019) et al [5] has proposed a portable alcohol detection based on exhaled breath analysis. This system uses breath sensor unit, smartphone and data cloud system. It can monitor driver status from a remote location. Breath sensor contains four separate sensors first is water vapor other are semiconductor gas sensor to detect ethanol, acetaldehyde and hydrogen level it checks the result and send it to cloud and future detection is made. Drunk Driving and Drowsiness Detection (2016) et al [6] has proposed a mechanism for detection of driver's drowsiness using visual features

along with this the drunk detection using alcohol sensor is done. Drowsiness detection is done using HAAR-Cascade classifier for face and eye, for yawning detection – template matching in the mouth region is done. Finally, alcohol detection is done.

III. PROPOSED SYSTEM

We propose a complete health tracking and monitoring system along with prevention technique so that we can reduce possibility of being in accidental situations due to variations in health conditions. Driver's vital health parameters such as (blood pressure, body temperature, sleep activity, heart beat and alcohol level) can be the main contributing factors to tell how fit a person is, so variations in these parameters may cause fatality. There will be a centralized controller (Raspberry Pi) along with alcohol sensor installed inside the car which controls the car ignition system. Then the driver's vital health parameters have to be recorded with the help of On-Body sensors or wearable device like smartwatch. The health parameters are recorded and sent to web application installed in the driver's smartphone. The sensor data is tracked, monitored and processed in the application. When the driver enters the car the driver's smartphone gets connected to the centralized controller and gets activated. Controller has access to the processed data, if there are no abnormalities then the controller finally checks the driver's alcohol level, if in permissible range then the car ignition system is unlocked and then the driver can start the vehicle.

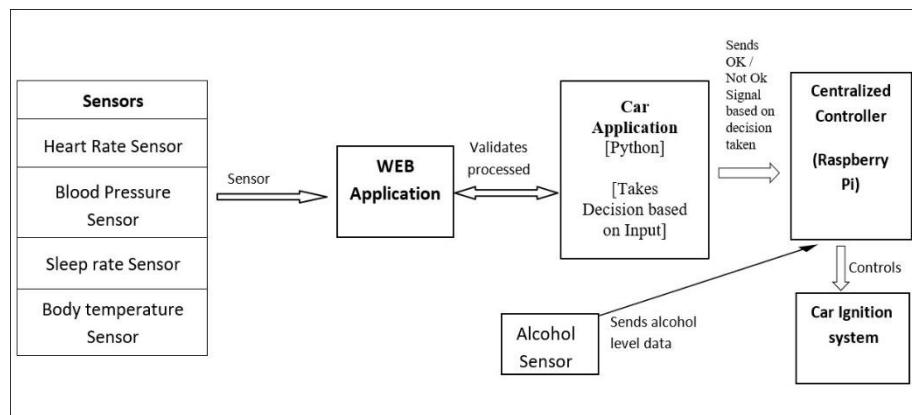


Fig 1: Basic Block diagram

A. Sensors [Data collection]

In this module, various sensor data such as heart rate, blood pressure, body temperature and sleep activity are continuously sensed from on-body sensors such as smartwatch. These health parameters determine the driver's health condition hence need to be transmitted to web application.

Health parameter & Sensor Name	Normal Range	Permissible Range	Non-Permissible Range
Heart Rate Optical Heart Rate Sensor	80-120 bpm	≥ 50 and ≤ 140 bpm	< 50 and >140 bpm
Blood Pressure Pulse oximetry	80/120 mmHg	(80 – 89) / (130 – 139) mmHg	>90 / > 140 mmHg
Body Temperature Temperature Sensor ICs	97 F to 99 F	≥ 97 F to ≤ 99 F	< 97 F to >99 F
Sleep Rate / Activity Bioimpedance Sensor	8 to 10 hrs	≥ 4 hrs to ≤ 12 hrs	< 4 hrs to > 12 hrs
Alcohol Level MQ3 Alcohol sensor	0.03% per 100ml	$\leq 0.03\%$ per 100ml	$\geq 0.03\%$ per 100ml

Table 1: Permissible and non-permissible range of all sensors

B. Web Application

In this module, the web application receives the sensor data from sensors. This data is stored dynamically and this data is continuously tracked and monitored for any variations in anyone of the vital health parameters. These health parameters determine the driver's health condition hence need to be continuously monitored for any slight variations. The web application produces a processed data file from the recently obtained data, when requested from centralized controller.

C. Car Application [Python]

This module is installed in the Car Console as a software which is triggered when the driver wants to start the car. This feature allows the Driver a smooth interface where the driver can trigger the start car functionality, upon clicking a decision will be taken by the processing unit and then a suitable action will be taken i.e., Locking / Unlocking the Car Ignition System if all vitals are normal else displays an error message on the screen.

D. Centralised controller [raspberry Pi]

In this module, when the driver enters the vehicle, his smartphone connects to the Centralized controller in order to activate the controller. After that the controller requests the web application for the recently processed data file. Further validates the data file for any abnormalities in health parameters. If all OK, then the controller unlocks the Car ignition system else it won't unlock.

E. Car ignition system

In this module, the car ignition system controls the car ignition process, i.e., controls the on/off of a vehicle. After only successful validation and OK signal from the centralized controller this unit will be unlocked and allow the driver to start the vehicle.

IV. SYSTEM ARCHITECTURE

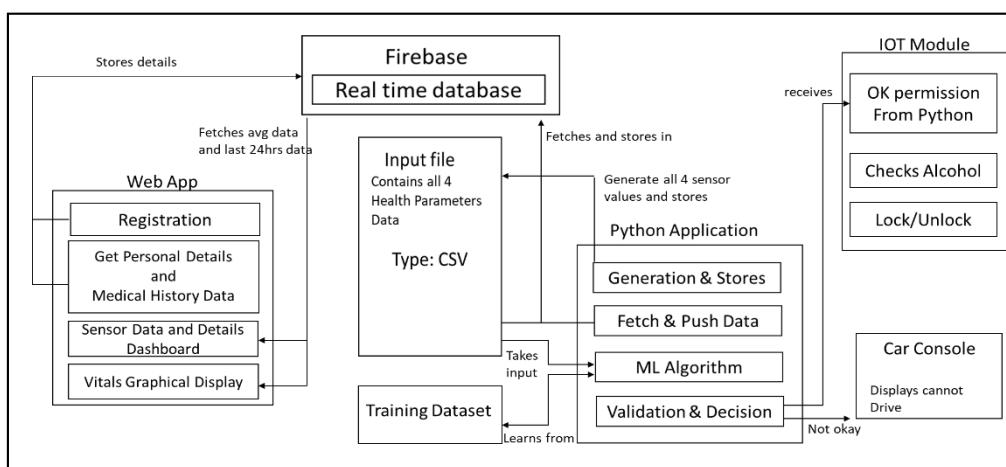


Fig 2: System Architecture

A system architecture is the conceptual model that defines the structure, behaviour, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviours of the system

A. Web Application

It contains four sub – modules: Registration: This page provides the driver to Sign Up to our Product by providing email id and password and the credentials will be verified by email verification module. Get Personnel details and Medical History Data: This page provides the driver to enter their personnel details upon successful User verification through Sign Up and to provide details about their present and past medical conditions. Sensor Data and Details Dashboard: This page provides the user a complete information about their vitals of various health parameters with a Dashboard view. It also contains details about the sensors used and displays the users Avg value of each parameter which is calculated dynamically based on the last 24 hrs. data that is collected and stored by the sensors. Graphical Display of Vitals: Graph provides a quick and easy understanding of variations. To provide the user with easy understanding of the variations in their health parameter this feature is implemented so that it shows a graph view for each individual parameter and individual sensor and displays the variations from current time to previous 24 hrs.

B. Firebase server

This Server contains various databases for different purposes and in our project, we have utilized two kinds of databases. One for storing user login credentials for authentication and other is the Real time database for storing sensor values and other user details. It performs storing and data sending and retrieval tasks.

C. Input file

It contains all the 4 sensors dynamic data i.e., in each column individual sensor data keeps getting updated every 5 secs and this input data is then pushed to the Firebase server for the Web application to access data for displaying. The data of individual sensor will in accordance to its standard data type and will be generated dynamically. The generated data will be sent to Processing unit i.e., Python application for further data processing, validation and decision taking based on the input generated.

D. Training dataset

It contains a sample dataset where the data of all 4 sensors are populated randomly and the data is then classified as valid input or not by assigning a Boolean value at the end of each row consisting of all the 4 sensor values. In this dataset, all kinds of possible variations and circumstances are drafted and for each possibility a valid value is assigned to make the ML algorithm learn based on these variations.

E. Car Application [python]

This is the main component which carries out the processing task for the entire project. This is installed on the Car console as software. When the Driver press the Start button then this application fetches the data from the input file i.e., the last 24 hrs. data and then refers the training dataset to learn and based on these two files a decision is taken by the ML algorithm running in the application and further the result is indicated to the IoT module and also an appropriate message is displayed for the Drivers understanding. The ML algorithm used is decision tree based ID3 algorithm which takes the input and learns from the drafted training dataset and takes a decision. The other functionalities of python application are to push the last 24hrs data to the firebase server and since this is Computer Science projected the hardware task of generating sensor values is also carried out by this application. It randomly generates the values for all 4 sensors according to the individual health parameter permissible range and keeps in mind the type of data that needs to be generated for individual sensor.

F. IOT module

In this module it waits for the processing unit to send the decision based on the input. The decision sent by the Processing unit is a Boolean value 0 or 1, if it is 0 then it indicates that there is some variation observed in the driver's health parameters and the driver is not fit to drive. Based on this decision the IoT module does not further check for the alcohol level and does not unlock the Car ignition system. If the value is 1 then the IoT module further checks for the Drivers alcohol content in the body using alcohol sensor integrated on the Centralized controller installed in the car. If the alcohol level is also in the permissible range, then it further Unlocks the Car ignition system indicating that the driver is fit to drive.

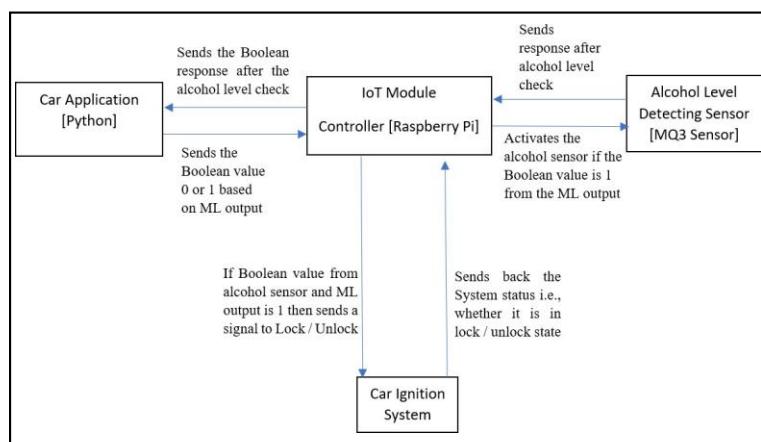


Fig 3: IOT Module

G. Car console

It is basically a GUI [Graphical User Interface] which provides an interface for the driver to Start the vehicle and also displays appropriate message after processing. If the driver is fit to drive then it displays "Welcome to Your Journey Has started Keep Calm and have a Safe Travel". If the driver is not fit to drive then it displays "Sorry You cannot Drive" This software is installed in the Car console.

V. FLOW CHART

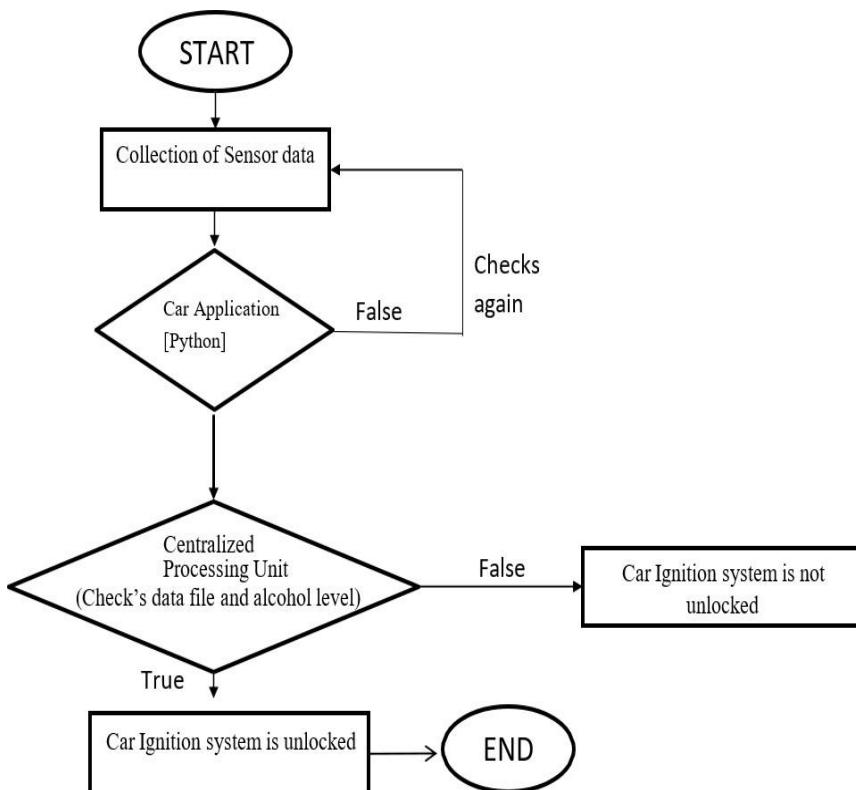


Fig 4: Flow chart

A flow chart could be a kind of diagram that represents a advancement or method. A flow chart may also be outlined as a diagrammatical illustration of associate degree rule, a stepwise approach to finding a task. The flow chart shows the steps as boxes of varied types, and their order by connecting the boxes with arrows.

VI. ALGORITHM

A. Decision tree Algorithm

Decision tree algorithm is a supervised machine learning algorithm used to build classification and regression model to form tree structure. The node in the tree represents the feature, the branch in the tree represent decision made by the algorithm and the leaf which represent final outcome of the algorithm. There are many algorithms which uses decision tree algorithm. Among those algorithms we use ID3 algorithm. ID3 Algorithm means Iterative Dichotomiser 3 algorithm. ID3 algorithm is a classification algorithm which follows greedy approach (it always makes the choice that seems to be best at that moment) by selecting best attribute that yields maximum information gain or minimum entropy.

Step 1: Begin the tree with the root node which contain dataset

Step 2: Find best attribute in dataset using Attribute selection method

Step 3: Divide root node into subsets that contain possible value for the best attribute

Step 4: Generate decision tree node which contain the best attribute

Step 5: Recursively make new decision trees using subset of dataset created in step 3. Continue process until a stage is reached where it cannot further classify the nodes and called final node as a leaf node.

VII. EXPERIMENTATION AND RESULT

A. Sensor module in web application

This module is implemented with help of chart.js package which requires data as input and need to specify the X axis and Y axis values and range and also write the function call backs to go and locate the firebase remote database and then fetch the values from the database and use the same fetched data for displaying. Provides the User with a sensor dashboard consisting of information about each sensor and can also know the average value of each individual sensor. Provides a Graphical

representation of the sensor data of all health parameters and help the users to quickly undersatnd the variations and changing trends in the health parameters. The data is dynamic and responsively coming from the server every time the data gets updated.



Fig 5: Sensor details with average value display

B. Algorithm model

In our project when health.csv is given to the ID3 algorithm it calculates the entropy of health.csv and entropy of each attribute in health.csv and it calculates information gain. Algorithm makes decision on information gain it chooses the highest information gain attribute and assign that attribute as a node under the root node, again root node make decision either it terminate node or it will analyse the next highest information gain attribute and assign that as next node. This process continues until final node is reached where there is no other attribute for classification. Based on leaf node the algorithm make decision by allowing user to continue with python application or alert user by a message "Sorry you can't drive because your health condition is not under limit ". If the Boolean value is 0 then without the consent or without waiting for response from the IoT module the Python application takes the decision that the driver is not fit to drive because Boolean value 0 indicates that there is a variation in the 4 vital health parameters and these values cannot be accepted to drive. The Boolean value 0 is sent to the IoT module indicating to lock the car ignition system. According to the output the Python application displays appropriate message

Fig 6: Graphical representation of sensor data

in the car console. If the driver is fit to drive then it displays "Welcome to Your Journey Has started Keep Calm and have a Safe Travel" If the driver is not fit to drive then it displays "Sorry You cannot Drive"

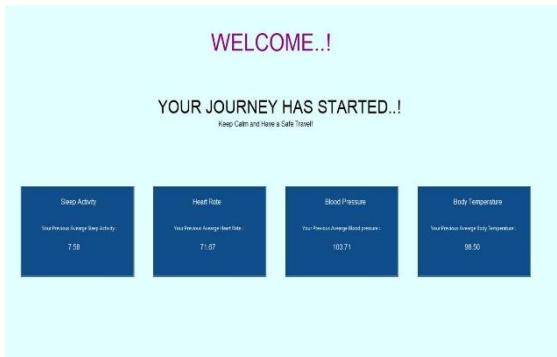


Fig 7: Allowing user to drive

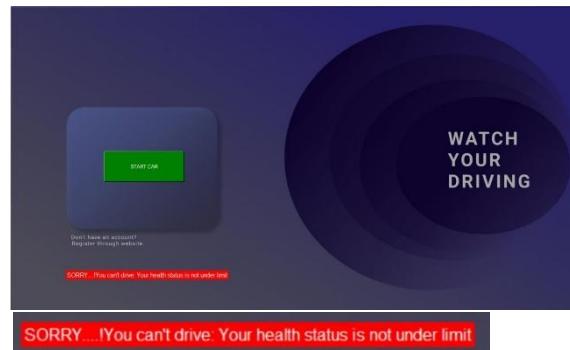
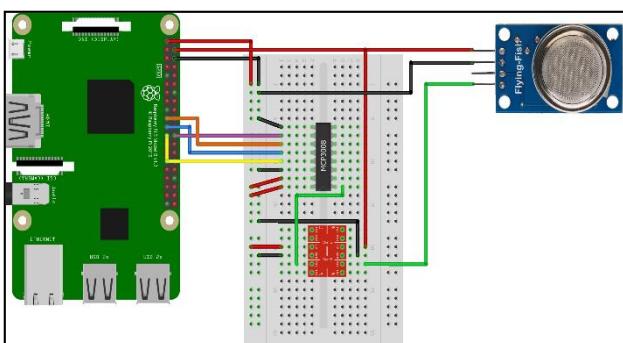


Fig 8: Alerting user

C. IOT Module

Car application sends a Boolean signal 0 or 1 based on the ML output. Based on the Boolean value obtained the controller i.e.; Raspberry Pi decides which step to proceed further. If the Boolean value is 1 from the ML output, then the controller activates the Alcohol detecting sensor and checks the alcohol level in the driver's body and sends the response back to the controller indicating the alcohol level value and status. If the Boolean value from alcohol sensor is 1 then the controller indicates the car ignition system to unlock else it indicates to lock it. If the Boolean value is 0 then the controller indicates the car ignition system to lock and asks back the system status of car ignition system. The status sent by the car ignition system is then sent back to the Python application to display appropriate message in the car console.



connection with Raspberry Pi

Fig 9:
MQ3
Alcohol
Sensor



Fig 10: Raspberry Pi

VIII CONCLUSION AND FUTURE ENHANCEMENTS

The main objective of the project is to ensure safety in driving and to avoid accidents by developing a reliable and a cost-effective system to safe guard human life. The system will help the drivers to a much larger extent. It is a real time model that can monitor and track the status of driver's health and automatically unlock the car ignition system. ID3 algorithm used because of Understandable prediction rules are created from training data. It builds a short tree in relatively small time. This system can be used by automobiles manufactures by integrating it in the manufacturing process of vehicles. It can be concluded that this driver health monitoring system using Raspberry Pi is a cost effective, reliable and feasible solution for prevention of accidents. This systems efficiency can be further improved by considering more health parameters and the data generated will be more so that the prediction can improve vastly. It can be further extended to Transport services such as Ola and other transport service-oriented companies to get drivers information and health details before boarding. It can also be extended to Automatic Traffic fine management system by taking driver license and other vehicles details and can automatically send the fines through the portal.

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'Deaf People Will Hear Again': How Virtual Reality Can Change The World

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ABSTRACT: Virtual Reality (VR) is an environment generated using computer with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. This environment is perceived through a device known as a Virtual Reality headset or helmet. Virtual Reality can be used to improve hearing of Deaf people. VR applications can be used to design devices for persons with hearing problems. The VR device can be fixed on any desktop or mobile VR Head-Mounted Display (HMD). The sound used in VR environment for analyzing is 3D. This device locates the direction of sound source. Two vibro-motors placed on the user's ears. It notifies the user about the sound direction. Ear senses the electronically generated movement. This movements can be experienced by the user. The person with hearing problem can make use of this device. In this paper I will discuss about the device which is one of the Virtual Reality applications used to help the deaf people in hearing.

I. INTRODUCTION

The ability to hear is one of the most senses which enables a person to connect to the world. Hearing is only the feature which connects us with the people. There are many people with hearing loss ranging from mild to severe. According to a report from the World Federation of Deaf, there are more than 70 million people with hearing problems around the world. They have a lot of limitations to use many of today's new technologies. These limitations also affect their educational skills. Thus, attention to a deaf people is very important.

People who are hard of hearing usually communicate through spoken language. They often use sign language for communication. This can also be achieved using VR technology. Virtual Reality (VR) is a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. This environment is perceived through a device known as a Virtual Reality headset or helmet. Visual quality, sound quality, and intuitive interactions are the main aspects of immersive experience. Focusing on these aspects helps user to achieve the feeling of full immersion.

Immersion enhances everyday experiences, making them more realistic, engaging, and satisfying [1]. Virtual reality is the ultimate level of immersion, but consumers want immersive experiences on all their devices whether playing a video game on a smartphone, video conferencing on a tablet, or watching a movie on a TV. The goal is to provide the appropriate level of immersion based on the device form factor, use case, and context. The three aspects of immersive experiences are visual quality, sound quality, and intuitive interactions. Full immersion can only be achieved by simultaneously focusing on the broader dimensions of each aspect.

In immersive virtual reality environments, the realistic audio rendering is also very important for the user immersion in addition to the realistic visual rendering. The three-dimensional audio rendering requires multiple surrounding speakers for reproducing the realistic sound field [2], [3]. The wired surround sound system requires an annoying installation for connecting cables between speakers and corresponding audio jack holes in the sound sources [4]. We can move around freely and receive sound from all directions in VR environment as same as real one. Virtual environment can be created with 3D audio where audio sources used can act as real-world audio sources. 3D audio is a very important factor in immersive VR environments. Feeling of immersion in VR can be increased with the help of 3D audio and it can draw user's attention to different locations.

Using this VR technology deaf people declare that they can feel sound waves (audio bass waves) using their bones and muscles. Also, some research showed that people can feel sounds and haptic cues with their muscles and on the face using VR device. Furthermore, Digital Signal Processing (DSP) has driven new paradigms of audio and music. For example, music, controlled through gesture or dance, or music without an audio component (only visuals), or vibro-tactile feedback for voicing enhancement. Scientists used tactile music to develop vibro-tactile audio systems. These systems can deliver music patterns to the skin through vibrations. It is possible to use vibro-tactile haptic devices to improve immersive VR experiences among DHH persons [5].



Fig. 1. The Virtual Reality device for deaf.

VR technology has proved efficiency in helping deaf people [6], and with increased availability and public interest around virtual reality (VR) technology [7], a number of authors started working on automated transcriptions for deaf people [8,9,10].

II. LITERATURE REVIEW

C. H. Lee proposed location-aware speakers for the wireless surround sound systems with the RSSI-based (received signal strength indication) localization [11]. Each speaker can detect its location in a specific speaker format and play an appropriate sound channel. The proposed method enables a quick and easy installation of the surround sound system. Especially for the immersive virtual reality environments, it would be useful because it would be more frequent to relocate the projector-based immersive systems or HMD (head-mounted display) systems than to relocate conventional sound systems.

The indoor and outdoor localization is a crucial technique in IoT and Wireless Sensor Networks (WSN). In this paper, they estimated relative distances between speakers and determine each speaker's position in a specific sound format. They attached a Raspberry Pi and a beacon to each speaker and estimate distances between speakers from the RSSI of beacons with Bluetooth Low Energy (BLE) signals. They showed the accuracy of the proposed method in three sound system formats of the stereo sound, the 5surround sound, and the 8 surround sound systems.

P. Paudyal designed a VR experience that mirrors the traditional classroom to promote collaboration [11]. In addition, they made some crucial modifications for accessibility to the deaf as suggested by the findings from a Workshop for emerging DHH scientists. Specifically, we identify three challenges that the DHH face while trying to get a technical education in STEM and propose DAVEE, a VR Classroom environment as a solution. In this work, they propose DAVEE, a Virtual Reality (VR) classroom experience that facilitates live interpretation. During live sessions, DHH students can ask questions, receive feedback and have interactions with other students. The lectures and the interpretations can also be recorded for offline viewing.

OPEN ISSUES ON LITERATURE REVIEW

It is still difficult to find accurate locations with wireless devices. There would be too much errors for estimating absolute locations of speakers. The system shows some errors in small areas because of the inaccuracy the RSSI-based distance estimation.

The design of DAVEE follows principles and recommendations from literature, however they must be validated and updated according to usage data.

III. PROPOSED METHOD

The components of VR device are Arduino Nano, two coin-vibro-motors, a stereo audio cable, and a Universal Bus Controller (USB) cable are the Hardware components. The VR environment's sounds are processed by Arduino Nano. The feeling of vibration is transferred using Vibro-motors to the user's ears. Stereo and USB cables transfer audio and power to the Arduino from desktop or mobile phones. A VR HMD is also needed to display the VR application.

The Hardware of VR device include the following:

1. Arduino Nano
2. Two coin-vibro-motors
3. VR HMD

Arduino produces a clock of precise frequency using constant voltage, but Arduino doesn't come with DC power jack. The external power source is required for the working of this device. Previous research showed that the Arduino can be used for real-time digital audio processing. This is needed to perform a frequency analysis and to switch on/off the vibro-motors.



Fig. 2. The Arduino Nano.

The Arduino detects a sound, it turns the vibro-motor on (related to the sound direction) in its full resonance vibration frequency (usually between 170 Hz to 240 Hz, depending on the coin vibro-motor specifications). Based on a research guideline by K. Myles and J.T. Kalb, the recommended range for effective and comfortable tactile-only communication on the head is between 32 Hz to 64 Hz. Therefore, for using the vibro-motors in the ears (for VR HMDs without embedded headphones), they can be able to set the resonance vibration frequency to 45 Hz by controlling the voltage level of the vibro-motors [5].

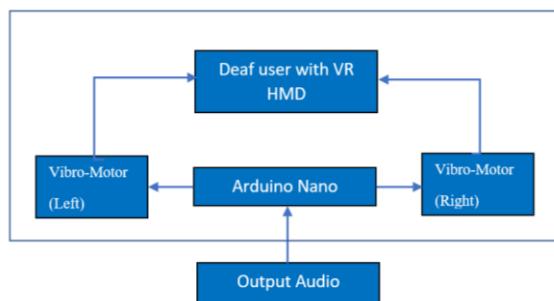


Fig. 3. The Virtual Device design.

VR HMD is used to display the VR environment. The HMD is the Head Mounted Display device is worn as the helmet and the screen is displayed Infront of eye. This helps the user to immerse into the environment. The Arduino is placed on top of the VR HMD and vibro-motors are placed inside the headphones. VR device only needs to connect to a headphone jack and a USB port. For mobile VR, they can use the headphone jack on mobile devices with a Universal Serial Bus (USB) cable. The soft material is attached to the Vibro-motors for the comfort of the user. This allows users to put vibro-motors inside their ears without any unpleasant feeling when using VR HMDs without embedded head phones.



Fig. 4. The VR HMD.

The VR HMD is connected to VR ready laptop with the following specifications: Intel Core-i7 processor, 16 Gigabytes of RAM, Nvidia GeForce GTX 1080 graphics card, and a 64-bit Windows 10 Operating System (OS). The processing power of the Arduino Nano is sufficient to analyze the input stereo sounds and to control two vibro-motors. They can provide the

Arduino Nano's operating voltage (5 volts) using a USB cable connected to a PC USB port, or a mobile phone's USB connector (through an OTG cable). A rechargeable lithium-ion (Li-ion) battery can also be used to provide the required power [5].

The stereo sounds are transferred to the Arduino through a stereo audio cable connected to the PC or mobile phone's headphone jack. The vibro-motors can switch extremely fast and can be controlled by a low current source. It indicates the direction of the closest sound to the user in real-time.



Fig. 3. The Vibro-Motors.

The Arduino processes the input stereo sound by analysing left and right stereo channels. The left vibro-motor (on the left ear) will vibrate if the intensity of the left channel is higher than the right and vice versa. Therefore, the user knows the direction of the incoming sound. If the intensity is equal in both channels, the vibro-motors will not vibrate. In this case, there are two main situations:

- 1) The sound source is in front of the user, which is easy to find because the user can see it
- 2) The sound source is behind, above, or below the user. If users cannot find the sound source in the front or behind, they pay attention to above or below.

Two Task were given in which the Deaf people [5] with and without the device were compared in finding the cubes in VR environment as the first task and the second was finding the correct cubes. Analysis of the results from task 1 showed us that Deaf people were able to complete the task much faster "With VR device" compared to "Without VR device". The total number of plays, wins, and game overs among this group increased significantly which demonstrate that DHH persons have much more desire to play the VR game "With VR device" and VR device helped them a lot to complete the task. DHH persons "Without VR device" were disappointed in completing the task after one or a few game overs. The functionality test was also conducted in which the below factors are taken into consideration with the device and without device [5].

IV. CONCLUSION AND FUTURE WORK

The device designed using the Virtual Reality is very useful of the people who are Deaf. By this Technology we can get much more change in the world by decreasing the problems of the hard hearing people and encouraging them to be as the normal people and explore the world. We have proved again that the computer science technology can get better change in the lifestyle of the people. The VR environment becomes more interesting for all users by using 3D audio. As future work, they considered developing a new version of VR device that is capable of analysing different sounds in the VR environment based on their level of importance and also combine sound visualization techniques with haptic feedback. By expanding the hardware, the researchers are going to analyze the effect of controlling the speed of vibro-motors by determining the distance between the user and the object that is generating sounds.

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A Survey Work On Towards Exploring The Potential Of Alternative Quantum Computing Architectures

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ABSTRACT: The recent advances in the physical realization of Noisy Intermediate Scale Quantum (NISQ) computers have motivated research on design automation that allows users to execute quantum algorithms on them. Certain physical constraints in the architectures restrict how logical qubits used to describe the algorithm can be mapped to physical qubits used to realize the corresponding functionality. Thus far, this has been addressed by inserting additional operations in order to overcome the physical constraints. However, all these approaches have taken the existing architectures as invariant and did not explore the potential of changing the quantum architecture itself a valid option as long as the underlying physical constraints remain satisfied. In this work, we propose initial ideas to explore this potential. More precisely, we introduce several schemes for the generation of alternative coupling graphs (and, by this, quantum computing architectures) that still might be able to satisfy physical constraints but, at the same time, allow for a more efficient realization of the desired quantum functionality.

I. INTRODUCTION

Quantum computing received significant interests because of its ability to provide efficient solutions for certain complex tasks such as quantum chemistry, optimization, machine learning, cryptography, etc. Physicists experimented with various technologies such as ion-traps, superconductors, semiconductor quantum dots, or photonic systems in order to physically realize quantum computers. Among these, the superconducting technology is considered very promising since it provides better physical realizations over other candidate technologies. This motivated researchers as well as companies to focus on the development of actual quantum computers.

Herein, the approach from IBM stands out it provided the first publicly available quantum processors. These processors can be accessed by anyone through cloud access. This allows designers to run their own quantum algorithms (usually represented in terms of circuits) on the IBM quantum computers, known as IBM QX architectures. In order to execute quantum circuits on those architectures, the initial circuits have to be decomposed into elementary quantum operations that are supported by the given architecture. To this end, several solutions exist that decompose arbitrary quantum circuits into a sequence of elementary quantum gates.

Once the circuits are represented in a sequence of elementary quantum gates supported by the architecture, further design steps need to be conducted. This includes the mapping of logical qubits used in the originally given quantum circuit to the physical qubits used in the architecture. This, however, cannot be done in a one-to-one fashion, because IBM QX architectures have certain physical constraints described by so-called coupling graphs. Current state-of-the-art methods insert additional gates in order to re-arrange the qubits and/or to change the control/target connections so that the constraints imposed by the coupling graphs are satisfied. Obviously, the insertion of additional gates increases the size of the quantum circuit and, thus, reduces the fidelity of the circuit. As a result, researchers and engineers focused on developing solutions that aim to derive a proper mapping of logical qubits to physical qubits while, at the same time, keeping the number of additional gates as small as possible.

II. PROBLEM STATEMENT

Coupling graph representing the restrictions of the Rueschlikon (also known as IBM QX5) architecture. As can be seen, the architecture has 16 physical qubits represented by vertices with labels Q0 to Q15. Reducing the gate overhead caused by the need to satisfy the constraints from physical realizations obviously is the main objective of solutions introduced thus far for quantum circuit realization.

III. PROPOSED SYSTEM

We propose initial ideas towards exploring the potential sketched above. In fact, exploiting the shown potential in a naive fashion is easy. One just needs to generate alternative coupling graphs and map the respective quantum circuits to it in order to see whether this yields more efficient results as if, e.g., IBM's Rueschlikon is considered as coupling graph. However, exploring the potential using "arbitrary" coupling graphs is meaningless (in this case, a complete graph where all qubits may arbitrarily interact with each other will be the best but also physically most unrealistic solution). Hence, we consider alternative schemes for coupling graph generation that, on the one hand, allow exploring the possible potential while, on the

other hand, remaining as close to the characteristics of existing quantum computing architectures (and, by this, most likely will also be physically possible).

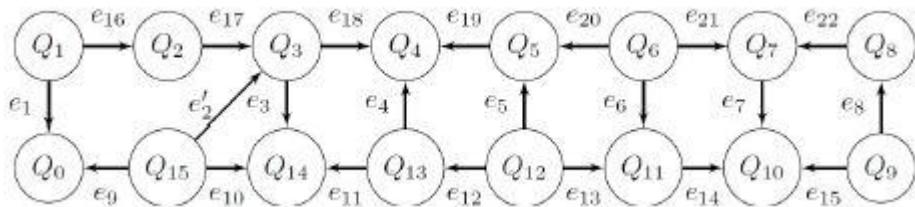


Fig. 1 Coupling graph determined by random modifications

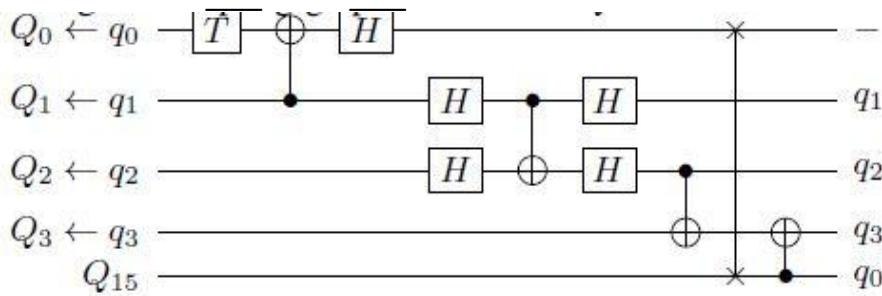


Fig. 2 Mapped circuit

Flipping Edges of Existing Coupling Graphs The first approach to generate alternative coupling graphs involves a minor modification of the existing coupling graph in order to still satisfy the physical constraints/restrictions discussed in Section III-B. We consider an existing coupling graph (such as for Rueschlikon) as a basis for generating a modified one. The modification is done by randomly reversing the directions of the edges that exist in the given coupling graphs. More precisely, given an existing coupling graph $A = (Q; E)$, we randomly choose an edge $e_i; j_2 \in E$ pointing from qubit Q_i to qubit Q_j ($Q_i; Q_j \in Q$) and flip its direction which results in an edge $e_j; i$, now pointing from qubit Q_j to Q_i . In a similar fashion, the directions of the other edges in the graph can also be reversed. The choice of the edges to be flipped is done in a purely random fashion.

IV. QUANTUM CIRCUITS AND ARCHITECTURES

Before the general idea and the proposed schemes are introduced, we first provide a brief review on quantum circuits as well as the quantum architectures commonly used in today's NISQ devices. Quantum bits (qubits) are the basic information units in quantum computation. A qubit can have two basis states, $|j_1\rangle$ or $|j_0\rangle$ and can also have a superposition of both states. A quantum circuit is composed of quantum gates, where each gate represents a quantum operation. A gate can either involve one or two qubits. In the case of two-qubit quantum gates, one qubit is the target qubit and other is the control qubit. The Clifford +T gate library, composed of the 1-qubit Hadamard (H) gate, T (phase shift by $\pi/4$) gate, and 2-qubit controlled NOT (CNOT) gate represents a universal gate library, i.e., all quantum operations can be performed by circuits composed of gates from this library. In order to realize an efficient quantum circuit, the total number of quantum gates in a circuit, should be kept as low as possible.

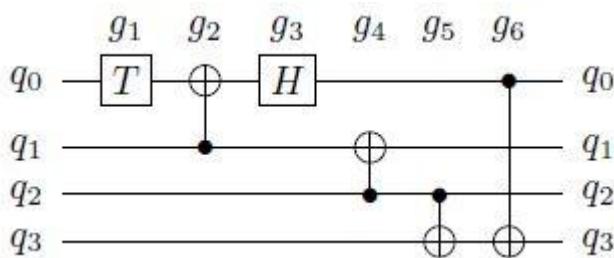


Fig. 3 Quantum Circuit

Fig. 3 shows an example of a quantum circuit composed of four qubits and six gates. The boxes labelled with H and T represent the single qubit gates H and T, respectively. The control and target qubits of the CNOT gates are denoted by $\underline{\dots}$ and $\overline{\dots}$, respectively. In order to execute a quantum circuit, they have to be mapped onto a real quantum computer. In the following, we focus on the quantum computers provided by IBM's Project Q. Here, quantum algorithms to be executed (usually provided in terms of a quantum circuit) have to be composed of elementary quantum gates only. To this end, several

methods decomposing the desired quantum functionality to an elementary gate library exist in literature. Besides that, there are also some constraints which need to be satisfied. In fact, 2-qubit quantum gates such as CNOT can only be applied between specific pairs of qubits. Furthermore, for each pair of qubits, which qubit will work as the control and which one will work as the target are firmly specified. This restriction is known as CNOT constraints, and is usually described in terms of a coupling graph which depicts the layout of the quantum architecture.

More formally, a coupling graph $A = (Q; E)$ over physical qubits $Q = \{Q_0; Q_1; \dots; Q_{15}\}$ is a directed graph consisting of a set of vertices Q and a set of edges $E = \{e_i\}_{i=1}^{22}$ where $e_i = (Q_u; Q_v)$ represents a 2-qubit operation with the qubits Q_u and Q_v being the control and target, respectively.

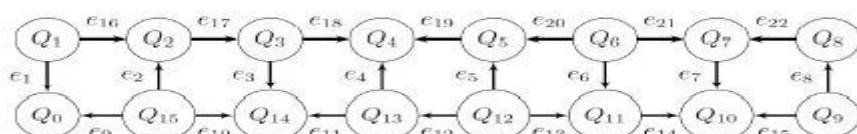


Fig. 4 Quantum architecture Rueschlikon

Fig. 4 shows a coupling graph representing the restrictions of the Rueschlikon (also known as IBM QX5) architecture. As can be seen, the architecture has 16 physical qubits represented by vertices with labels Q_0 to Q_{15} . The edges e_1 to e_{22} in the graph represent the connections between the qubits. For example, edge e_1 pointing from physical qubit Q_1 to qubit Q_0 indicates that a CNOT with control qubit Q_1 and a target qubit Q_0 can be applied here. Similarly, all other edges define the other allowed qubit interactions. All remaining interactions are prohibited.

V. RELATED WORK

In this section, we first briefly review the state-of-the-art process of realizing quantum functionality on real quantum computers. Afterwards, we discuss a potential that has not been utilized thus far. This provides the basis for investigations towards the generation of alternative coupling graphs that satisfy physical constraints but also allow for more efficient realizations of the desired quantum functionality.

A. Current Design Process
Thus far, the realization of quantum functionality onto real quantum computers has been conducted by simply taking the existing architectures as invariant and not questioning the correspondingly resulting constraints. This does not only yield a significantly more complex design process (in fact, realizing a given quantum functionality to a given architecture has been proven to be NP-hard), but also substantially increases the costs of the resulting realizations. This is because the given architectures substantially restrict the allowed interactions between qubits. Current state-of-the-art methods address this problem by adding additional gates which re-arrange qubits and/or change control/target connections so that they are eventually in line with the constraints imposed by the quantum architecture/coupling graph. An example illustrates the idea.

Consider the circuit from Fig. 3 that is to be realized on the Rueschlikon quantum computer. The constraints as defined by the coupling graph shown in Fig. 4 have to be satisfied. By directly mapping each logical qubit q_i to a physical qubit Q_i , the first three gates are supported. However, gate g_4 and gate g_6 cannot be realized under the given constraints, because an interaction between Q_2 and Q_1 is only possible if Q_2 is target and Q_1 is control (which is the opposite in g_4) and because no interaction is allowed between Q_0 and Q_3 at all (which is required in g_6), respectively. These issues can be addressed as follows. First, add four H gates which flip the respective control/target connections of a gate and, by this, satisfy the constraints for gate g_4 as shown in Fig. 3. Second, SWAP gates are applied which exchange

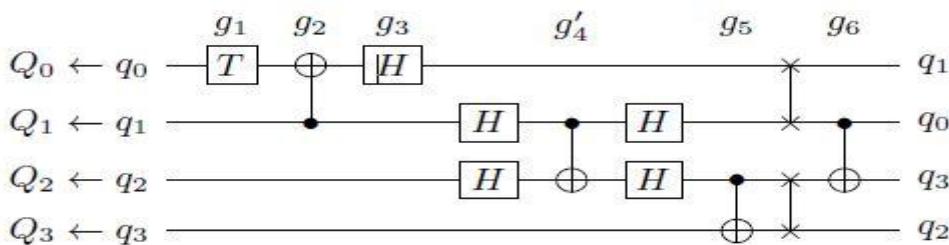


Fig. 5 Mapped circuit (assuming coupling graph from Fig. 2)

Fig. 5: Mapped circuit (assuming coupling graph from Fig. 4) two qubit values and effectively “moving” qubit values from one physical position to another. This is applied to satisfy the constraints for gate g_6 as also shown in Fig. 5. Since all these adjustments require 18 additional elementary gates (four H gates and two SWAP gates which need to be realized with seven

elementary gates each), realizing this circuit onto the Rueschlikon architecture increases the gate count by a factor of 3. In the recent past, several methods for realizing quantum.

Functionality under these constraints have been proposed. They employ various heuristics, clever reordering schemes, templates, etc. Even exact solutions which guarantee a minimal overhead with respect to H/SWAP gates have been proposed. However, all these solutions frequently yield substantial overheads in terms of a large number of additional gates—a significant drawback since the total number of gates significantly affects the fidelity of the result. In fact, studies by IBM have shown that, if the gate overhead gets too large, the intended result cannot be determined anymore because of the noise levels are too high.

VI. METHODOLOGY

Reducing the gate overhead caused by the need to satisfy the constraints from physical realizations obviously is the main objective of solutions introduced thus far for quantum circuit realization. However, even if minimal overheads can be determined, their impact on the reliability of the resulting computations remains substantial. Hence, to further improve realizations, more avenues need to be explored. Changing the constraints imposed by the existing quantum computer architectures (and described by the coupling graphs) seems to be a promising further direction. Since those constraints resulted from physical requirements, they have been taken as invariant and were not questioned thus far. In this section, we show that, even if we recognize that physical constraints have to be satisfied, some degree of freedom exists. This allows for the design of valid alternative quantum architectures onto which certain quantum circuits can be realized with much less gate overhead than before. The physical constraints of quantum computing technology have to be considered in more detail. We focus on the constraints of quantum superconducting as a representative technology¹. Here, each qubit is realized as an artificial atom using a non-linear inductor-capacitor circuit. The non-linear elements lead to an harmonicity which results in unequally spaced energy levels. As a result, in a multi-qubit quantum computer, each qubit has a unique frequency. In case of 2-qubit gates, the qubit with high frequency is usually used as control qubit and the qubit with low frequency is usually used as target qubit. Exceptions to this high frequency control and low frequency target arise when the qubits are degenerated.

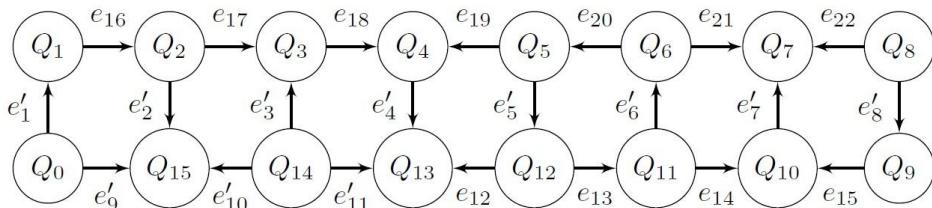


Fig. 6 Coupling graph of an alternative architecture

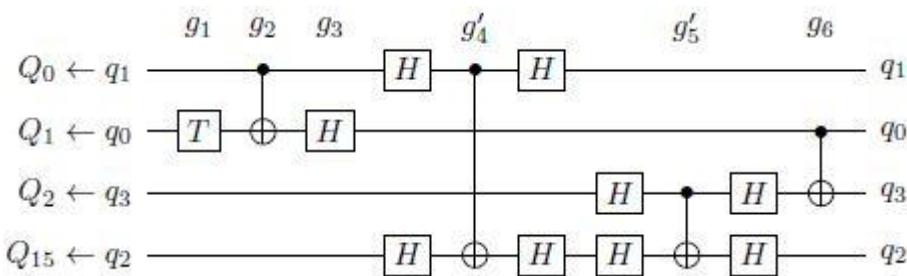


Fig. 7 Mapped circuit (assuming coupling graph from Fig. 6)

Or there is interference between coupling qubits and other qubits with low frequency. This establishes couplings between two qubits and thus allows to perform operations on the target qubit based on the state of the control qubit eventually, realizing 2-qubit operations such as CNOT. However, such a strong coupling is only possible between two qubits and can only be established if the qubits are next to each other (otherwise, the qubits may degenerate which results in a gate operation with very low fidelity). Eventually, this led to quantum computer architectures with constraints defined by coupling graphs.

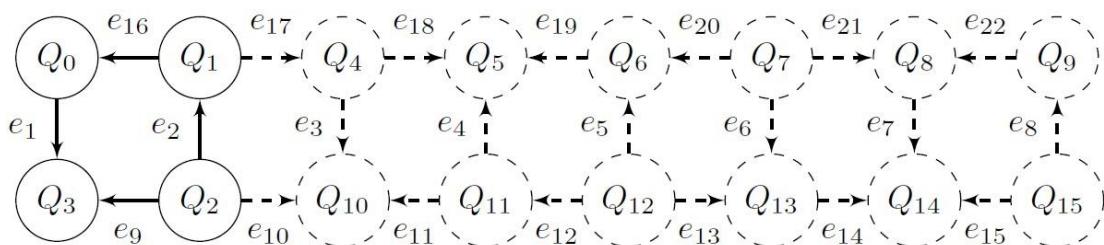
However, it is obvious that these characteristics not necessarily have to lead to quantum architectures as available thus far. In fact, a coupling between qubits that follow these characteristics can be established in numerous fashions. This allows determining architectures with coupling graphs that are much more suited for quantum circuits to be executed on them. Fig. 6 shows the coupling graph for an alternative architecture that also satisfies the physical constraints discussed above. In fact, this coupling graph is almost identical to the coupling graph for the Rueschlikon architecture shown before in Fig. 4, but differs in the directions of the edges. Despite these minimal differences (which should not pose any obstacles with respect to a physical realization), this allows to map the quantum circuit from Fig. 5 with significantly less overhead as shown in Fig.

1. In fact, rather than 18 additional gates, only eight additional gates are needed—an overhead reduction of 55%. This example sketches the possible potential in the design of quantum architectures: Rather than only satisfying physical constraints (which, of course, always remains a primary objective), it should also be considered how good/bad a derived architecture is able to realize the desired quantum functionality.

Random Modifications

While the coupling graphs generated by the above scheme differ from the existing graphs with respect to the directions of the edges, i.e., only minor modifications are made, more substantial modifications can be made by a random approach which is proposed as second scheme to generate alternative coupling graphs. We again consider an existing coupling graph (such as for Rueschlikon) as a basis for generating an alternative one. The modification is done by randomly adding and removing edges that exist in the considered coupling graph. More precisely, given an existing coupling graph $A = (Q; E)$, we randomly select a qubit Q_i , its adjacent qubit Q_j followed by a qubit Q_k which is adjacent to Q_j ($f(Q_i; Q_j; Q_k) \geq 2$). Based on the edges with outward direction, we order the nodes as control qubit to target qubit. Without loss of generality, assume that an edge points from Q_i to Q_j , while another edge points from Q_k to Q_j resulting the order $Q_i > Q_j < Q_k$. Next we remove an existing edge between Q_i and Q_j and add an edge either pointing from Q_i to Q_k or vice-versa.

Consider again the coupling graph from Fig. 4. Applying the scheme sketched above, we choose qubits Q_{15}, Q_2 and Q_3 which are adjacent to each other (see Fig. 4). Now, we remove the edge pointing from Q_{15} to Q_2 and add an edge pointing from Q_{15} to Q_3 . This leads to an alternative coupling graph as shown in Fig. 1. Using this coupling graph, the circuit from Fig. 3 can be realized as shown in Fig. 2. Rather than 18 additional gates (needed in case of the Rueschlikon architecture), this requires only eleven additional gates—a reduction of the overhead by 39%.



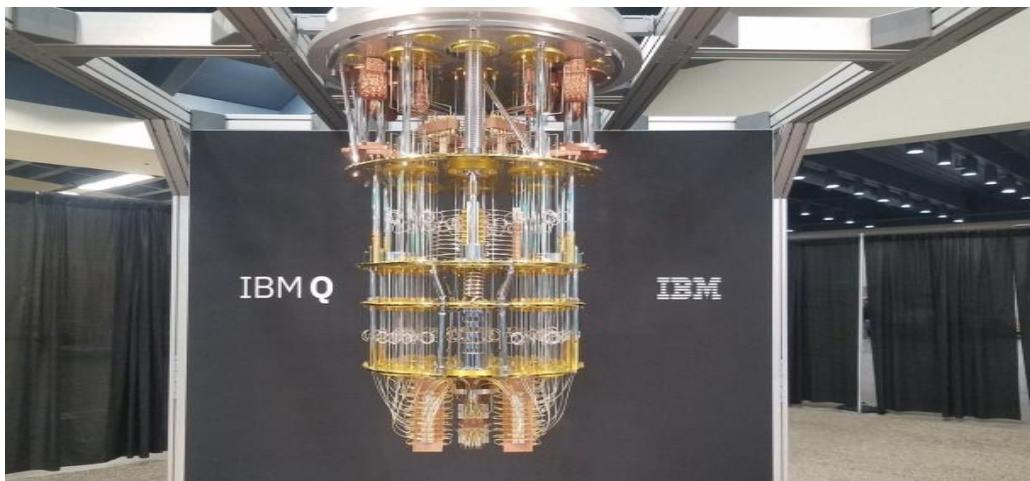


Fig. 9 Quantum computer IBM

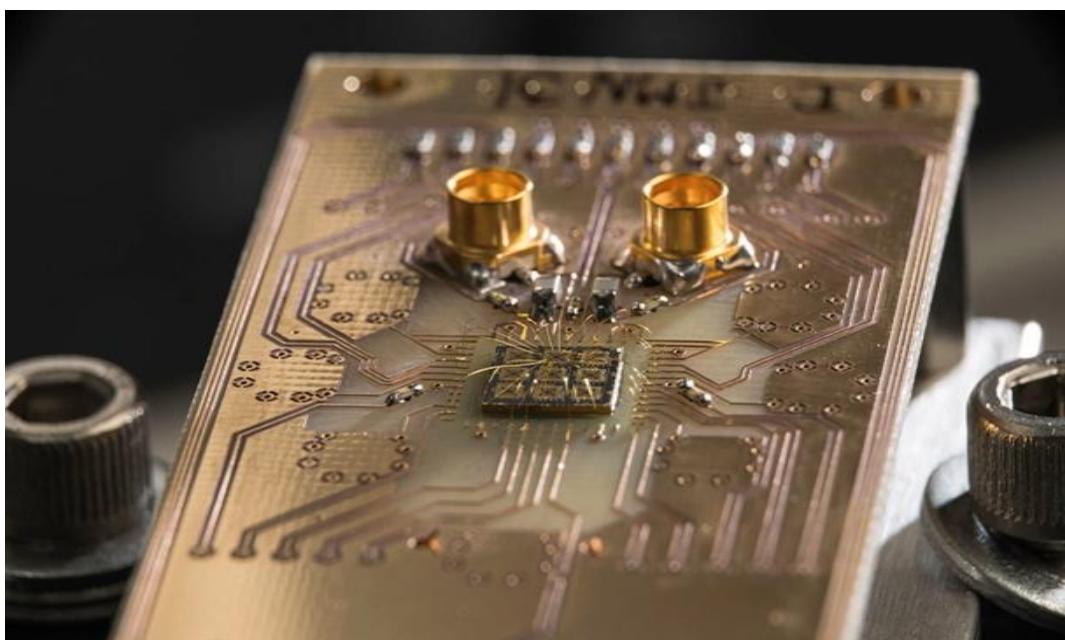


Fig. 10 Quantum computer processor

CONCLUSION

In this work, we proposed initial ideas for the generation of alternative coupling graphs (i.e. quantum computing architectures) that might be able to realize quantum functionality in a more efficient fashion. The considerations may motivate physicists to develop quantum computers while not only considering physical constraints, but also taking the effect of the corresponding architectures on the quantum functionality to be executed into account. In order to provide further motivation along those lines, a more thorough evaluation of the outlined potential is left for future work. However, all these approaches have taken the existing architectures as invariant and did not question the correspondingly resulting constraints. In this work, we show that there exists further potential. In fact, changing the constraints imposed by the existing quantum computing architectures is a valid option (of course, as long as the underlying physical constraints remain satisfied). In the following, we motivate that in more detail and propose initial ideas to explore the resulting potential. More precisely, we introduce several schemes for the generation of alternative coupling graphs (and, by this, quantum computing architectures) that still might be able to satisfy physical constraints but, at the same time, allow for a more efficient realization of the desired quantum functionality.

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Role Of Blockchain In Finance And Accounting

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ABSTRACT: A blockchain, is a growing list of information, called blocks, which are linked using cryptography. A blockchain is a decentralized, distributed and a public digital ledger that is used to record transactions across many devices so that any involved record cannot be changed easily, without modifying all subsequent blocks, because of this, blockchain has found its use in wide-ranging fields. This review paper, therefore, describes the role of blockchain in IoT and financial applications, two fields which will be benefitted the most by it. Furthermore, this paper examines the privacy and security concerns related to it and shares some insights on how these problems can be tackled. In this paper, we have reviewed multiple such papers in which similar issues were addressed. Lastly, the public perception of blockchain technology is taken to addresses how blockchain is perceived in different segments of society.

KEYWORDS: Energy *Blockchain, Security, Privacy, Finance, IoT.*

I. INTRODUCTION

Since the establishment of bitcoin in 2009, one thing that has raised hopes of many is the technology running under the hood, Blockchain. 9 years on and blockchain has made its way into an array of other technologies with Financial and IOT being at the forefront of this development. The blockchain is a distributed ledger which helps in facilitating and verifying transactions between mutually distrusted parties without the need of central authority. Ethereum, the world's largest Blockchain has a market cap of 21 Billion \$ and 333.1 million confirmed transactions [1] (As of writing this paper). Furthermore, it has more than 4.5 million unique addresses [2] (As of Writing this paper). With 69 % of banks experimenting with blockchain, it shows how important this technology is to the financial world [3].

The Internet of Things (IoT) and Blockchain are two topics which are causing a great deal of exposure and elation, not just in the technical environment but in the far-ranging business world, too. However, the idea that putting them together could lead to something even greater than the sum of its individual parts, is something which is starting to gain attention. Put them together and in theory, you have an empirical, secure and immutable method of recording data processed by "smart" devices in the IoT. Simplified business workings, better customer experience and cost efficiencies are made possible due to blockchain based IoT solutions. It is often said that IoT needs Blockchain and vice-versa.

Four ways IoT can exploit blockchain technology: Trust building, Cost reduction, Accelerated data exchanges and Scaled security.

II. RELATED WORK

Blockchain in Financial Applications:

In this paper, the author has started with an overview of blockchain technology and later in the paper described some of the issues but, the author missed out on some key issues. In addition to this, the description of each issue is obscure with negligible references. Further, in the paper, he has proposed solutions to the problems presented in the paper which are as follows,

- Pegged side-chain: It is the concept of integrating two blockchains by peg mechanism to facilitate bidirectional transfer between the chains. This solution is fundamentally for scalability and privacy problem, one of which isn't addressed in this paper at all. When we are integrating two blockchains, fundamental problems more or less remains the same. By adopting this approach developers have added a layer of complexity (SPV) in the already complex system which will further hinder the performance of blockchain. Furthermore, Integrating two blockchain also mean that there will be more than one asset at disposal, so one will have to significantly change the architecture to identify any malicious transactions.
- Two-factor authentication: This solution suggests that private keys should be broken down in parts and stored in different devices. It addresses the problem of transaction malleability and privacy. It can be very useful if implemented. For example, a person stores one part of the key in his/her mobile phone and another part in their wallets. What if the person's mobile is hacked or cloned? Then the hacker will have part of the user's private key and time has proven that wallets can be

hacked too. In this way, two-factor authentication can be easily circumvented.

- Proposed solution: In the proposed solution the, author has combined two solutions and tried to create a more secure blockchain. The problem here is that it does more harm than good. Firstly, it will only increase the complexity of Blockchain as pegged blockchain is introduced furthermore, there is a need for additional software to check this authentication. Which will ultimately take a toll on the efficiency of the blockchain? Also, the author hasn't performed any comparative study of his proposed method without which its viability cannot be assessed.

This paper gives an overview of blockchain technology. It explains what blockchain technology is and what the process of transferring currency through a blockchain is. Furthermore, the author compares decentralization and centralization and states why decentralization is better than its counterpart. Later on, Author has given a gist of attacks like 51% attack, double spending attack, Brute force attack and Finney attack which is another form of double-spending attack. One important thing to note here is that Side channel attacks are discussed here, which are often overlooked but is a cause of serious concern.

Also, the author has missed out on some crucial issues like DDoS attacks etc. In the last section, Different constraints of blockchain like are discussed which are as follows

- Hashing: Hashing function is a piece of code which converts data into ciphertext. The author describes all the qualities an algorithm needs to possess, in order to be a good hashing Algorithm.
- Digital Signature: It is the process of appending a piece of unique information along the intended file such that the sender is easily identified.

III. CONCERNS OF BLOCKCHAIN

Privacy Concerns

Wallets: Wallets are organizational entities which keep the private keys of its registered users. There are numerous types of wallets like mobile wallets, desktop wallets, hardware wallets, online wallets, and paper wallets. When wallets become subject of an attack it compromises the security of the whole system, resulting in revealing sensitive information to hackers including private key.

Discoverability/Transaction Privacy Leakage: Transactions performed on a blockchain can be seen throughout the network (As a ciphertext). And that data of transaction includes addresses of payee and sender. When the same person transacts numerous times, there's metadata generated and statistical or correlational analysis of that metadata can sometimes reveal certain information which in turn allows for pattern recognition. This problem can be mitigated using channels.

Security Concerns:

51% Vulnerability: Blockchain is based on the consensus protocol, which fundamentally states that any transaction on a network needs a majority (At least 51%) to be successful. In this issue, if a miner has 51% of hashing power then he/she can manipulate the data resulting in malicious transactions, stopping the transaction or creating new blockchain altogether. This concern is more prominent in private Blockchains as total hashing power of the blockchain will depend on the size of the organization and that power is generally not that significant compared to public blockchains.

Smart contract: Smart contracts are self-executing code based on blockchain which completes certain task upon execution. It is executed as soon as predefined conditions are met. It helps us to facilitate credit transactions without using third parties. One major drawback of a smart contract is that it is immutable i.e once it is appended on a blockchain it can't be modified. one has to code an entirely new contract which takes a toll on the efficiency of the blockchain.

Double spending - Double spending lets a user transact the same crypto-currency multiple times. It can be done either by exploiting 51% vulnerability or by performing a race attack. In the former one hacker or a group of hackers take control of the entire network and create a new blockchain (As explained in 51% vulnerability), race attack is more of a lone wolf attack and generally involves lower valued transactions.

DDoS: Here attacker overwhelms the network by performing an extremely large number of transactions resulting in unnecessary load and occupying huge space in a network. DDoS attacks are common in smart contracts which are underpriced. Here, the attacker calls a contract numerous times in a single transaction resulting in loss of computational resources and ultimately leading to blockchain shutdown. A prime example of it is an attack on the Ethereum network which exploited the low gas price of EXTCODESIZE opcode [28]. Recently, Verge experienced DDoS attack as well.

Transaction malleability: Here an attacker changes the unique id of a certain transaction just before it is put into a block

resulting in the fraudulent transaction. This problem is seen in bitcoin transactions. Ethereum blockchains are immune to this after homestead hardfork . One possible solution can be as described in .

IV. PUBLIC PERCEPTION ABOUT BLOCKCHAIN TECHNOLOGY

After doing a numerous survey on blockchain technologyon financial and IoT field, the public perception of blockchain technology is also taken. The public domain includes:

- Developers fromthe blockchain industry
- Stakeholders, developers, analysts from the service and manufacturing industry.
- Technical students who are doing projects on blockchain in academia.
- Faculties, mentors of technical fields from reputeduniversities.
- Researchers who know blockchain technology.

The form (online) is circulated among these people andthe following questions were asked.

1. In your opinion, what kind of impact will block-chain technology have on the business community?
2. In your opinion what is the core of following features of blockchain technology?
3. Which Industry,do you think block-chaintechnology can create the most value in?
4. Looking at today's applications, at what level youtrust block-chain technology?
5. In your opinion, what are the challenges for thedevelopment of block-chain technology?

Following conclusions can be drawn from the abovequestionnaire.

- Majority of people think that blockchain technologywill have a significant impact on the business community. Since blockchain technology is a decentralized system, it provides enough security for business data, also it protects the data fromintruders.
- People think that distributed systems like smart contracts are the most significant features ofblockchain technology. In the literature survey papers that we read, the researchers' community have also focused on distributed system and smart contracts in addressing blockchain technology.
- People also feel that the government sector is the most promising sector where blockchain technology can be implemented. We all know that government has most sensitive data of their citizens including personal identification number (such as aadhar UID, SSN etc.), health data, biometric information, transportation information (such as vehicle number,registration date), location information etc.hence the data need to be protected.
- Welcoming the new technology – blockchain is a need of an hour. From the survey that we have taken, more than 50% of the people have immense trust in this technology. There is still a need for an awareness that is required. We always have a lack of professionals in the blockchain technology. There is a requirement of new courses on blockchain technology that is a must, for understanding the core concepts, working and challenges that blockchain technology face today.
- Speaking about the challenges of blockchain technology, around 48.6% of people have admitted that we lack the understanding of blockchain technology. On the parallel line, 48.6% of people also think that market readiness is required to accept the blockchain technology. No doubt, in the upcoming year's blockchain will be one of the most trustworthy,acceptable and secure technologies in the world.

V. Future Scope

The future scope of the paper can be summarized as follows :

- A common framework of blockchain technology for all these diversified applications, bringing the uniformity in data exchange, its protection, and privacy.

- Uniform policy of using this blockchain in the applications so that misuse of the data will not happen
- The common attacks like DDoS, Double Spending, Transaction Malleability must be addressed properly in order to improvise security.
- Awareness among the people about the blockchain technology so that the trust level among users will increase.

VI CONCLUSION

The blockchain is used in many diverse applications including IoT, Healthcare and Finance and many more. The paper is significantly drawn a conclusion that the role of Blockchain is extremely important in case of an application where data is sensitive and privacy is a major concern of the data. IoT is creating new opportunities and providing a competitive advantage for businesses in current and new markets. It touches every aspect of technology: not just the data coming from sensors, but how, when, where and why you collect it. Since these data need to be protected, we need common blockchain oriented framework for IoT applications. The data generated through financial sector is also equally important as it decides the future market trends and stores the investment details of customers and investors since this data is sensitive, the possible attacks like Man in the middle, DoS is likely to happen. Privacy of such financial application is also a major concern which can be solved by blockchain technology. Blockchain technology has the potential to transform health care, placing the patient at the center of the health care ecosystem and increasing the security, privacy, and interoperability of health data. This technology could provide a new model for health information exchanges (HIE) by making electronic medical records more efficient, disintermediated, and secure.

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Wheel Defect Detection Of Moving Railways Using Machine Learning

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ABSTRACT: Early detection of serious wheel defects on freight trains are an essential part in preventing damage to the railway infrastructure and in providing the train operator with timely information on necessary repairs, that can prevent further deterioration of the wheels. Major damage to railway infrastructure and rolling rock is due to wheel defects on railway wagons. There are two machine learning methods to automatically detect these wheel defects. These methods analyse multiple time series of the vertical force of a wheel under operational speed and output if a wheel has a defect or not. Both the methods are trained automatically on measurements gathered from defective and non-defective wheels. The first method is based on novel features for classifying time series data it is used for classification with a support vector machine. To detect the defects multiple data sets are being used. The second method is based on neural networks. Multi sensor structure of the measurement system through multiple instances learning and shift invariant networks are being modelled to improve the performance of wheels. The methods enable us to predict defects on wheels where there is no prior understanding of how these defects manifest themselves in the measurements. The methods detect and classify different types of defects based on measurements during normal operation where the trains pass the measurement sites in full operational speed. In this paper I will discuss the features that are developed for the use in supervised learning are general and principle can be used for any time series data and are not restricted to specific defect types.

I INTRODUCTION

The life span of the railway infrastructure is significantly shortened by the negative effect of wheel defects. The life span of railway bridges for instance is calculated with an assumed maximal dynamical load of 21 tons. Wheel defects of railway vehicles directly cause an increase in attrition of and damage to the railway infrastructure, e.g., the track systems or the civil engineering works, thereby adding additional costs to maintenance and repair and leading to a reduced lifetime and availability of rolling stock. Due to wheel defects the actually occurring dynamical load can be up to 50 tons, or 270% higher than the theoretically assumed maximum, thus shortening the life span.

Wheel defects on railroad carts have been distinguished as a significant wellspring of harm to the railroad framework and moving stock. They likewise because clamor and vibration outflows that are exorbitant to relieve. Detection of wheel defects are an essential part in preventing damage to the railway infrastructure and in providing the train operators with timely information on necessary repairs.

In the European Union (EU) Project “Railway Induced Vibration Abatement Solutions” (RIVAS)¹ 27 partners from nine countries investigated the source and mitigation measures for noise and vibration emissions. They found that reducing wheel defects by wheel maintenance significantly reduces vibration and noise emissions directly. Therefore, it is recommended to use timely and targeted maintenance of train wheels as an economic means to reduce emissions. This measure is all the more important as the density and usage of modern railway networks is steadily increasing and failures quickly disrupt operation of the whole network or parts of it. Since 2008, all states in the EU are advised to employ noise emission ceilings. Switzerland started a noise abatement program based on emission ceilings that requires the infrastructure manager to curb emissions above the ceiling [1].

The methods that are proposed promises to increase the reliability of the railway infrastructure, to reduce the cost of freight train operation and to save additional investments on noise protection measures. To reach this goal without the costly construction of further measurement sites or newly built sensors, the use of statistical methods that allow us to automatically inspect the existing data and extract the information about defective wheels that is already present [2].

A number of deviations from the theoretical idea of the expected mechanical interaction between railway vehicles and track are observed in the real operation environment. The load transmitted by each wheel in static and dynamic aspects has become an object of increasing interest. A team of experts participated in several national and international projects have proposed particular solutions for creating a model to develop the necessary system of sensors as a main component of the systems of control on moving trains.

In [3], the proposed methods enable us to predict defects on wheels where there is no prior understanding of how these defects manifest themselves in the measurements. The methods detect and classify different types of defects based on

measurements during normal operation where the trains pass the measurement sites in full operational speed. The features that have developed for the use in supervised learning are general and can in principle be used for any time series data and are not restricted to specific defect types. In a second step, automatically learn features directly from the raw measurement signal. The methods empower us to foresee defects on wheels where there is no earlier comprehension of how these defects show themselves in the estimations.

The methods that were developed for this work are currently being implemented as part of the SBB wayside train monitoring system. To improve the quality of the training and test data RFID tags will be deployed to enable perfect association between defect labels and measurements.

II. LITERATURE REVIEW

Ying Li, present a real-time automatic vision-based rail inspection system, which performs inspections at 16 km/h with a frame rate of 20 fps [4]. The system robustly detects important rail components such as ties, tie plates, and anchors, with high accuracy and efficiency. To achieve this goal, first develop a set of image and video analytics and then propose a novel global optimization framework to combine evidence from multiple cameras, Global Positioning System, and distance measurement instrument to further improve the detection performance. Quantitative analysis performed on a large video data set captured with different track and lighting conditions, as well as on a real-time field test, has demonstrated very encouraging performance on both rail component detection and anchor exception detection. Specifically, an average of 94.67% precision and 93% recall rate has been achieved for detecting all three rail components, and a 100% detection rate is achieved for compliance-level anchor exception with three false positives per hour. This system is the first to address and solve both component and exception detection problems in this rail inspection area.

N. Nenov to control on the technical state and loading of rolling stock, management and synchrony in the access to infrastructure implemented by monitoring systems with the so-called Check Points located in railway network is an urgent problem in both scientific and practice-applicable aspects [5]. One of the functions of these systems is to monitor the most important technical parameters of the running rolling stock in real time, thus ensuring a high level of safety. Another important feature is the implementation of operational management and synchronization in the access to infrastructure. This function is used to perform monitoring on traffic and current location of cargoes, to determine infrastructure fees, etc. An important component of Check Points is the subsystem that is designed to detect, identify and record the defects on the rolling surface of the rolling stock wheels, which in practice is assumed to call “out-of-roundness (OOR)” or “wheelflat”. In general, these defects are chord-wise wearing of the conical surface of the rail vehicle wheels. From the safety point of view, this issue is extremely topical.

OPEN ISSUES ON LITERATURE REVIEW

- The experimental setup is very expensive and maximal power consumption.
- There may be chances of unfair results

III. PROPOSED METHOD

Wheel Load Checkpoint:

SBB infrastructure operates an integrated wayside train monitoring system that controls safety relevant aspects of the railway traffic and infrastructure [6]. Automatically monitoring trains and network are thus important to minimise the risk of incidents that quickly affect the scheduling of trains on the network. In 2010, 95.4 km of trains travelled one kilometre of track on average; this value documents the highest utilisation of network capacity in the world. the infrastructure division of the Swiss railway operator SBB operates and maintains the one of the most heavily used railway network of the world. the wheel load checkpoints (WLC) measure vertical force through strain gauges installed on the rails. These devices are used for observing maximal axle load, maximal train load, load displacement and grave wheel defects. The wheel load checkpoints are installed on multiple strategic sites on the railway network: ten on the border to Switzerland at the entrance to the railway network maintained by SBB and a dozen within the network [7],[8].The Fig. 1 shows schematically the measurement of one wheel by one measurement bar. In this example a defect is directly observed by the measurement of the first sensor.The Fig. 2. strain gauges are installed perpendicular on the center line of the railroad track and they are combined into one vertical wheel force measurement. One sensor covers approximately 30cm of the wheel circumference [9].

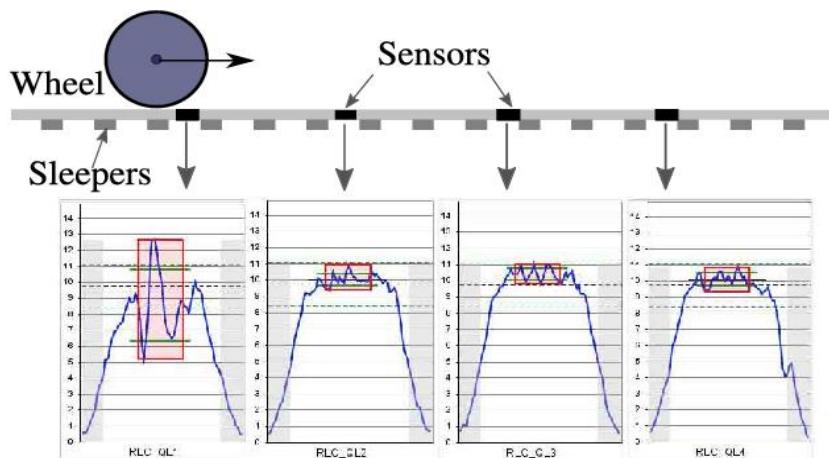


Fig. 1. Multiple vertical wheel force measurements of a train wheel by the four sensors of one measurement bar. The wheel is affected by a discrete defect that manifests itself in the measurement of the first sensor. The remaining sensors do not directly observe the defect.

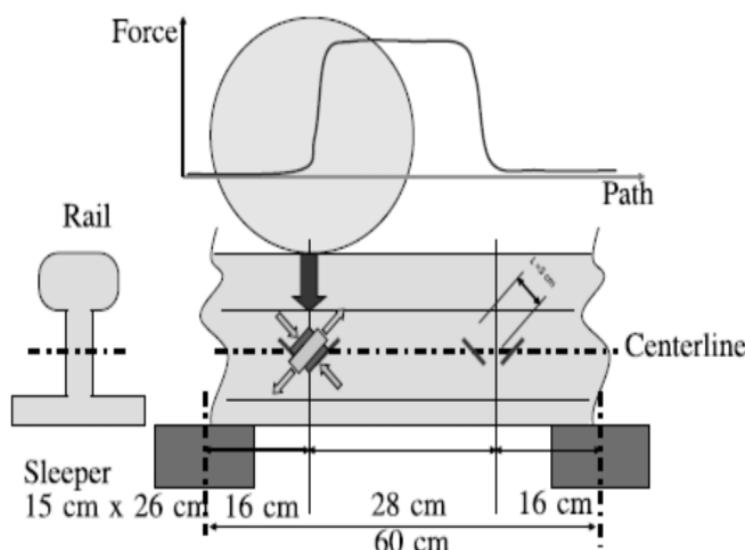


Fig. 2. Diagram of one sensor on a measurement bar of the WLC. The strain gauges are attached to the side of the wheel between two sleepers and cover 28cm of vertical wheel force of the wheel rolling on the track.

Railway Wheel Defects:

One of the wheel defect type is the flat spot or wheel flat. This defect occurs when the wheel stops rotating (for instance during an emergency brake) and is dragged along the track. Grave wheel flats can be detected by looking at simple statistics of the measurement if the defect hits the sensor perfectly [10]. To be able to detect flat spots that are less grave or that do not hit a sensor directly, more advanced machine learning methods are required.[11],[12] Other common wheel defects on railway vehicles are non-roundness and shelling. Wheels with non-roundness have a high influence on the vibration and noise emitted by a passing train and, therefore, they are an important type of defect to detect. The additional data set that contains the defect types flat spot, non-roundness and shelling and then, compare the performance of our two machine learning methods in predicting these three defect types. Flat spots are usually caused by use of the emergency brake, or slip and slide conditions that cause wheels to lock up while the train is still moving. Flat spots are more common in the autumn and winter when the rails are slippery, but can also be caused by faulty brakes or wheelset bearings.

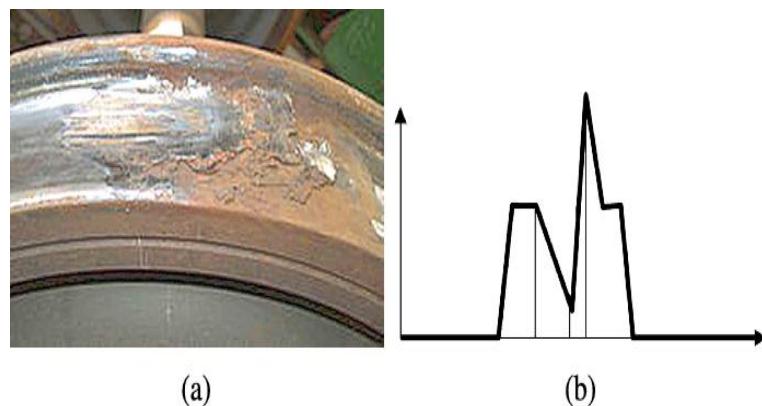


Fig. 3. flat spot on train wheel of SBB(a) and wheel load measurement(b)

IV. CONCLUSION AND FUTURE WORK

There are two machine learning methods to automatically detect these wheel defects. The first method is based on novel features for classifying time series data it is used for classification with a support vector machine. The second method is based on neural networks. Multi sensor structure of the measurement system through multiple instance learning and shift invariant networks are being modelled to improve the performance of wheels. The methods do neither require a model of the measurement system, nor of train dynamics or wheel defects. To perform these methods datasets are being collected from different sources and demonstrated to improve the performance of flat spots, non-roundness, shelling. RFID tags are being used to improve the quality of training and test data. These methods are currently being implemented as part of the SBB wayside train monitoring system.

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Prediction Of Heart Disease Using Data Visualization And Machine Learning

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ABSTRACT

Data Science plays vital role in identifying patient's health status and notify necessary steps to prevent their disease. We need to visualize data because visualized information makes it easy to identify patterns and trends than looking through thousands of rows and a specified number of columns in a spreadsheet, visualizing data plays an important role before applying preprocessing and machine learning techniques. Data preprocessing is a data mining technique that transform raw data into understandable data format. About 70% of the Data Scientists' time is spent in visualizing and preprocessing data. Machine learning can be used to detect the maximum score of our module by considering certain attributes like chest pain, gender, age of the person, and some other attributes. In this research paper intends to use data visualization using 'seaborn' and 'matplotlib'. We have created dummy variables using skleam and split data into training and testing 33% for testing and 67% for training. Then we applied Machine Learning algorithms, namely, ` K Nearest Neighbor Classifier'(K-NN), and 'Super Vector Classifier'(SVC), where KNN algorithm was applied for 10 different k values to find the best accuracy and for SVC algorithm we applied for 4 different kernels to compare among those kernels. In this paper we achieved the 'K Nearest Neighbor classifier the highest score of 87%.

Keywords: Heart Disease; Data visualization; Preprocessing; Machine Learning, K Nearest Neighbor Classifier (KNN); Super Vector Classifier (SVC)

I. INTRODUCTION

Data science is the field of study that combines domain expertise, programming skills, and knowledge of mathematics and statistics to extract meaningful insights from data. Data Science Machine learning algorithms can be applied to numbers, images, audio, video, text and many more to produce artificial intelligence system to perform given task. In turn these system analyses the task into tangible business values. A heart attack occurs when one or more of your arteries become blocked. India has the highest rate of heart disease worldwide.

In [1] the annual number of deaths in India has been a rise from 2.26 million in 1990 to 5 million in 2020. In rural population it has ranged from 1.6% to 7.4% of Indian population is discussed in [2].The INTERHEART study showed that CVD risk factors such as abdominal obesity, hypertension, tobacco, lack of physical activity, and higher diabetes, even at young ages, than among other ethnic groups [3]. The prevalence rates of CVD risk factors have been rapidly rising within India over the past 25 years, particularly within urban communities [4]. In this regard, cohort studies provide unbiased estimates of the relationship of exposure to outcomes, which would increase understanding of the determinants of CVD. The New Delhi Birth Cohort [5] provides a unique opportunity to evaluate the incidence of CVD risk factors in a young, urban Indian population.

The rest of the paper is organized as follows: Literature survey in section II, proposed methods in section III and in section IV, the simulation experimental outcomes alone with analysis of performance are discussed. The conclusions are given in section V.

II. LITERATURE SURVEY

Many of the researchers have studied the heart disease and are as follows. The annual number of deaths in India has been a rise from 2.26 million in 1990 to 5 million in 2020 is been observed in [1]. In rural population it has ranged from 1.6% to 7.4% of Indian population is discussed in [2].The INTERHEART study showed that CVD risk factors such as abdominal obesity, hypertension, tobacco, lack of physical activity, and higher diabetes, even at young ages, than among other ethnic groups [3]. The prevalence rates of CVD risk factors have been rapidly rising within India over the past 25 years, particularly within urban communities [4]. In this regard, cohort studies provide unbiased estimates of the relationship of exposure to outcomes, which would increase understanding of the determinants of CVD. The New Delhi Birth Cohort [5] provides a unique opportunity to evaluate the incidence of CVD risk factors in a young, urban Indian population. In[6], todays real world datasets are highly susceptible to noise, missing values, and inconsistent data. Due to mechanical failures and to their typically large size. This data is known as "dirty data". Preprocessing techniques should never be applied blindly to a dataset,

we need to visualize the dataset before applying any preprocessing techniques. The author has applied KNN algorithm for the heart disease dataset with different data manipulation, using the different K values in the KNN algorithm, the author has achieved a maximum score of 83.16% for 9 nearest neighbor. In [8], will build a classification model based on SVM algorithm modified with multiple kernel learning. The result shows that SVM with multiple kernel learning has good accuracy with 78 % and also has short computation time, where it needs about 64.35 seconds for training session and 26.15 seconds for retrieval session.

III PROPOSED METHOD

The analysis is carried out using publicly available data for heart disease in kaggle. The dataset holds 303 instances with 14 attributes such as age, gender, cp, trestbps, chol, fbs, restecg, thalach, exang, oldpeak, slope, ca, thal, target. The dataset is analyzed with a visualization tool, preprocessing, and Machine Learning Algorithms.

3.1. Data Visualization

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools are essential to analyze data and make data driven decisions. Data is visualized with 14 attributes, age is considered as the major risk factor for heart disease, slightly older with age 50 and more can have high chances of heart disease. When compared with a male and female, male are at high risk of heart disease.

Table 1 represents the name of the attributes and their description for each attribute. From table 1 we can classify the data into ‘Qualitative’ and ‘Quantitative’ data.

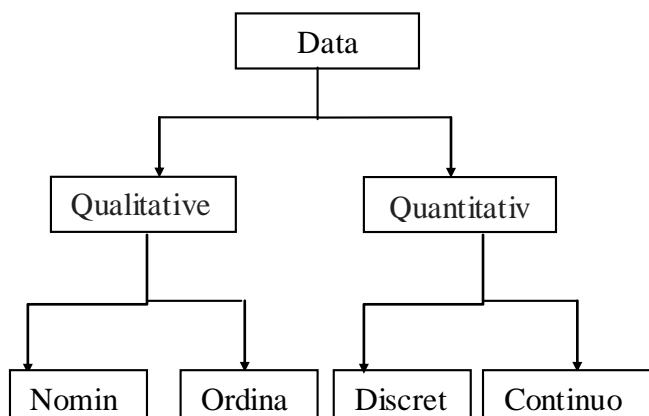


Fig: 1 Data Classification

SNo:	NAME	Description
1	age:	Age
2	gender:	1:male, 0:female
3	cp:	chest pain type 0:typical angina; 1:atypical pain ;2:non- anginal pain;

3:asymptomatic

4	tresbps:	resting blood pressure
5	chol:	serum cholesterol in mg/dl
6	fbs:	fasting blood sugar>120 mg/dl if fasting blood sugar>120mg/dl then : 1(true) else: 0(false)
7	restecg:	resting electrocardiographic results(values 0,1,2); 0:normal 1:having ST_T wave abnormal 2:left ventricular hypertrophy
8	thalach:	maximum heart rate achieved
9	exang:	exercise induced angina 1:yes 0:no
1	oldpeak:	oldpeak=ST depression induced by exercise relative to the rate
1	slope:	the slope of the peak exercise ST segment 1:upslope 2:flat 3:down sloping
1	ca:	number of major vessels (0-3) colored by fluoroscopy
2		
1	thal:	3=normal 6=fixed defect 7=reversible defect
3		
14	target:	Target variable displays whether the individual is suffering from heart disease or not 0:present 1:absent

Table 1 represents the name of the attributes and their description for each attribute

'Qualitative' data is also known as categorical data, this is not measured using numbers but categorized based on properties, attributes, labels, and other identifiers. Qualitative data can be divided into two types namely 'Nominal' data and 'Ordinal' data. In statistics, nominal data is a type of data that is used to label variables without providing any quantitative value.. Examples of nominal data are 'gender' is attribute and 'male' and 'female' are 'Nominal values'. We will conclude using 'histogram' graph in upcoming sections. Let's see what is 'Ordinal' data, 'Ordinal data' is classified into categories within a variable that have a natural rank order. However, the distances between the categories are uneven or unknown . Example are 'Income level' is attribute and 'low level', 'middle level' and 'upper level' are the 'ordinal values'. 'Quantitative' data is the type of data whose values are measured in the form of numbers or counts.'Quantitative' data can be divided into two groups namely 'Discrete' and 'Continuous' data. Discrete data is a type of data that consists of counting numbers, and as such cannot be measured. Measurements like weight, height, and length are some of the examples of 'Discrete' data. 'Continuous data' is a type of data that takes numeric values that can be meaningfully broken into smaller units. As opposed to discrete data which can't be measured, continuous data can be placed on a measurement scale (e.g. weight, length, time, etc.). We shall further analysis using graphs like histogram, barplot, and so on in section 4.

3.2. Data Preprocessing

Data preprocessing is a process of preparing raw data and making it suitable for machine learning model. The symbolic, logical learning algorithms can process symbolic and categorical data only. However, real-world problems involve both symbolic and numerical features. Therefore, there is an important issue to discretize numerical (continuous) features. After exploring the dataset, we need to convert some categorical variables into dummy variables and scale all the values before training the Machine Learning models. Dummy Variables These variables usually indicate the presence or absence of the "quality" or an attribute, such as male or female. They are essentially nominal scale variables. One way we could quantify such attributes is by contributing artificial variables that take on values 1 or 0. The 1 indicating the presence of that attribute and 0 indicating the absence of those attribute variables that assumed such 0 and 1 values are called dummy variables. Dummy variables can be incorporated in regression models just as easily as quantitative variables. A preprocessing module can be implemented using 'Standard Scaler'

3.2.1. Training and Testing

Train/Test is a method to measure the accuracy of your model. It is called Train/Test because you split the data set into two sets: a training set and a testing set. 33% of data is used for testing and the remaining 67% of data is used for training. Training and testing modules can be implemented using the "from module_selection import train_test_split" method.

3.3. Machine Learning Algorithms

Machine learning is an application of artificial intelligence that aims to perform their jobs skillfully by using intelligent software. The statistical learning methods are the backbone of intelligent software which is used to develop machine intelligence. Machine learning methods have been applied to solve many real time problems such as language recognition, fraud detection, health care sectors, predicting feature values and so on. Heart disease prediction is also one of the applications among them. Machine learning approaches can be classified in terms of representation and adaptation. A machine learning system needs to store the trained information in some knowledge representation structure which is known as hypothesis and typically it is in the form of a model. A trained algorithm specifies how to update the trained hypothesis with new training data such that the performance measure to the task given is optimized. Let's see what are the types of machine learning methods.

Types of machine learning methods are 'Unsupervised', 'Semi-supervised', 'Reinforcement', and 'Supervised Learning'.

3.3.1. Unsupervised learning

It is another method of machine learning concept, the module are trained using unlabeled data. The main concept behind the unsupervised learning is to identify the structure and patterns from the input. Unsupervised learning is used for clustering and association.

3.3.2. Semi-supervised learning

It is a combination of both supervised and unsupervised machine learning method , in such a way that small amount of labeled data is combined with large amount of unlabeled data during training.

3.3.3. Reinforcement learning

It is used to find the best possible behavior or path to it should take in specification situation. These are dependent, so labels are given to the sequence dependent decisions.

3.3.4. Supervised learning

It is a machine learning method in which the modules are trained using labeled data, models need to identify the function that matches with the input variables with the output variables $Y=f(X)$, where Y is output and X is input. In supervised learning the training data has answer with in the dataset, in the above-mentioned dataset there is a 'target' attribute which is answer key for our data frame whether a person is suffering for heart disease or not, in this the model is trained with the perfect values. Supervised learning is used for both classification and regression.

In this paper we will discuss about two supervised machine learning algorithms, namely, ‘K Nearest Neighbor Classifier’ (K-NN) and ‘Super Vector Classifier’ (SVC).

3.3.4.1. 'K' Nearest Neighbor Classifier

This algorithm is quite simple and very powerful Machine Learning model, using the whole training dataset as the representation field. The predictions of the outcome value are calculated by checking the whole dataset for K data nodes with similar values (so-called neighbors) and using the Euclidian number (which can be easily calculated based on the values differences) to determine the resulting values. Such a dataset can require lots of resources to store and process the data, suffer accuracy loss when there are multiple attributes, and have to be constantly curated. However, they work extremely fast and very accurately and efficiently at finding the needed values in a large dataset. The K value indicates the count of the nearest neighbors.

We need to compute the distance between the trained and tested labels. There is no mathematically or statically pre-defined to find the K value. Initialize a random K value and start computing. Choose the K value which has the minimum error rate. Before applying any machine learning algorithms split the data into training and testing. Split the dataset into X and Y, where X will be all the attributes present in the dataset leaving answer key attribute, Y will be only answer key attribute. 33% of data is used for testing and the remaining 67% of data is used for training, X_train will be 67% of present dataset and remaining 33% will be X_test, in the same manner Y_train is split with 67% of answer key and remaining 33% is for Y testing.

KNN Algorithm for different K values:

Step 1: For implementing and algorithm, we need dataset, so during first step we need to load training and testing data set.

Step 2: Next, we need to choose the k value i.e the nearest data point. k can be any integer value.

Step 3: For each point in the test data do following process -

3.1- Calculate the distance between test data and each row of training data with the help of Euclidean method.

3.2- Now based on their distance values, sort them in ascending order.

3.3- Next it will choose the top k rows from the sorted array.

3.4- Now it will assign a class to the test point based on most frequent class of these rows.

Step 4: Evaluate the KNN module using confusion matrix.

Step 5· END

3.3.4.2. Super Vector Classifier (SVC): This algorithm is one of the most widely discussed among data scientists, as it provides very powerful capabilities for data classification. This is called hyperplane is a line that separate data input nodes with different values, and the vectors from these points to the hyperplane can either support or defy it (when the data point is outside the planes of its class). There are two main issues with using a hyperplane. The first main issue is the problem of learning this hyperplane is an ill-posed one because there is not a unique solution and many solutions may not generalize well to the examples. The second issue is the data might not be linear. These problems can be more easily solved in its dual formulation as follows.

Maximize

$$W(\alpha) = \sum_{i=1}^l \alpha_i - \frac{1}{2} \sum_{i,j=1}^l \alpha_i \alpha_j y_i y_j (x_i, y_i) \dots \dots \dots (1a)$$

The basic idea with SVMs is to map the training data into a higher dimensional feature space through some mapping $\varphi(x)$ and construct a separating hyperplane with maximum margin there[8]. By use of a kernel function, $K(x, z) = (\varphi(x), \varphi(z))$, it is possible to compute the separating hyperplane without explicitly carrying out the mapping into feature space.

Typical choice for kernels are :

Linear Kernel: $K(x, z) \equiv (x, z)$

Polynomial Kernel: $K(x, z) = (x, z)^d$

Radial Basis Function (RBF) Kernel:

$$K(x, z) = \exp\left(-\frac{\|x-z\|^2}{\sigma^2}\right)$$

Sigmoid Kernel: $K(x, z) = \tanh(\gamma * (x, z) - \theta)$

SVC Algorithm using kernels:

- Step 1: For implementing and algorithm, we need dataset, so during first step we need to load training and testing data set.
- Step 2: Import the SVC function from sklearn SVM(Support Vector Machine) model. Build the SVM module with the help of SVC function.
- Step 3: Predict values using SVM algorithm model.
- Step 4: Evaluate the model using confusion matrix.
- Step 5: END.

IV. EXPERIMENTAL RESULTS AND DISCUSSIONS

The simulation experiments of the proposed algorithm are conducted using Jupyter notebook python 3 simulator with the simulation parameters chosen as mentioned in the Table 1.dataset. The efficiency of the proposed K nearest neighbors classifier achieved better results compared to super vector classifier (SVC) is analyzed on the basis of three performance metrics, namely, polynomial kernel, linear kernel, RBF kernel and sigmoid kernel. we use pandas libraries to read our dataset. For data visualization we shall use pyplot sub package of matplotlib, we use rcParams to add styles to plot graphs and rainbow to add colors. For machine learning and preprocessing the data we use sklearn.

4.1. Histogram Distribution

Histogram distribution of different attributes, it is observed from the below Fig.2, using inbuilt histogram function in python i.e data.hist(). This function is used to differentiate between ‘Quantitative’ and ‘Qualitative’. From figure 1 we can classify nominal data, ordinal data, discrete data and continuous data.

Let's classify all these different types of data from figure 2

Nominal data :- ‘gender’, ‘fbs’, ‘exang’ and ‘target’

Ordinal data :- ‘cp’, ‘restecg’, ‘slope’, ‘ca’ and ‘thal’

Continuous data :- ‘age’, ‘trestbps’, ‘chol’, ‘thalach’, and ‘oldpeak’

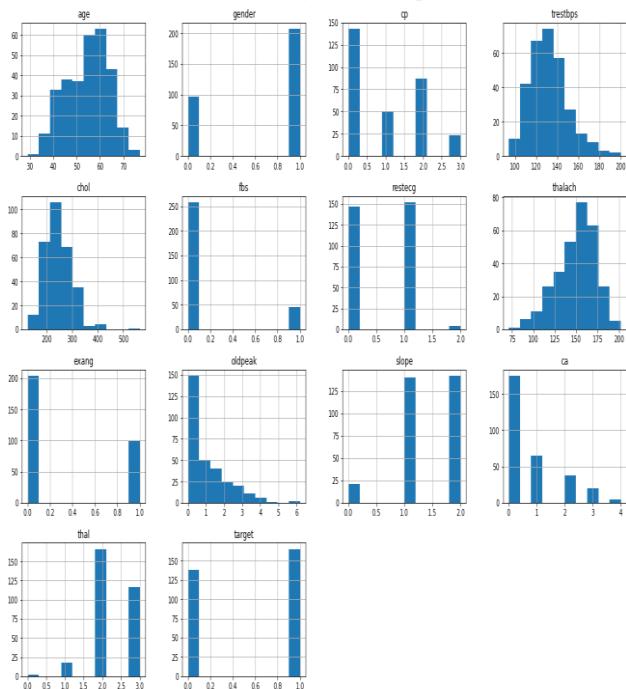


Fig.2. Histogram distribution of different attributes for Quantitative

4.2 Correlation Hitmap:

Correlation heatmap matrices are an essential tools of data analysis. It is observed from the Fig.3., tells us which among the variables are correlated, to what degree in which direction, and alerts us to likely identify multicollinearity problems. Correlation ranges from -1 to +1. Values closer to zero means there is no linear relation between two variables, the values close to 1 the correlation is the more positively correlated this is called perfect positive correlation. If values ranging from -1 to 0 this is called negative correlation, the relation between two variables in which one variable decreases and other increases. This correlation heatmap was created by manual numpy calculation, and we can observe in the below figure that

among the attributes there is a strong correlation with one another. (especially heart disease and thal), and we can observe that we have some negative correlation with target value.



Fig.3. Correlation Heatmap for continuous data

4.3. Target versus Age

Using seaborn barplot we can visualize mean of two categorical data, from Fig.4 we have concluded that target and age are categorical variables. Seaborn is a python data visualization based on matplotlib, it provides an informative statistical graphics. From this plot we can visualize the average age of people who have heart disease v/s those who do not. And we can observe in figure 4 that slightly older people have more chance of having heart disease. Where blue color indicates people affected with heart disease and orange color indicates people who are not affected.

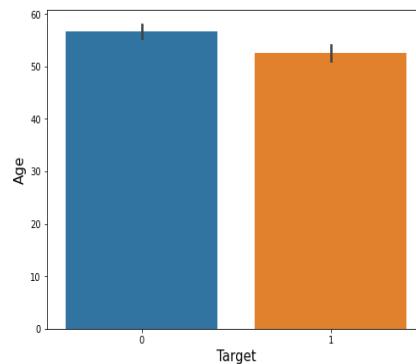


Fig.4. Target versus Age for analyzing which age people got heart disease

4.4. Grouped Barplot

A grouped chart is advantageous when we have multiple categorical variables. We might want to visualize the relationship of age of the person, segregated into gender (male or female), but also factor in which target from age. This is a fair bit of information in a plot, and it can easily all be put into a simple Bar Plot. To group bars together, we use the hue argument. Technically, as the name implies, the hue argument tells Seabom how to color the bars, but in the coloring process, it groups together relevant data as discussed in Fig.5.

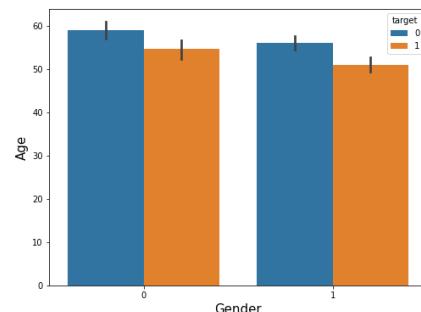


Fig.5. Grouped barplot for gender v/s age with respect to target

4.5. Machine Learning

Before moving ahead in to the experimental results of machine learning algorithms, lets discuss one of the important concept in machine learning i.e confusion matrix.

Confusion Matrix:

In machine learning and in statistical classifications, confusion matrix is also known as ‘error matrix’, it is specifically in the form of table layout that allows visualization of the performance of an algorithm.

		ACTUAL	
		Positive	Negative
PREDICTED	Positive	TRUE POSITIVE	FALSE POSITIVE
	Negative	FALSE NEGATIVE	TRUE NEGATIVE

Table 2: confusion matrix

If we plot the predicted values against actual values we get the matrix as shown in the above table.

Let's discuss what are ‘True positive’, ‘True negative’, ‘False positive’ and ‘False negative’.

True Positive (TP): These are the data points whose actual values were positive and the predicted values are also positive.

True Negative (TN): These are the data points whose actual values were negative and the predicted values are also negative.

False Positive (FP): These are the data points whose actual values were negative but algorithm incorrectly identified as positive.

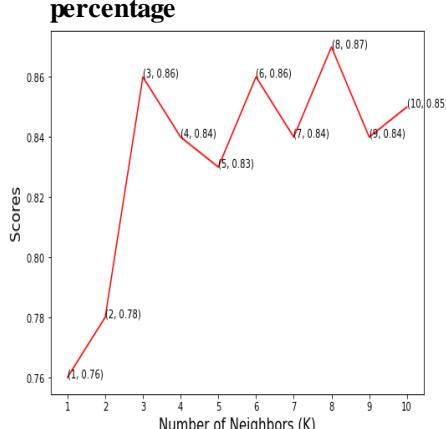
False Negative (FN): These are the data points whose actual values were positive but algorithm incorrectly identified as negative.

Now let's move ahead in to the algorithm results and let's conclude for the best result.

4.5.1. K Nearest Neighbor Classifier

Applying KNN algorithm as mentioned in section 3.3.4.1 for our preprocessed dataset we have trained our module and found the best accuracy of our trained module. It is observed from the Fig.6, we have constructed our model for 10 different K Values and achieved the highest score of 87% when K value is 8.

Table 3: K values and there scores in percentage



K Values	Scores in %'
1	76%
2	78%
3	86%
4	84%
5	83%
6	86%
7	84%
8	87%
9	84%
10	86%

Fig.6. K Nearest Neighbor for K values and there scores in percentage

Confusion Matrix for k values 1, 6 and 8:

con_mat_K_value_1 - NumPy object array

		0	1
0	38	10	
1	14	38	

con_mat_K_value_6 - NumPy object array

		0	1
0	41	7	
1	7	45	

Paramters	When K value is 1	When K value is 6	When K value is 8
TP	38	41	42
TN	38	45	45
FP	10	7	6
FN	14	7	7
Total Score	76%	86%	87%

con_mat_K_value_8 - NumPy object array

	0	1
0	42	6
1	7	45

Fig(6.a) confusion matrix for k=1

Fig(6.b) confusion matrix for k=6

Fig(6.c) confusion matrix for k

Table 4:

comparing the confusion matrix

with 3 different K values of 1,6 and 8.

From above Table 4 we can conclude that when K value is 8 we found the 87% true predicted values against actual values.

4.4.1. Super Vector Classifier (SVC)

Applying SVC algorithm as mentioned in section 3.3.4.2., these algorithms contains the same steps as KNN algorithm, we initialized K values in the KNN algorithm but in SVC algorithm we initialize four different kernels to train our SVC algorithm. For the same preprocessed dataset we applied SVC algorithm and found the best accuracy score of 83% for Linear Kernel as shown in Fig.7.

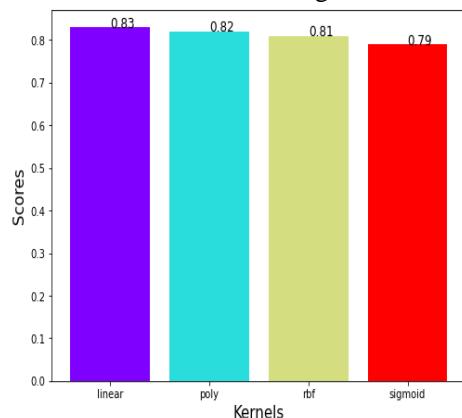


Fig.7. Super Vector Classifier for [linear, poly, rbf, sigmoid] kernels.

Confusion matrix for four different kernels:

	0	1
0	39	9
1	8	44

Fig(7.a) Linear Kernel

	0	1
0	40	8
1	10	42

Fig(7.b) Polynomial Kernel

	0	1
0	38	10
1	9	43

Fig(7.d) Sigmoid Kernel

	0	1
0	37	11
1	10	42

Fig(7.c) RBF Kernel

Paramaters	Linear kernel	Polynomial Kernel	RBF Kernel	Sigmoid Kernel
TP	39	40	38	37
TN	44	42	43	42
FP	9	8	10	11
FN	8	10	9	10
Score in %	83%	82%	81%	79%

Table 5: comparing the confusion matrix with linear, poly, rbf and sigmoid kernel

From above Table 5 we can conclude that linear kernel with 83% where true predicted values against actual values.

V. CONCLUSION

In this paper, we used Machine Learning to predict whether a person is suffering from a heart disease. After importing the data, we analysed it using histogram plot, barplot for target and age, barplot for grouped data i.e gender versus age with respect to target. We then generated dummy variables for nominal data and ordinal data features and scaled other features. we then split the data for training 67% and 33% for testing. Then applied Machine Learning algorithms, K Neighbors Classifier(for different K values), Support Vector Classifier(using kernels), we then varied parameters across each model to improve their scores. In the end, K Nearest Neighbor's Classifier achieved the highest score of 87% when K value is 8.

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Automated Ultrasonic Disinfectant Rover To Maintain Hygiene Environment Using IoT

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Abstract:- The world is going through a major health crisis due to covid-19. This project is for regular sanitation of places without much involvement of humans to reduce infection rates. Project is based on Arduino and bluetooth with robotics using ultrasonic proximity sensors. In order to reduce the possibility of spread of virus regular sanitization is required which can be blundering for humans as higher risk of infection whereas the machines are not affected. This rover can play an important life saver role. The current global challenge of the pandemic caused by the novel severe contagious respiratory syndrome covid-19 presents the greatest global public health crisis. It is a big challenge for human workers keeping in mind the vulnerability to covid-19. Due to limits on the human working capacity, especially a limit on the human workforce, is one of the advantages in adopting such robotic approaches. We have applied different safety measurements as it avoids sanitation on the surfaces with higher temperature than the sanitation solution's burning point to prevent fire. At the time of sanitation it automatically detects the object to sanitise. It will work continuously until refilling is needed again. As compared with physical interaction the new system is an easier way to manage the whole sanitation process in a safest manner.

Keywords: IoT, Ultrasonic, Sensor, Actuators, IDE, nRFtoolbox, UART.

I INTRODUCTION

The Internet of things (IoT) describes the network of physical objects "things"-that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet. The primary drive for automation IoT is to significantly reduce operating expenditures when automation devices, sensors and actuators become Internet-enabled devices. The Internet of Things (IoT) has drawn convincing research ground in several sectors especially in healthcare.

[1] IoT is evolving healthcare systems from conventional to more personalized healthcare systems through which patients can be diagnosed, treated, and monitored more easily.[2] IoT devices tagged with sensors are used for tracking real time location of medical equipment like wheelchairs, defibrillators, nebulizers, oxygen pumps and other monitoring equipment.

[3] In a global pandemic like COVID-19 IoT can play an immense role in saving human lives. This project is for regular sanitation of places without much involvement of humans to reduce infection rates.

II SCOPE

The IoT integrated robotic product produced is an application by name "Automated Ultrasonic Disinfectant Rover to Maintain Hygiene Environment using IoT". According to the World Health Organization(WHO) over 3 million people died due to COVID-19 infection and around 181 million people got infected. COVID-19 virus is a mutated virus in which the mutation and evolution rate has increased exponentially as it can mutate within 15 days to new form. By the time latest variant Delta and DeltaPlus is found to be 50 times more infectious than the original COVID-19 Sarc virus, the maintenance of hygiene environment is the most important thing to reduce the mortality rate in long period as it can last several years.

In the first stage, the rover is developed for the indoor sanitation process. It can go through all the hurdles with the help of controlling commands and found feasible for the highly precise sanitation process as testing practice. It successfully identified the objects to be sanitised and found the way without collision. In the larger perspective it can be deployed in public places where large numbers of people gather. Public places like bus Stands, railway stations, hospitals, airports and institutions like schools and colleges will be highly benefited with this rover.

However, a limit on the human working capacity,especially a limit on the human workforce, is one of the advantages in adopting such robotic approaches. We have applied different safety measurements as it avoids sanitation on the surfaces with higher temperature than the sanitation solution's burning point to avoid fire casualties.

This IoT based approach will be very effective in fighting against COVID-19 virus and its successors as hygiene is the most important way to prevent all infections and diseases.

This approach has a wide deployment range and it can be leveled up by making it completely automated by advancement in technologies for future reference.

I OBJECTIVES

This IOT based Disinfectant Rover is basically inspired from the COVID-19 Global health crisis. In order to stop COVID-19, social distancing and regular washing of hands with soap or to use alcohol based sanitizers is must to reduce spread of COVID-19. The rover solves many issues for sanitization without much human interaction to the vulnerable places. The rover can go to places which are most vulnerable to humans and have greater risk of covid infection. This project is to disinfect the public places using automated rovers where more crowds gather. It can reach and sanitize places with the help of sanitation devices placed in front of the rover. Environmental cleaning in healthcare facilities or houses with suspected or confirmed covid cases has great scope of this rover. Ensuring good environmental cleaning and waste management practices in communities, homes, schools, marketplaces and health-care facilities will further help to prevent transmission of the COVID-19 virus. Rover helps in protecting one's health, assures safety against covid-19 infection

II EXISTING SYSTEM

During this global health crisis the sanitation of the environment can help in reducing the infection rate but due to lack of technology this work has to be done by sweepers or covid warriors. Being a human they are at higher risk of getting infected and we know that corona warriors lost their lives due to this risky work. They have to go to every place to disinfect them without proper safety equipment and gambling their lives. Also the current system costs a huge labour cost. This scenario can be changed using technology

III PROPOSED SYSTEM

Motivation

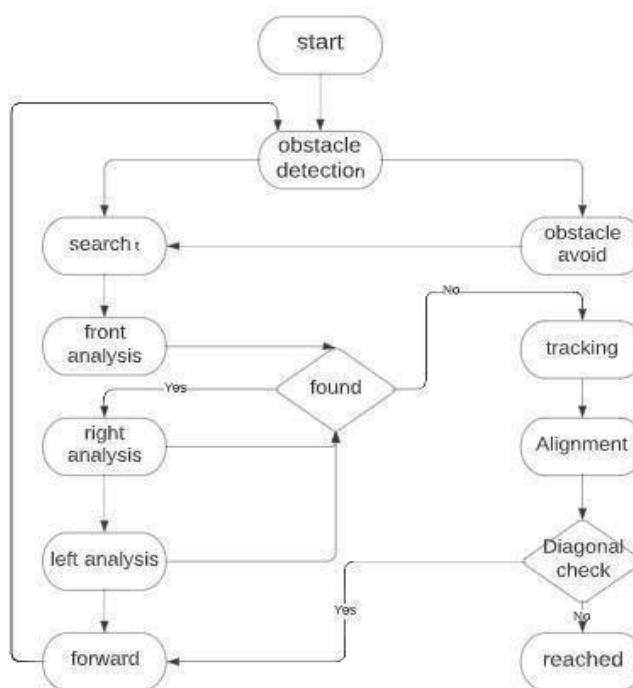


Fig. 4.1 System Model

This project is to disinfect places like Health care and transportation ports using automated rovers where humans are most vulnerable to covid-19 infection. In Places where humans avoid to go this rover can be used for sanitization. Rover eases human's efforts for sanitization in Covid exposed areas. Less human contact means less Exposure to Coronavirus resulting in safer lives. In places where we do not wish to use water and soap for sanitization, this can really be a gamechanger.

The project is based on arduino and bluetooth technology. First we assemble the rover over the acrylic mounting plate and

secure it with metal screws. Motor wires and power cables are connected to the drive shaft and wheels are assembled. Ultrasonic proximity sensors and bluetooth are assembled with a rover. The rover is programmed using an Arduino IDE with Intel curie core. Motors are controlled using a Grove motor controller. Commands are given with UART (default layout)string transmission and BLE mobile device. Movement commands of the rover are programmed using the nRF toolbox; for autonomous mode Auto:Auto command is given..

Merits

Solution is made available over the bluetooth connectivity using an as-a-service model thus extending the availability hours of the human workers. Most accurate,Simple and easyto operate thus more precision in the disinfection process. It is also safe that it prevents fire accidents by using temperature sensors. Also it extends the working hours as the human body has a limited working capacity.

Proposed System Model

The following system model describes the working of the rover according to the data generated by the sensors mounted on the rover.

To reduce the transmission of COVID-19 virus and to increase the chances of survival, and to determine certain conditions and automating sanitation processes with reduced human intervention with higher accuracy and to reduce chances of infection and to disinfect most vulnerable public places by providing an efficient low cost solution.

III SYSTEM ARCHITECTURE

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could see it as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis,systems architecture and systems engineering. If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into a single approach to product development," then design is the act of taking the marketing information and creating the design of the product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user. Until the 1990s systems design had a crucial and respected role in the data processing industry. In the 1990s standardization of hardware and software resulted in the ability to build modular systems. The increasing importance of software running on generic platforms has enhanced the discipline of software engineering.

The design will contain the specific component based design that describes the high level design of the rover including all these modules, their interaction with other modules and integrated working. The output of the design process is a description of the architecture.

The design phase:

- High Level Design
- Low level Design (Detailed)

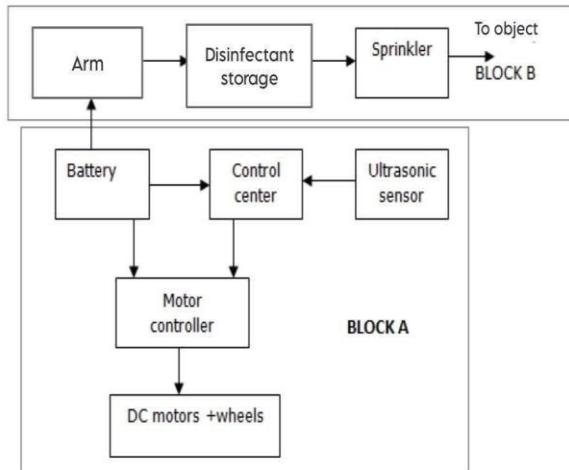


Fig. 5.1 High Level System Architecture

IV. IMPLEMENTATION

1. Object Detection for Sanitation

The basic principle behind the working of an ultrasonic sensor is to note down the time taken by the sensor to transmit ultrasonic beams and receive the ultrasonic beams after hitting the surface. Then further the distance is calculated using the formula. In this project, the widely available HC-SR04 Ultrasonic Sensor is used. The Trig pin of HC-SR04 is made high for at least 10 us. A sonic beam is transmitted with 8 pulses of 40KHz each. The signal then hits the surface and returns back and is captured by the receiver Echo pin of HC-SR04. The Echo pin had already made high at the time sending high. By using the time taken by beam to return back Distance = (Time x Speed of Sound in Air (343m/s))/2.

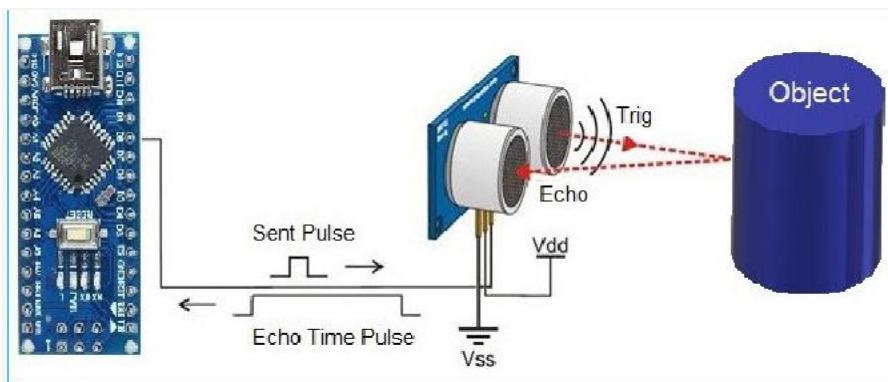


Fig 6.1 Object Detection using Ultrasonic Sensor

I. Assembly and Wire connections

In this module, we solder two wires to each DC motor. Then fixed two motors to the chassis using the screws. Then we have attached the Universal wheel (or ball caster wheel) to the front and back of the chassis. After that, mounted the ArduinoUNO, L298n motor driver and the Breadboard on the chassis and. attached the HC-06 Bluetooth module on the breadboard. then mounted the HC-SR04 Ultrasonic sensor and temperature sensor at the front of the chassis. We have mounted a sanitizercontainer on the rover and attached a servo motor for the spraying mechanism.

II. Programming Arduino UNO

In this module, we have written driver code for the rover and uploaded it using driver on Arduino-UNO board. Here we initialised the Arduino libraries on the device and uploaded the code using the pin0 (RX) and pin1 (TX). Functions like distance checking , movement and sanitation functions are written here.

III. Bluetooth Connectivity

The Bluetooth module is interfaced with a microcontroller to wirelessly transmit the commands from the user to the robot car. In this project one character commands are sent from the Bluetooth terminal application on the PC/Mobile to the HC-05 Bluetooth module mounted on the car using the serial communication interface. The command PT_SETUP() has been used to set up the serial communication and the required baud rate for the functioning of the Bluetooth. In the protothread that has been initialized to set up the Bluetooth module the characters are received and transmitted using following commands.

character = UARTGetDataByte(UART2)UARTSendDataByte(UART2, character)

IV. Android App nRFtoolbox

In this module we ensure the connectivity of the rover with the controlling device using bluetooth module HC-06 using nRftoolbox for providing commands using UART medium. This app enables users to control the rover and its movement. It shows the connectivity status 'connected' or 'disconnected' for the bluetooth module. The rover can be moved forward, backward, left and right as shown in the fig. 6.5 below. as ‘

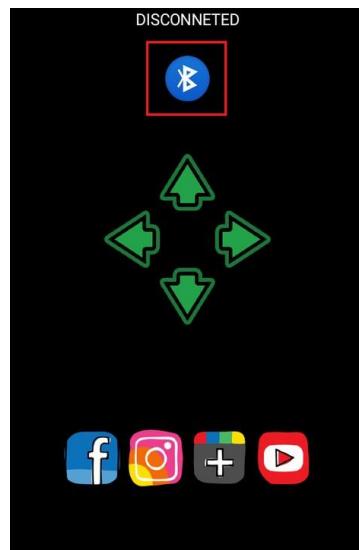


Fig. 6.5 nRFtoolbox App Snapshot

V. TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the software system meets its requirements and user expectations and does not fail in an unacceptable manner. The system has been verified and validated by running the test data and live data.

Levels of Testing

- Unit Testing
- Integration Testing
- System testing
- Validation Testing
- Output Testing
- Test data and Output

Ultimately, software is included with other system components and the set of system validation and integration tests are performed. System testing is a series of different tests whose main aim is to fully exercise the computer-based system. Although each test has a different role all work should verify that all system elements are properly integrated and formed allocated functions.

Test Action	Results
Rotation of Wheels	Success
Transmission Control	Success
Object Detection	Success
Avoid Sanitation	Success
Connection to Arduino	Success
Movement Control	Success
Move Up and Down	Success
Spray on Object	Success

Table 7.1: Test Cases for Rover

VI RESULT

We have provided robot-aided solutions to disinfect possibly contaminated surfaces to reduce the spread of infectious diseases. Thus reduced human intervention in the disinfection process. Also created a more consistent process than a human cleaning. We were successful in following the sanitation process of objects in range of the rover and it helped in breaking chain transmission through human contact. Using this rover we solved sanitation issues which is a need for the moment in this pandemic. Finally, successfully sanitized target objects with 99% accuracy.

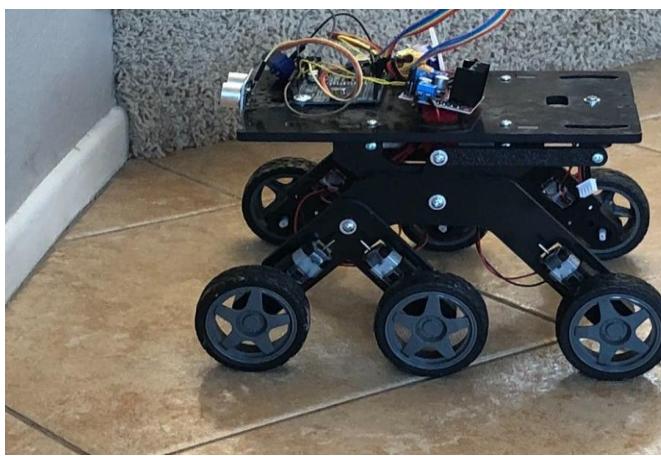


Fig 8.1: Disinfectant Rover

VII CONCLUSION

This project is designed for the purpose to reduce human involvement in the manual sanitation process saving them from exposure to infectious diseases. At the time of sanitation it automatically detects the object to sanitise. It also senses higher temperature where it should not use sanitizer due to the flammable nature of liquid, it will work continuously until the

cycle of work completes, that is until refill is needed again. As compared with physical interaction the new system is an easier way to manage whole things in a particular manner. As per the existing system it is a very risky process to live, this rover will be a game changing technology.

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Intelligent Parking Management System Using Android And IoT

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ABSTRACT : In this fast-growing economy, the number of vehicle users increases exponentially demanding more parking space. Pervasive presence of smart phone encourages users to prefer mobile application based solutions. Growth of android and IoT has paved way for integration of mobile devices, wireless communication technologies. This paper proposes an android based Smart parking system that integrates with mobile Application. It provides a comprehensive parking solution both for the user and owner of the parking space. Features are provided for reserving a parking space, authenticating a reserved user, identifying nearest free space depending on the size of the vehicle, navigating to the parking slot and computes accounts information on daily, weekly and monthly basis. IR sensors are used to identify if a parking spot is free. Availability of a free slot with its location information is transmitted using WIFI module technology, microcontroller and wireless communication technology to the server and is retrieved through a mobile application. RFID tag attached to a vehicle is used to authenticate a user who reserves the parking slot on a hourly, daily, weekly or monthly basis. A scheduling algorithm is used to identify the nearest free slot based on the size of a vehicle. The owner of the parking space can get the analytics of the number of free and available slots for a given period, the occupancy rate on week days and weekend and the amount collected for a given period and can use it for fixing variable parking fees. The mobile application is designed to provide rich customer experience.

KEYWORDS: Smart Parking, Android, IoT, Mobile Application, RFID, Analytics

I. INTRODUCTION

Now a days, main problem in malls, function halls and etc., is parking. It is due to the lack of sufficient parking space. Now a days the vehicles in a family are greater than the head count of the family members, and due to this the vehicles are also increased in the country, which leads to the parking scenario which is unhappily falling short to the current requirements in the country. Due to this parking is difficult and it also increases the time needed to park the vehicle with increase in the fuel consumption of the vehicle. And during the working days the companies and offices are facing the problem of the parking in urban areas. Now a days vehicles are most affordable to the low income group families also and the vehicles especially the cars are taking lot of space. Due to the increase in vehicles the parking space is also not sufficient in this congested cities. Whether at a shopping malls, stations and airport, problems with parking is a big issue. Most of the time people spend their time on searching parking, to park their vehicles. Thus, lot of congestion occurs in the traffic which leads to a tedious job to find the parking space to park their vehicle. The most traffic occurs only because of vehicle congestion in the urban areas thus people are wasting time in searching the parking area abnormally to park their vehicles. And one more issue is also added to this is pollution, which effects the entire environment due to this increase in vehicles.

II. RELATED WORK

[1]The sensors used in android based smart parking system stores and accesses data from remote locations with the help of the cloud these factors give raise to cloud of things (COT). The nodes could be monitored and controlled from any location the system that we propose provides information regarding the availability of the parking slots with the help of the mobile application the users from the remote location can book the parking slots. [2] An algorithm is used to increase efficiency of cloud-based parking system and network architecture technology is used. This algorithm is used to find the lowest cost parking space. Considering the number of parking space available and also considering the distance of the parking space from the user. The user can directly access the cloud-based server and find the information on the parking space. The user can also install an application in their mobile phones to access this information. With the help of this algorithm, waiting time of the user to find a parking space can be minimised. Security aspects are not included in this paper. [3] A wireless sensor node along with smart phone application is being used to find the parking space. Since, wireless technology is used here the system has high accuracy and efficiency. In this system, onboard units are used to communicate with other vehicles. The user parks his vehicle in any one of the several bays available a mechanical lift lifts the vehicle out. number of hops will help in reducing the range of the transmission power. Route discovery has been done in the same way as being done in on-demand routing algorithms. After packet has been reached to the destination, destination will wait for time δt and collects all the packets. After time δt it calls the optimization function to select the path and send RREP. Optimization function uses the individual node's battery energy; if node is having low energy level

then optimization function will not use that node.

A ticket key and id are given to the user and it is only known to the user which is used to retrieve the vehicle. The user need not carry any paper ticket since an Rfid card is given to the user. The technology used here is economical. Security features must be improved to protect the user's privacy. [4] The author of smart parking system the survey has divided detector system and vehicle sensors into two main categories as intrusive sensors and non - intrusive sensors. Intrusive sensors are installed in holes on the road surface by tunnelling under the road. Non-intrusive sensors do not affect the surface of the road and it can be easily installed and maintained. Smart parking system helps us to resolve the grounding problems of the traffic congestion and it also reduces the emission from a car. [5] A paper proposes efficient way to unfold the issue of parking availability in the real time scenario and to reduce the time consumption. In this, the data is sent locally with devices which filters the data. This signal is transmitted over the cloud for the process as well as for evaluation which uses machine learning algorithms. This paper uses mobile phone application that connects the user with the real time traffic status via Google API. Thus, avoiding traffic congestion. This paper does not provide the reservation facility for the car parking. [6] Smart parking using android technology helps to designs and develops a real smart parking system which provides information for vacant spaces and also helps the user to locate the nearest availability. This paper uses a computer vision to detect vehicle number plate in order to enhance the security. The user can pay for the parking space prior to the entry of the car through mobile payment. Thus, insuring the reservation of the parking. The user is notified about the parking location, number of slots available and all other relevant information. The paper uses efficient algorithms and techniques for extracting license plate text. An algorithm operates on the ultrasonic sensor detection of the vehicle entering into the parking slot and calculates the minimum cost for the user. [7] Smart parking system based on reservation allows the reservation of a vacant space which involves smart parking system based on reservation (SPSR). This consists of host parking database management which collects and stores data about the driver's identity and parking location. When the parking reservation time is about to expire a notification will be sent to the user through the web service that has been provided to the user by the admin. The main drawback is that some other user can occupy a reserved parking space to avoid this QR scanners are used to identify the user. [8] It helps us to propose a way in which the user can reserve his parking space by mentioning the destination and the vehicle type with the help of mobile applications . The booking details will be stored in the cloud which finds the shortest path from the user to the parking space , the location of the user is updated regularly in the cloud with the help of GPS . When the user reaches the car parking the Rfid is scanned and the user is allowed into the parking space. The billing is done by the cloud server. The main disadvantage is that the car parking space must be registered in the smart parking system for the user to use it. [9] This paper describes the implementation of wireless sensor networks (WSN) used in a car parking system with the help of a server which is using xbee zigbee. The car parking system can detect the car which is parked in the parking slot. The aim of this project is to make it cost effective and user friendly. Car parking system helps the user to sustain the data with 90% of accuracy. [10] Smart car parking system provides a comprehensive parking solution for the user as well as admin of the parking area. It provides the feature for a reserved parking slot and identify reserved user. In this, user can navigate to the nearest parking area depending upon the size of the vehicle. The user can reserve parking slot based on hourly, daily, weekly or monthly basis. An algorithm is designed to identify the nearest parking according to the size. The mobile application provided to the user is used to reserve and pay-as-you go service.

III.PROPOSED SYSTEM

Finding a place to park cars involves three-stage. First, the parking area which has Arduino devices along with the sensors to interact between the user and the parking area. The second stage contains the cloud services which act as an intermediary between the user and the parking area. The third stage is the user side. The user gets a notification of the availability via mobile applications. For each parking region, Arduino sensors are positioned, and the sensors detect the number of parking slots, the number of free, and booked slots. WIFI module is used for communication between the mobile app and sensors.

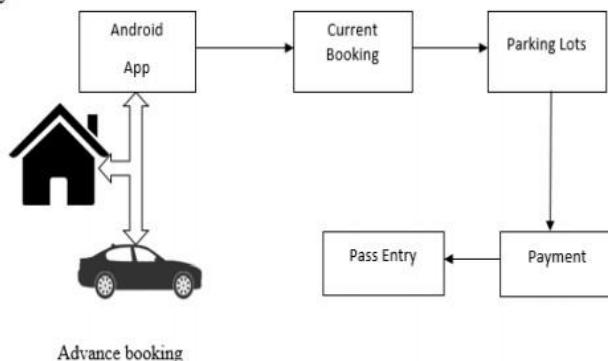


Fig 1.1. Architecture for online booking Parking slot

I. RESULTS

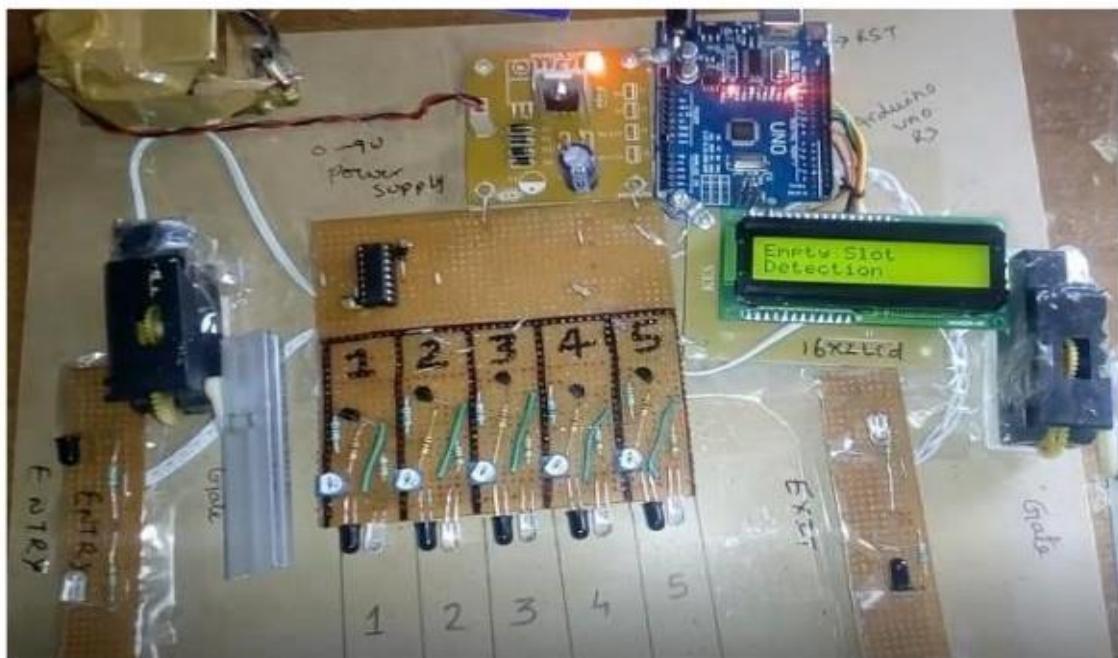


Fig 1.2. Smart Parking Implementation

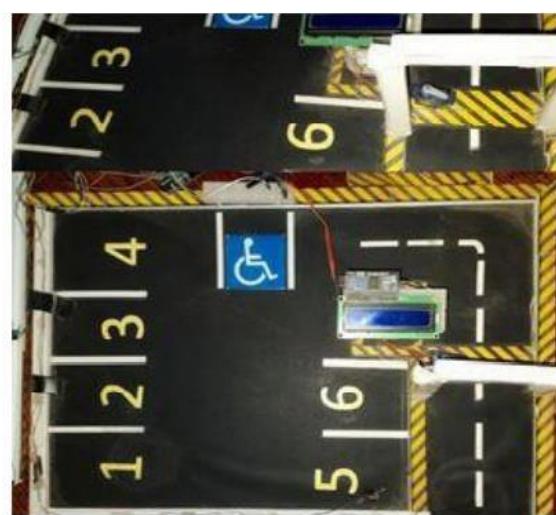


Fig 1.3. Smart Parking Design

IV. CONCLUSION AND FUTURE WORK

The concepts of smart cities have always been a dream. There have been advancements made from the past couple of years to make smart city dream to reality. The advancement of intemet of things and cloud technologies has given rise to the new possibilities in terms of smart cities. Smart parking facilities have always been the core of constructing smart cities. The system provides a real time process and information of the parking slots. This paper enhances the performance of saving users time to locate an appropriate parking space. It helps to resolve the growing problem of traffic congestion. As for the future work the users can book a parking space from a remote location. GPS, reservation facilities and license plate scanner can be included in the future.

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IoT based Air Quality monitoring system using Sensors with Machine Learning analysis

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ABSTRACT: MQ135 a gas sensor is used to measures the level of NH₃, NO_x, alcohol, Benzene, smoke, CO₂ in air. The resistance connected to MQ135 is different for various kinds of concentrated gases, so the sensitivity adjustment of components is necessary at time of using. Air Quality using MQ135 sensor along with Carbon Monoxide CO using MQ7 sensor. Measuring Air Quality is an important element for bringing lot of awareness in the people to take care of the future generations a healthier life. Based on this, Government of India has already taken certain measures to ban ‘Single Stroke’ and ‘Two Stroke’ Engine based motorcycles which are emitting high pollution comparatively. In this paper using IOT and machine learning techniques, using graphical representations of pollution level including temperature and humidity Dashboard is built, and an awareness to every individual about the harm has been done to our environment. Already, New Delhi is remarked as the most pollution city in the world recording Air Quality above 300PPM. To get the present air quality we use IOT sensors and to predict pollution in upcoming days Machine learning algorithms is implemented. To set the dashboard to public such that everyone can come to know the Air Quality at the location where the system is installed.

KEYWORDS: MQ135 sensor, MQ7sensor, IOT, Air Quality Monitoring

I.INTRODUCTION

Air is getting polluted because of release of toxic gases by industries, vehicle emissions and increased concentration of harmful gases and particulate matter in the atmosphere. The level of pollution is increasing rapidly due to factors like industries, urbanization, increasing in population, vehicle use which can affect human health. Particulate matter is one of the most important parameter having the significant contribution to the increase in air pollution. This creates a need for measurement and analysis of real-time air quality monitoring so that appropriate decisions can be taken in a timely period. This system presents a real-time air quality monitoring. Internet of Things (IoT) is nowadays finding profound use in each and every sector, plays a key role in our air quality monitoring system too. The setup will show the air quality in PPM in webpage so that we can monitor it very easily. In this IoT project, you can monitor the pollution level from anywhere using your computer. The problem with MQ135 sensor is that specifically it can't tell the Carbon Monoxide or Carbon dioxide level in the atmosphere, but the pros of MQ135 is that it is able to detect smoke, CO, CO₂ and NH₄. So, just to tell the individual gases level particularly, we have used CO (Carbon Monoxide) MQ7 sensor. After getting the sensor values we proceed with analysis and prediction. More than one algorithm is trained as the accuracy of algorithm differs with data scattering different algorithms gives different accuracy so after training the algorithms the algorithm with highest accuracy is considered for upcoming days prediction and the sensors can be deployed at any geographic location so we are using location based values.

II.

RELATED WORK

Xiaoke Yang et.al [1] This paper proposes an open platform of a Wi-Fi enabled indoor air quality monitoring and control system, which could be incorporated into such a ‘smart building’ structure. The complete software and hardware design of this system is presented, along with a series of control experiments. The proposed system operates over an existing WiFi wireless network utilizing the MQTT protocol. It is capable of monitoring the indoor air quality as well as controlling an air purifier to regulate the particulate matters concentration. Experiment results under a real world office environment demonstrate the effectiveness of the proposed design.

H. Ali et.al [2], in this paper, a low-cost solar-powered air quality monitoring system based on ZigBee wireless network system technology is presented. The solar powered network sensor nodes can be deployed by schools to collect and report real-time data on carbon monoxide (CO), nitrogen dioxide (NO₂), dust particles, temperature, and relative humidity. The proposed system allows schools to monitor air quality conditions on a desktop/laptop computer through an application designed using LabVIEW and provides an alert if the air quality characteristics exceed acceptable levels.

They tested the sensor network successfully at the Singapore campus of the University of Newcastle, Australia. The experimental results obtained by them demonstrated that the sensor network can provide high-quality air quality measurements over a wide range of CO, NO₂ and dust concentrations.

R du Plessis [3], This paper describes the development of a wireless monitoring system which can be deployed in a building. The system measures carbon dioxide, carbon monoxide and temperature. The system developed in this paper can serve as the monitoring component of a HVAC control system and function as an indoor air quality monitor independently.

Ch.V.Saikumar et.al [4], The main objective of this project is to monitor the air eminence in industrial and urban areas. The proposed outline includes a set of gas sensors (CO, and NO₂) that are positioned on masses and structure of a IOT (Intemet of things) and a dominant server to support both short-range real time incident management and a continuing deliberate planning. In this Arduino platform is used to communicate the data simply and quickly.

III.

PROPOSED ALGORITHM

The process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose. There is no current system which display the pollution level to public and the prediction of pollution of the upcoming days at particular area so people can understand their responsibilities and can take measures to control air pollution. The pollution will affect the people in that area and also affects ozone because the amount of pollutant is not monitored properly and can't know the amount. Location update unavailable. According to the existing system it is not that much eases and comfort for the peoples to view the amount of pollution which is prevailing in the locality. Machine learning model for prediction is there which is based on existing dataset and that dataset may not be recorded for a particular region or area. This system shows the current air pollution status and predicts the pollution in upcoming days. Over a wireless network sensor values are stored in server using a microcontroller (NodeMcu) using graphs it shows the status of pollution level so people can easily know the pollution level location based data using Sensors are recorded to predict pollution location wise. Figure 1, shows server using a microcontroller (NodeMcu) showing the status of pollution level based on sensors where m is the number of hops in the route, TE = TE_{node} is the transmission energy between the nodes. The route having minimum total transmission energy i.e. min (TTE_R) will be selected as energy efficient route.

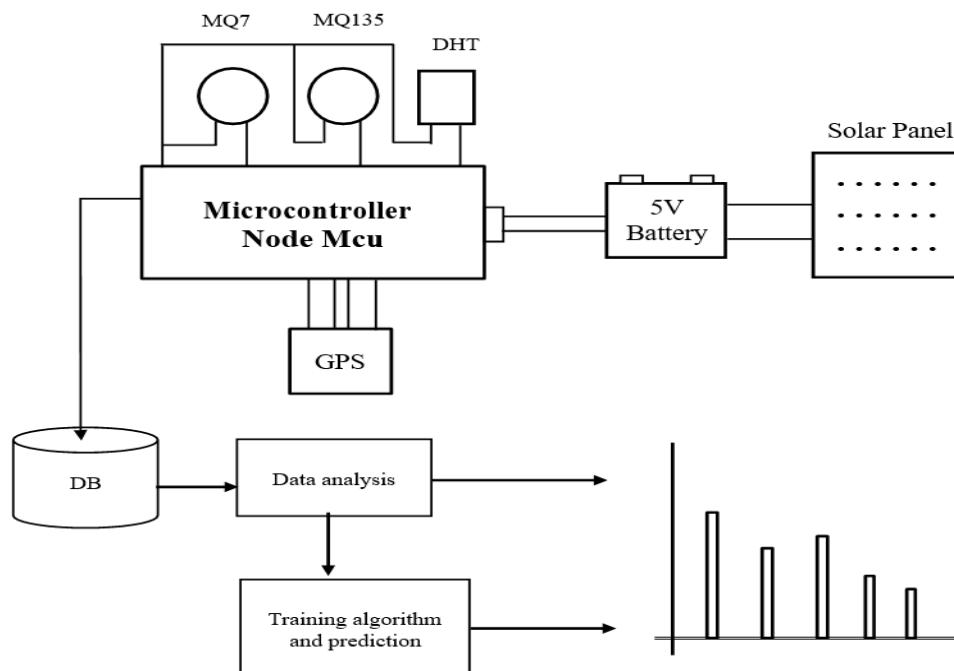


Fig: 1 A server using a microcontroller (NodeMcu) showing the status of pollution level based on Sensors

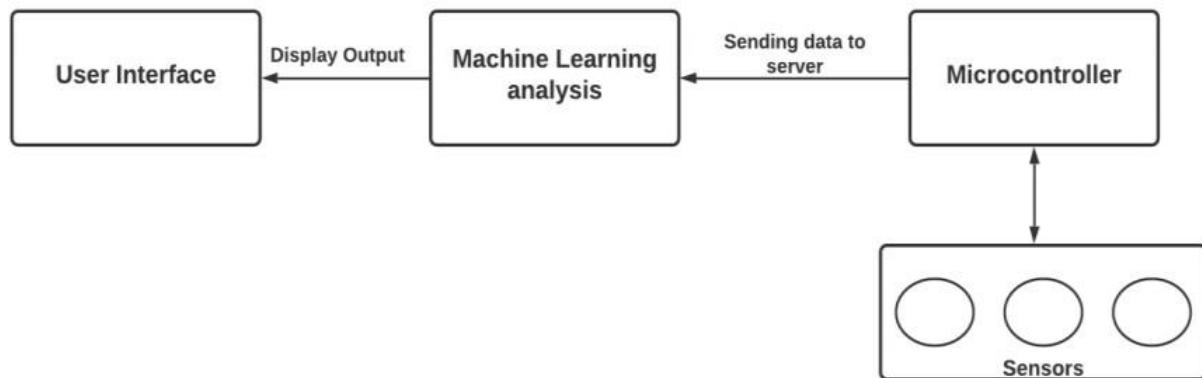


Fig.2 Level 1 Dataflow Diagram

System will get a data from the sensors and preprocess the data and train and test the dataset. The data is plotted in graph and the final result graph is displayed to the user. The following figure displays the pre-processed data.

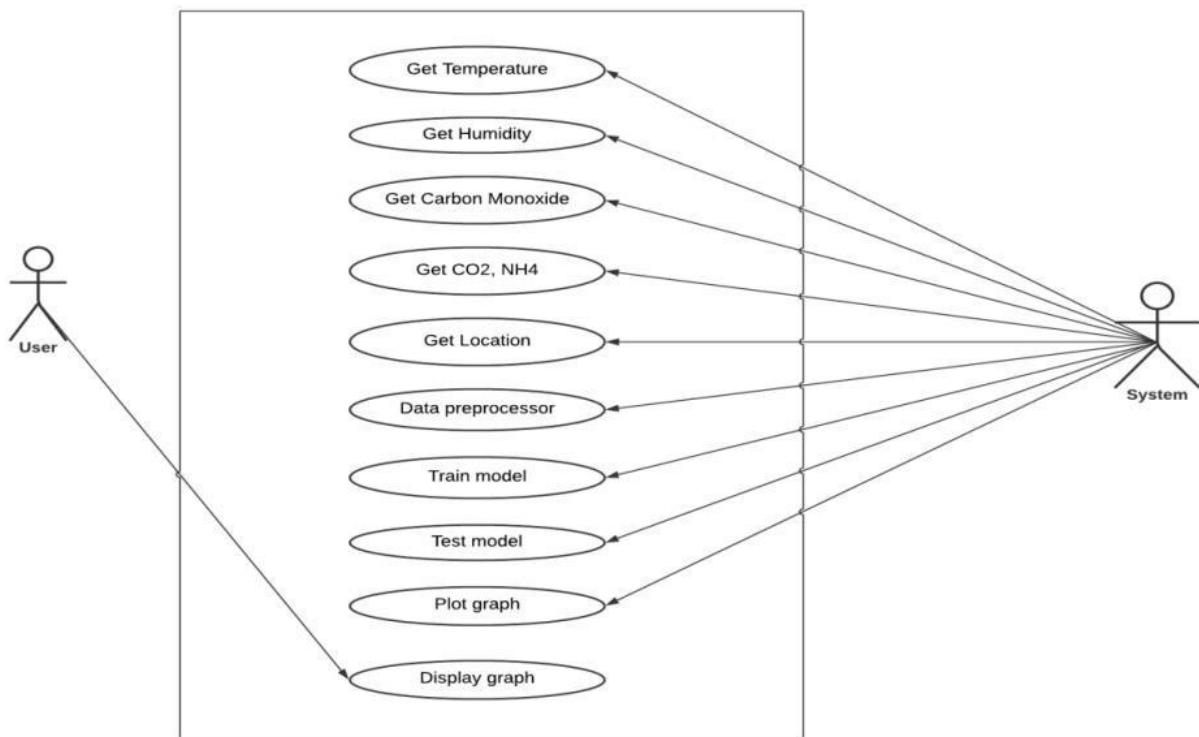


Fig.3 The data processed after training and testing is displayed to the user

The system start running microcontroller. Microcontroller has connected to the sensors like MQ135 and it is able to detect smoke, CO, CO₂ and NH₄. CO (Carbon Monoxide), MQ7 sensor is used as individual gases level. After getting the sensor values the microcontroller send data to server and the start Machine learning analysis like we proceed with analysis and prediction. The final output is displayed in user Interface.

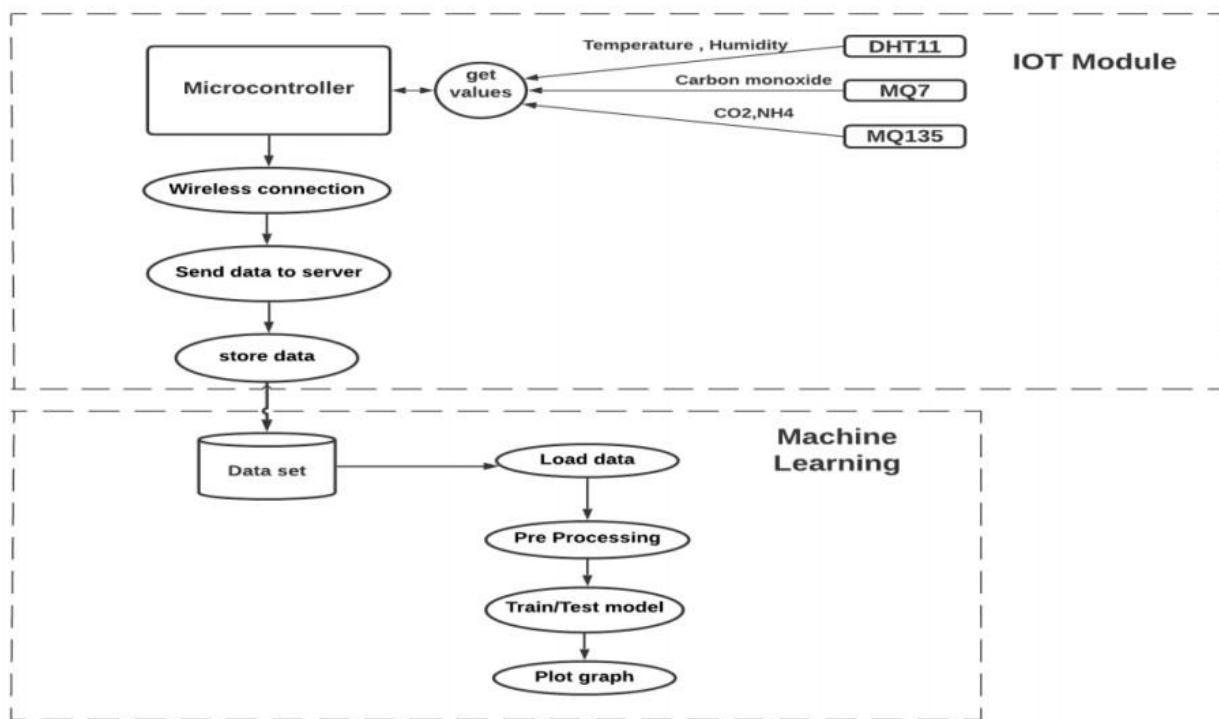


Fig.4 Level 2 Dataflow Diagram

The values obtained from the microcontroller is generated by the sensors. Microcontroller send data to server. The connection between Microcontroller and server is wireless and the data is stored on server side. System will get the data from the stored data set. The data is loaded and Pre-processed and then the dataset is trained and tested and finally the dataset is plotted . The following sequence diagram is shown below.

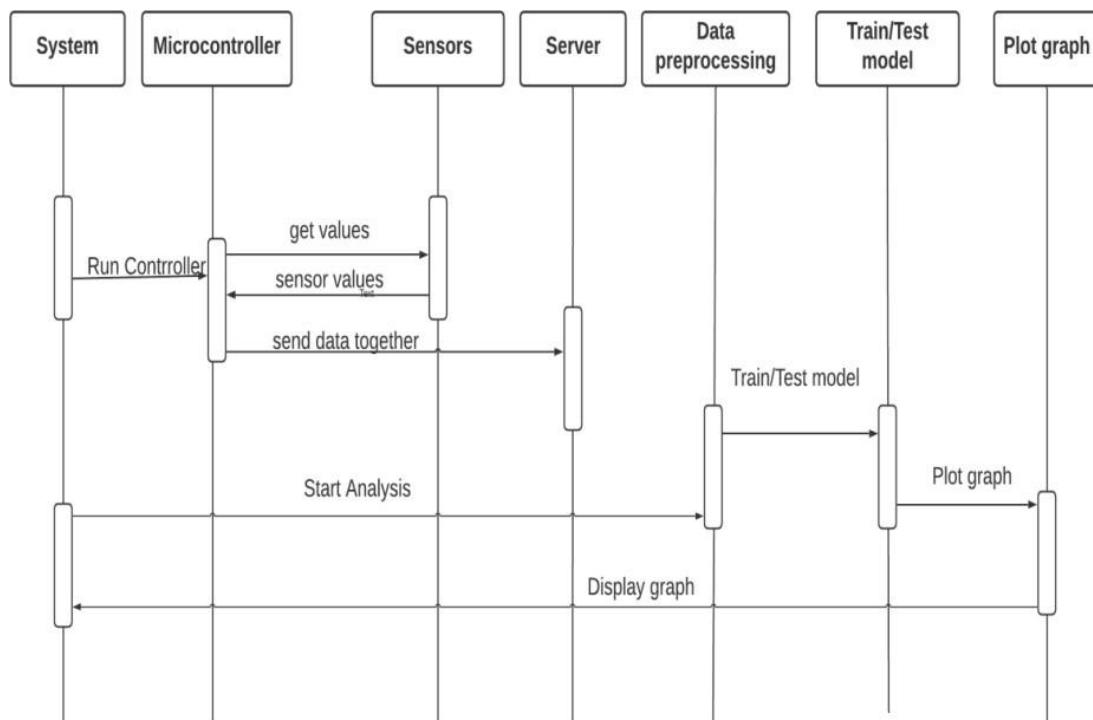


Fig. 5 Sequence Diagram of the trained data set

IV. RESULTS

More than one algorithm is trained and the algorithm with highest accuracy is considered for prediction. For the machine learning models training using live recorded data is implemented which increases accuracy, and with air pollution temperature and humidity values are also recorded for analysis. The air pollution monitoring system using various gas sensors senses the pollutant levels and uploads the data to server, thus making the public get easy access to the pollution level in their area. MQ135 sensor MQ7 sensor detect smoke, CO, CO₂ and NH₄. After getting sensor values we proceed with analysis and prediction. The following figure shows the result of pollution level in their area where MQ135 sensor MQ7 sensor detect smoke.

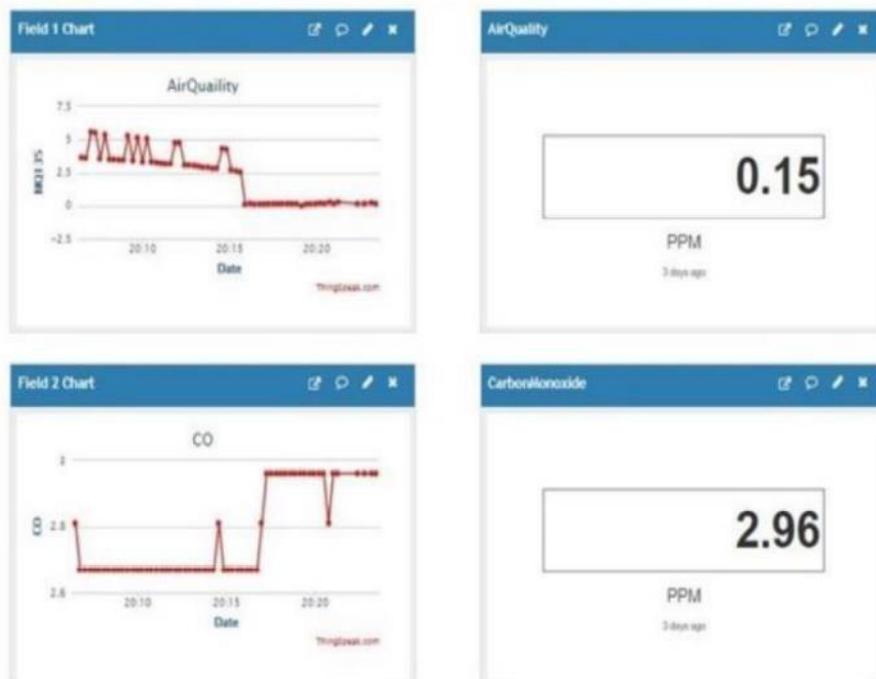


Fig. 6 Pollution level using MQ135 sensor MQ7 sensor to detect smoke

V.

CONCLUSION AND FUTURE WORK

The air pollution monitoring system using various gas sensors senses the pollutant levels and uploads the data to server, thus making the public get easy access to the pollution level in their area. MQ135 sensor MQ7 sensor detect smoke, CO, CO₂ and NH₄. After getting sensor values we proceed with analysis and prediction. More than one algorithm is trained as the accuracy of algorithm differs with data scattering different algorithms gives different accuracy so after training the algorithms the algorithm with highest accuracy is considered for upcoming days prediction and the sensors can be deployed at any geographic location. From today to next thirty days the values are predicted. This is of wide use to offices, factories, residential areas and education institutions, if installed in their premises, because staying in tune with the changes in our environment is the most necessity of today.

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Tomato Leaf Diseases Detection UsingConvolutional Neural Networks

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ABSTRACT: Smart farming system is an innovative technology that helps improve the quality and quantity of agricultural production in the country. Plant leaf disease has been one of the major threats to food security since long ago because it reduces the crop yield and compromises its quality. Diagnosis of accurate diseases has been a major challenge and the recent advances in computer vision made possible by deep learning has paved the way for camera-assisted disease diagnosis for plant leaf. It described the innovative solution that provides efficient disease detection and deep learning with convolutional neural networks (CNNs) has achieved great success in the classification of various plant leaf diseases. A variety of neuron-wise and layer-wise visualization methods were applied and trained using a CNN, with a publicly available plant disease given image dataset. So, it observed that neural networks can capture the colors and textures of lesions specific to respective diseases upon diagnosis, which can act like human decision-making.

Keywords: Disease detection, Deep learning, Tensorflow.

I. INTRODUCTION

Deep learning is a branch of machine learning which is completely based on artificial neural networks, deep learning is also a kind of mimic of human brain because the neural network can mimic the human brain. It's on hype nowadays because earlier we had lot of data and not enough processing power. A formal definition of deep learning is - neurons. Deep learning is a particular kind of machine learning that achieves great power and flexibility by learning to represent the world as a nested hierarchy of concepts, with each concept defined in relation to simpler concepts, and more abstract representations computed in terms of less abstract ones. In human brain approximately there are 100 billion neurons, all together this is a picture of an individual neuron and each neuron is connected through thousands of their neighbours. So, it creates an artificial structure called an artificial neural net where we have nodes or neurons.

II. LITERATURE SURVEY

A. Chowdhury, Dhruba K. Bhattacharyya, Jugal K. Kalita propose an Co-Expression Analysis of Gene Expression: A Survey of Best Practices. It presented an overview of best practices in the analysis of (differential) co-expression, coexpression networks, differential networking, and differential connectivity that can be discovered in microarrays and RNA-seq data, and shed some light on the analysis of scRNA-seq data as well.

XiaoyanGuo, MingZhang, Yongqiang Dai proposed Image of plant disease segmentation model based on pulse coupled neural Network with shuffle frog leap algorithm. A novel image segmentation model SFLA-PCNN for plant diseases based on hybrid frog-hopping algorithm is proposed. Using the weighted sum of cross entropy and image segmentation compactness as the fitness function of SFLA, the image of potato late blight disease is taken as a trial segmentation image to find the optimal configuration parameters of PCNN neural. Image segmentation is a key step in feature extraction and disease recognition of plant diseases images.

Chit Su Hlaing, SaiMaungMaungZaw proposed Plant Diseases Recognition for Smart Farming Using bModel-based Statistical Features. It has shown the advantages of GP distribution model for SIFT descriptor and successfully applied in plant disease classification. Furthermore, it proposed feature achieves a good tradeoff between performance and classification accuracy. Although it proposed feature can successfully model the SIFT feature and applied in plant diseases recognition, it needs to try to improve our proposed feature by considering and cooperation with other image processing methods.

III. EXISTING SYSTEM

Plants are considered as energy supply to mankind. Plant diseases can affect the agriculture which can result in huge loss on the crop yield. Therefore, leaf from various areas, and classifies it into one of the predefined set of classes. The features and properties like color, intensity and dimensions of the plant leaves are considered as a major fact for classification and the various types of plant diseases and different classification techniques in machine learning that are

used for identifying diseases in different plants leaf.

IV. PROPOSED SYSTEM

We planned to design the module so that a person with no knowledge about programming can also be able to use and get the information about the plant diseases. It proposed system to predict lead diseases. It explains about the experimental analysis of our methodology samples of 38 images are collected that are comprised of different plant diseases like Tomato, Grapes, Apple and Healthy leaves. Different number of images is collected for each disease that was classified into database images and input images. The primary attributes of images are based upon the shape and texture oriented features.

V. SYSTEM ARCHITECTURE

1. ARCHITECTURE DIAGRAM

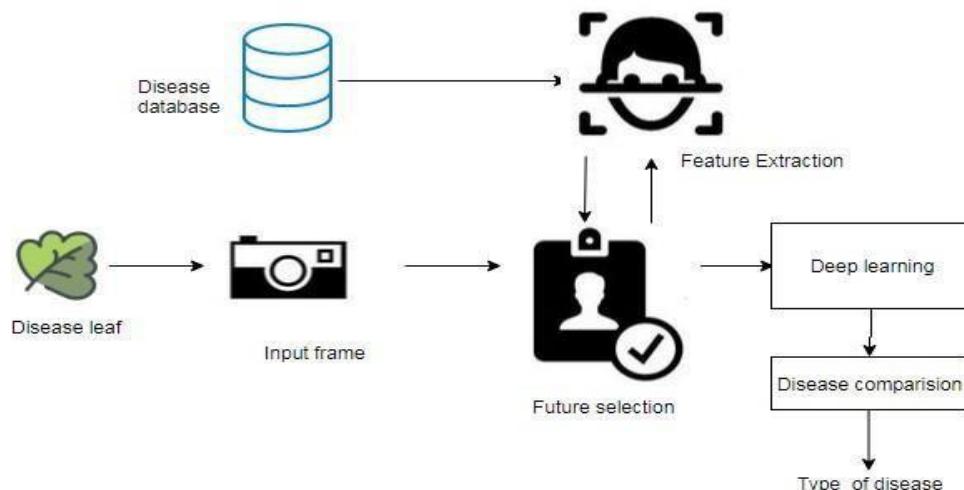


Fig 1. Architecture diagram

As shown in figure 1 there is a database which consists of all the different plant leaf diseases which we have taken into account. The module is trained repetitively to attain the maximum accuracy. If a new image is given to the module its features get compared with the features that are already trained in the database. It then provides the appropriate result.

2. USE CASE DIAGRAM

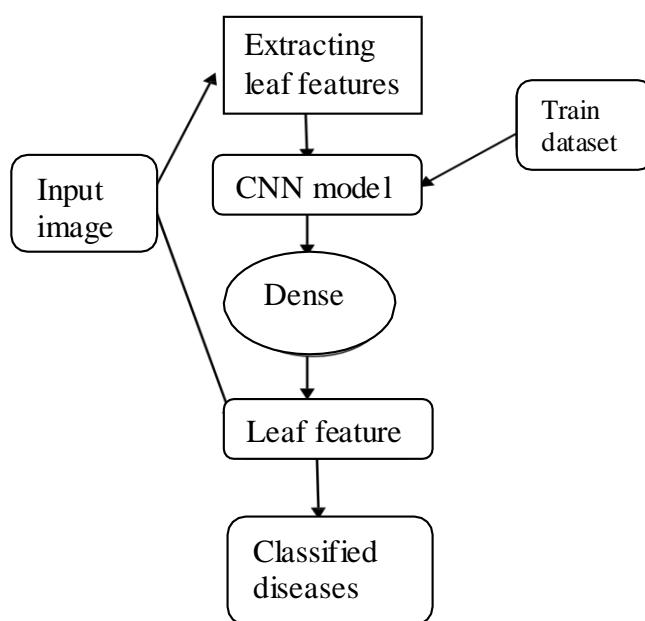


Fig 2: UML use case diagram

As shown in figure 2, When we give a new input image first the module extracts the leaf features. Then it goes through the CNN model. It then compares the features with already trained dataset. Then it goes through dense CNN

and the leaf features are extracted separately. Then the module will predict whether the plant leaf is affected by any disease or not. It shows the output from one of the 38 classes which are predetermined and trained. Then the output will be in a textual format.

1. DATA FLOW DIAGRAM LEVEL 0

As shown in figure 3, at level 0, the person recognizes the plant leaves disease and able to classify it.

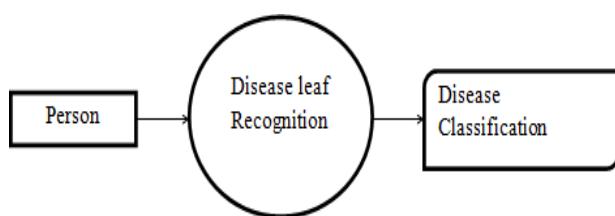


Fig 3: Data flow diagram level 0

2. DATA FLOW DIAGRAM LEVEL 1

As shown in figure 4, at level 1,a test image is given and it is tested with using the trained dataset. The features are extracted and gets compared. Then we can able to predict the leaf disease.

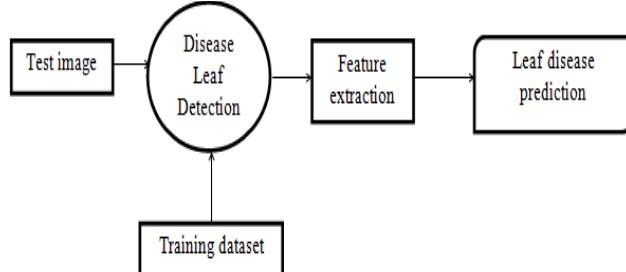


Fig 4: Data flow diagram level 1

3. DATA FLOW DIAGRAM LEVEL 2

As shown in figure 5, at level2, The testing and training dataset are used in CNN model to predict the leaf disease

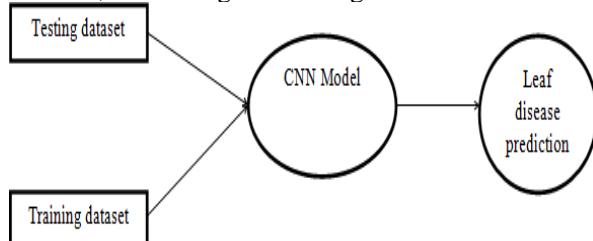


Fig 5: Data flow diagram level 2

4. DATA FLOW DIAGRAM LEVEL 3

As shown in figure 6, at level 3, The last level comprises of both CNN and dense CNN model. It is used to gain more accuracy.

Level 3:

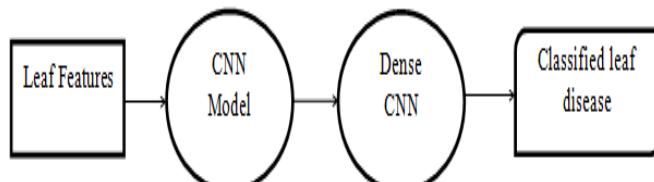


Fig 6: Data flow diagram level 3

5. CLASS DIAGRAM

As shown in figure 7, the normalization class comprises of raw image and it is feeded to the CNN model which comprises of dense and weight .The CNN model classifies and detects by using the training model. The training model class comprises of the image dataset. Leaf detection gets use of the features.

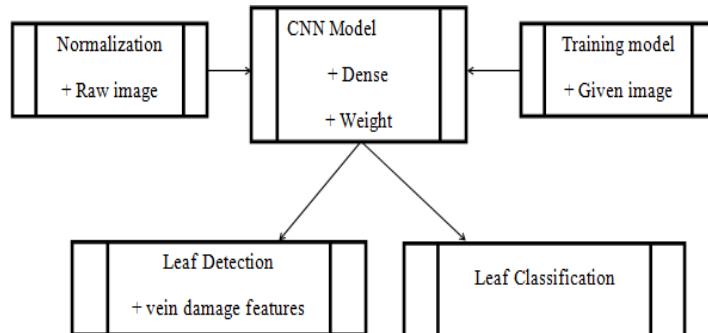


Fig 7: Class diagram

VI CLASS

As shown in figure 8, these are the 38 classes we are taken into the modules. It can be seen that there is apple, blueberry, cherry, grape, orange, peach, pepper bell, potato, raspberry, soybean, squash, strawberry, tomato, com. You can also see that there is a healthy class for all the above mentioned plant leaves. The module predicts the output from the classes.

```
{
'Apple__Apple_scab': 0,
'Apple__Black_rot': 1,
'Apple__Cedar_apple_rust': 2,
'Apple__healthy': 3,
'Blueberry__healthy': 4,
'Cherry_(including_sour)__Powdery_mildew': 5,
'Cherry_(including_sour)__healthy': 6,
'Corn_(maize)__Cercospora_leaf_spot_Gray_leaf_spot': 7,
'Corn_(maize)__Common_rust_': 8,
'Corn_(maize)__Northern_Leaf_Blight': 9,
'Corn_(maize)__healthy': 10,
'Grape__Black_rot': 11,
'Grape__Esca_(Black_Measles)': 12,
'Grape__Leaf_blight_(Isariopsis_Leaf_Spot)': 13,
'Grape__healthy': 14,
'Orange__Haunglongbing_(Citrus_greening)': 15,
'Peach__Bacterial_spot': 16,
'Peach__healthy': 17,
'Pepper,_bell__Bacterial_spot': 18,
'Pepper,_bell__healthy': 19,
'Potato__Early_blight': 20,
'Potato__Late_blight': 21,
'Potato__healthy': 22,
'Raspberry__healthy': 23,
'Soybean__healthy': 24,
'Squash__Powdery_mildew': 25,
'Strawberry__Leaf_scorch': 26,
'Strawberry__healthy': 27,
'Tomato__Bacterial_spot': 28,
'Tomato__Early_blight': 29,
'Tomato__Late_blight': 30,
'Tomato__Leaf_Mold': 31,
'Tomato__Septoria_leaf_spot': 32,
'Tomato__Spider_mites_Two-spotted_spider_mite': 33,
'Tomato__Target_Spot': 34,
'Tomato__Tomato_Yellow_Leaf_Curl_Virus': 35,
'Tomato__Tomato_mosaic_virus': 36,
'Tomato__healthy': 37}
  
```

Fig 8: Classes of plant leaf diseases

VII. CNN MODEL STEPS

- Conv2D: It is the layer to convolve the image into multiple images activation is the activation function.
- MaxPooling2D: It is used to max pool the value from the given size matrix and same is used for the next 2 layers.
- Flatten: It is used to flatten the dimensions of the image obtained after convolving it. Dense: It is used to make this a fully connected model and is the hidden layer. Dropout: It is used to avoid over fitting on the

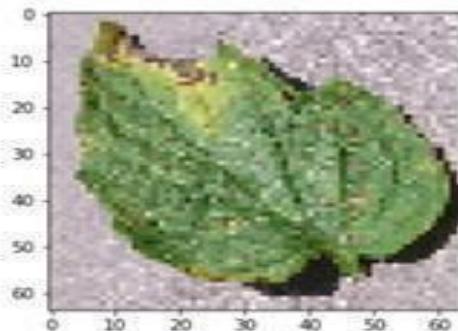
dataset and dense is the output layer contains only one neuron which decide to which category image belongs.

- Image Data Generator: It is that rescales the image, applies shear in some range, zooms the image and does horizontal flipping with the image. This Image Data Generator includes all possible orientation of the image.
- Training Process: Train_datagen. Flow_from_directory is the function that is used to prepare data from the train_dataset directory Target_size specifies the target size of the image. test_datagen. flow_from_directory is used to prepare test data for the model and all is similar as above. fit_generator is used to fit the data into the model made above, other factors used are steps_per_epoch tells us about the number of times the model will execute for the training data.
- Epochs: It tells us the number of times model will be trained in forward and backward pass.
- Validation process: validation_data is used to feed the validation/test data into the model. validation_steps denotes the number of validation/test samples.

VIII. RESULT

As shown in figure 10, if we give a new image to the model to predict its outcome. The model predicts any one of the classes from the 38 class mentioned before. Here the test image we have given is tomato leaf with septoria leaf spot

```
In [50]: import matplotlib.pyplot as plt
img = plt.imshow(test_image)
```



```
In [51]: test_image=image.img_to_array(test_image)
```

```
In [52]: test_image=np.expand_dims(test_image, axis=0)
```

```
In [53]: result=model.predict(test_image)
```

```
In [54]: prediction = result[0]
```

Fig 10: Test image

```

print("Tomato_Leaf_Mold")
elif output['Tomato_Septoria_leaf_spot']=1.0:
    print("Tomato_Septoria_leaf_spot")
elif output['Tomato_Spider_mites_Two-spotted_spider_mite']=1.0:
    print("Tomato_Spider_mites_Two-spotted_spider_mite")
elif output['Tomato_Target_Spot']=1.0:
    print("Tomato_Target_Spot")
elif output['Tomato_Tomato_Yellow_Leaf_Curl_Virus']=1.0:
    print("Tomato_Tomato_Yellow_Leaf_Curl_Virus")
elif output['Tomato_Tomato_mosaic_virus']=1.0:
    print('Tomato_Tomato_mosaic_virus')
elif output['Tomato_healthy']=1.0:
    print("Tomato_healthy")

```

Tomato_Septoria_leaf_spot

Fig 12: Output prediction

The output is tomato_septoria_leaf_spot.

IX. CONCLUSION

It focused how image from given dataset (trained dataset) in field and past data set used predict the pattern of plant diseases using CNN model. This brings some of the following insights about plant leaf disease prediction. As maximum types of plant leaves will be covered under this system, farmer may get to know about the leaf which may never have been cultivated and lists out all possible plant leaves, it helps the farmer in decision making of which crop to cultivate. Also, this system takes into consideration the past production of data which will help the farmer get insight into the demand and the cost of various plants in market.

X. FUTURE ENHANCEMENT

Agricultural department wants to automate the detecting the yield crops from eligibility process (real time). To automate this process by show the prediction result in web application or desktop application. To optimize the work to implement in Artificial Intelligence environment.

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Blockchain Based Internet Of Medical Thing

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ABSTRACT: The Internet of Things promises to connect more than 50 billion devices in a multitude of application domains. However, user privacy and security remain a major challenge in IoMT. This approach consists of four main components: a cloud server, network cluster, medical facility, and smart medical devices. Each medical facility contains a “bolster”, a powerful computing device that operates as a gateway/server to support in-range smart medical devices. The BCT is used in the framework to overcome the security issues of IoMT through the use of latest encryptions. This framework harnesses the benefits of BlockChain like reduced cost, speed, automation, immutability. The end products are (i)A systematic investigation of the current IoMT, BlockChain and Cloud Storage in Health Care (ii) Explore the challenges and necessities for the confluence of BlockChain (BC), yet it brings major advantages to meet the standard security and privacy requirements in IoMT. The fusion of the IoMT, Cloud Storage with BlockChain technologies not only offers benets like reduced cost, speed, automation, immutability, near-impossible loss of data, permanence, removal of intermediaries, decentralization of consensus, but also overcomes most of the issues especially the security issues of through the use of latest encryptions.

KEYWORDS: Authentication, authorization, availability, block chain, cloud computing, confidential, consensus, data privacy, data security, electronic medical records, health care, integrity, internet of medical things, Internet of Things, interoperability, patient centric health care, privacy preserving, provable data possession, remote monitoring devices, security.

I INTRODUCTION

The IoMT (Internet of Medical Things) is the unification of data from various medical gadgets (equipped with sensors) and software applications in the Health Care wirelessly. The IoMT collects remote patient health data from the wearable sensors; pre-processes the collected data, streams it to the Health Care Professionals via machine-to-machine (M to M) fortified with Wi-Fi. The Health Care data is stockpiled in the Cloud server for additional analysis. This data unication results in improved patient outcomes by combining the people, data and processes through connected medical devices and mobile applications. The IoMT thus increases the efficiency of HealthCare devices, and the speed and accessibility of Health Care services.

The IoMT supports in reduction in costs of Health Care through the support of technology, precise identification of diseases, minimisation of errors, and allowing patients to directly communicate health information data to doctors.

This is particularly important in the current COVID-19 crisis; because, the IoMT does not need in-person medical visits. AllTheResearch gives an implication that the global pandemic of COVID-19 has only further accelerated the need for IoMT is playing a huge role in the growth of the technology. IoMT comes as a handy technology to the medical industry researchers, who are in search of the most efficient screening process and quick monitoring of patient symptoms.

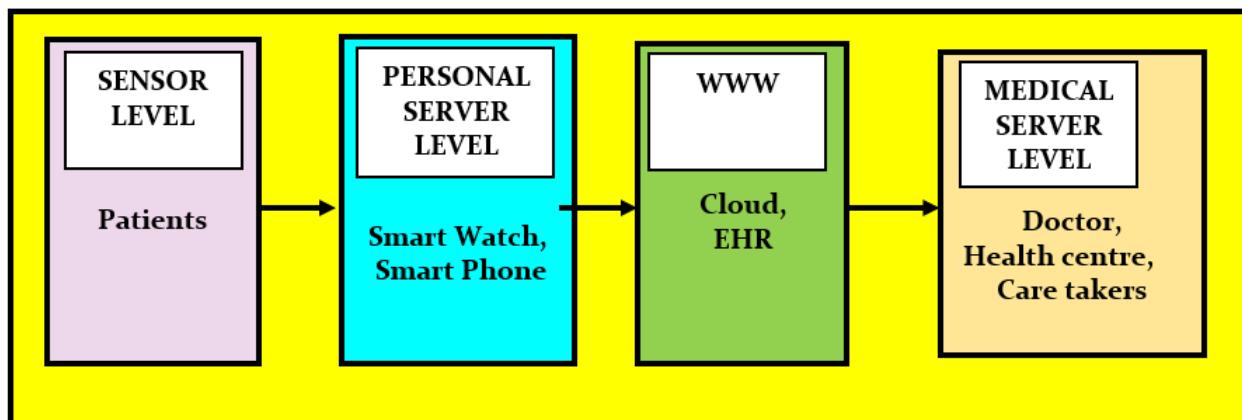


Fig.1 High level diagram of internet of medical things.

Fig-1 shows the high level implementation of medical things, it starts with sensor level, here different sensors associated with medical devices collects data from users, and data from sensors sent to associated medical things like smartwatches

or smartphones and from there it sent to cloud via different protocols and next to Medical servers from which doctor examines patient's condition.

IoMT, deals with enormous amount(volume), of heterogeneous HealthCare data(variety), generated continuously(velocity); which, mandate's the necessity to devise special techniques to tackle the big Health Data. High cost is incurred on patients (for linking to smart devices, remote patient monitoring systems), and Medical care takers (integrating of medical equipment into the current HealthCare ecosystem). Health Care data includes extremely sensitive data like patient's ailment information, treatment details and their geolocations. This necessitates for devising strong privacy protection mechanisms. IoMT implementation brings to the forefront issues like security perils

Block Chain picks up where IoMT & Cloud technology bites the dust. BC is used to store information securely in safe locations for future information sharing. A Block Chain is a ledger which is dispersed and it operates based on consensus alias validation mechanisms programmed on dissimilar nodes of its networks. The Block Chain is used to generate a tamper-proof digital ledger of transactions; which is shared among the parties. The transactions among the parties are signed using public-key cryptography and these dealings are stockpiled on a circulated ledger. The ledger is encompassed by cryptographically linked blocks of transactions, to form a block chain. Once recorded it is very difficult to remove a block from the BlockChain ledger. BlockChain thus gives a digital version of etching information into solid stone. BlockChain technology further permits dispersed preservation of encrypted data.

The utilization of BlockChain technology offers reliability(decentralized architecture)and safety in the HealthCare system. The Block Chain can alleviate problems arising from the privacy and integrity of patient information, due to the features of BlockChain, such as immutability, transparency and reliability. BlockChain supports the management of logs and the auditing of the data.

II. Related work

In [1] authors used blockChain technology for encryption of highly sensitive data, without encryption, the control over the privacy of the sensitive data is lost. The users or service providers with the key have exclusive rights on the data. Untrusted providers, cloud operators can keep sensitive data and its identical. flying credentials of users long after the user ends the relationship with the services. With encryption, it utilized homomorphic encryption (HE) schemes. HE is a special kind of encryption scheme, which allows any third party to operate on the encrypted data without decrypting it in advance. Indeed, the idea of HE has been around for over 30 years; however, the first plausible and achievable Fully Homomorphic Encryption (FHE) scheme was introduced by Craig Gentry in 2009. Since then, different FHE schemes demonstrated that FHE still needs to be improved significantly to be practical on every platform as they are very expensive for real-life applications. Legacy encryption systems depend on sharing a key (public or private) among the peers involved in exchanging an encrypted message. However, this approach poses privacy concerns.

III. Proposed Methodology

A. PERCEPTION LAYER

Perception layer has sensors, actuators and tags. Perception layer is in complete authority for data procurement through the equipment that is used for detection and measuring. The layer is not used to procure information, it is also used to convey proper reaction by actors. Sensor (s) - Sensors can be self-tracking devices and solutions. Sensor(s)uses a process for detecting and signaling the activities, by the appropriate sensors(shown in Table 4), each made up of an electronic circuit having an indicator and an optical signal activator, in which the one or more sensors are joined to the frame; a power source electrically connected to the one or more sensors; and an pressure signal electrically linked to the photosensitive signal trigger, and its use in providing an intelligent alert module. The collected data is streamed. Connection is achieved either by wire or wirelessly sensor. The quantified devices/sensors can be habiliment electronics and/or multi-sensor platforms home appliances as part of IoMT.

B. NETWORK LAYER

The network layer is made up of any type of BlockChain, BlockChain Platforms, Components & Services, InternetWired (cable bre, power line communication), LAN (Ethernet, Wi-Fi), Network & Protocols, PAN (6LoWPAN, Bluetooth, UWB, Wired, ZigBee). Wireless (GSM/UMTS,3G,5G, LTE/LTE-A, Wi-Fi), All the communications and the related data go through BlockChain (see Figure 4), to form an immutable and traceable record of connections. This method is valuable in trade and rent set-ups to get reliability and security. It records all the exchanges.

The Block Chain , also controls all the dealings between service and Cloud providers. This will grant access to the patient data collected through sensors, actuators and tags. Gateways are publishers and they create all the data linked to a patient. The Publishers state the access control levels and permissions (read/write/modify) in the Cloud (using smart contracts). Authorities are subscribers who are able to access the data generated by the publishers in the Cloud.

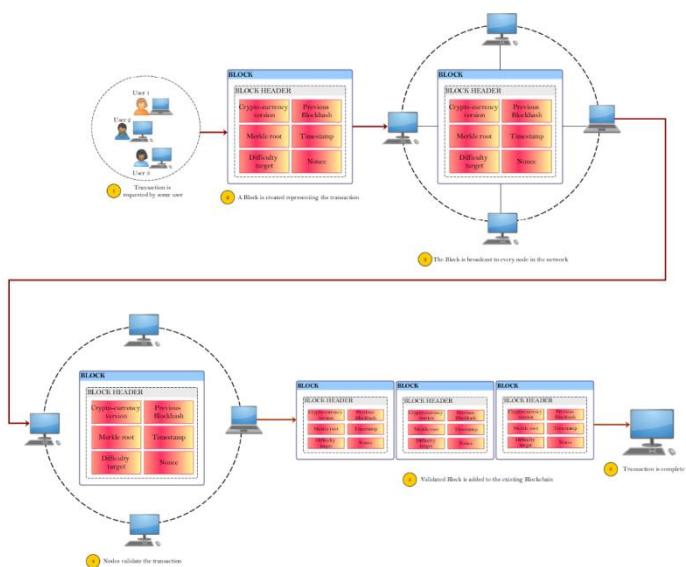


Fig-2 Working of IoMT BlockChain

BlockChain Based Internet of Medical Things offers the users a six-pronged strategy by an uninterrupted, ubiquitous, user-friendly, unappable, unblemished, unlimited Health Care services. Steps involved in the functioning of block chain.

Step 1. Demand Contract

Step 2. Create a block (represents transaction)

Step 3. Create a Block Chain

Step 4. Send Chunk to every node in the network

Step 5. Authenticate the contract by the node

Step 6. Collect (Nodes) an incentive for the proof of work

Step 7. Add block to the existing chain

Step 8. Complete Transaction

C. MANAGEMENT LAYER

The management layer is subdivided into data usage layer (IoMT, supply chain and authentication), data management layer (data analysis, data management, user management) and data storage layer (data storage, Cloud services). Security and privacy are like two sides of a coin and they are critical. Data created is stored on blocks or on the Cloud storage. The Cloud provider layer will take care of all the processing and storage capacities in the Cloud.

Healthcare data management in block chain.

Step 1. Generate primary data upon interaction with Patient by the doctors, and specialists

Step 2. Produce a record with the primary data collected in the initial step.

Step 3. Include prescription and treatment information from doctors, and pharmacy

Step 4. Make the Individual patient owner of the sensitive record.

Step 5. Customize access control to the owner

Step 6. Request permission to view record

Step 7. Forward request to owner

Step 8. Request received by the owner

Step 9. Decide if permission can be given or not

Step 10. Authorize Health Care providers

Step 11. Permission granted to Health Care providers

Step 12. Get access (End user like Health Care providers informal clinic, public Health Care center, hospitals)

In the management layer, we endorse the working of secure and integrity preserved storage. The generic Secure Privacy Conserving Provable Data Possession (SPCPDP) framework [48], is used as an additional layer for ensuring the data integrity. The generic PDP mechanism has four main phases: setup, challenge, proof, and verification.

D. APPLICATION LAYER

The application layer consists of Business User, Chiropractor, Clinical Psychologist, Hospital Personnel, Medical Personnel, Physician, Patients, Public. It also includes Clinical Trials, Diagnostic Centre, Laboratories. The Government, National Provider, Regulators, Researcher are all placed in this layer. The EMR, Monitor All Reports, Dialectic Health Applications all are laid in this layer. There are several Private Block Chain at the patient level. The main node in the BlockChain is an influential computer (Public Block chain) that will be the gateway to other higher layer Block Chains. The end users are the Health Care providers who will be permitted to access the patient records only upon the grant of consent from the data owner; this is for legitimate rights.

Algorithm to Fetch Health Care data from a database

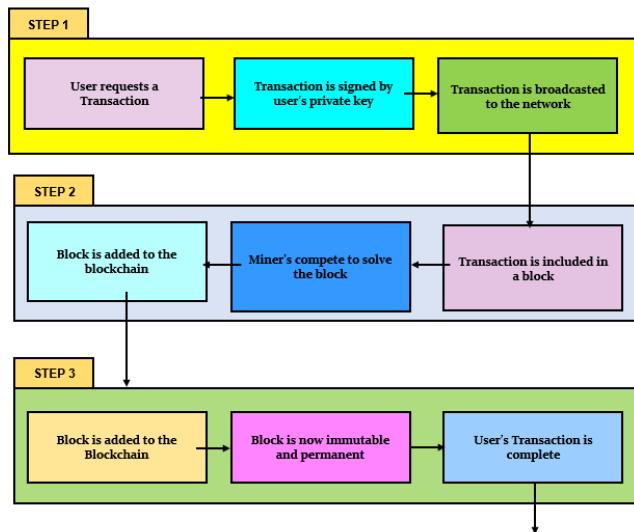


Fig-3 Steps for blockChaining

Every block includes data of the patient, originating time of the block, and the block creator information. Based on the amount of mining data, the block is endorsed. Reward is given to the initial miner who solves the mathematical riddle, and broadcasts the created block to all peers in the network, gets the reward. Upon acceptance of the new block by a greater number of peers, it gets inserted into the chain. The block gets forked and is orphaned in the chain if it is not matching with the previous block. After the block gets added to the chain, it cannot be detached or changed without disturbing adjacent blocks. This aids in viewing the Patients past in a very authentic innocent manner, deprived of any anxiety of getting tampered.

IV. Pseudo code

Step 1. Search for file

Step 2. Fetch File

Step 3. Load File

Step 4. Read File

Step 5. Completed reading le

Step 6. Close file

Algorithm to add block into Block Chain by the medical doctor

Input : Name of the patient

Output : Block added to BlockChain

Assign block (patient p)

Chain the Blocks

Subscribe for Identity (identity)

Read loaded file (p.Patient)

Generate Block (read, timestamp, identity)

Check the formed Block

Transmit the Block

Check for approval

Condition for approval is satisfactory

Approve Sanction

Check if block is in similar chain

```

If yes,
    Add Block in chain
    Show Status of Block Successful
else
    Add Block in Fork
    Block added successfully as a fork into the chain
Condition for approval is not satisfactory
    Discard Block
    Update Block chain
Display status of Block chain

```

V. Simulation Results

Data Volume(Number of files) versus Reliability

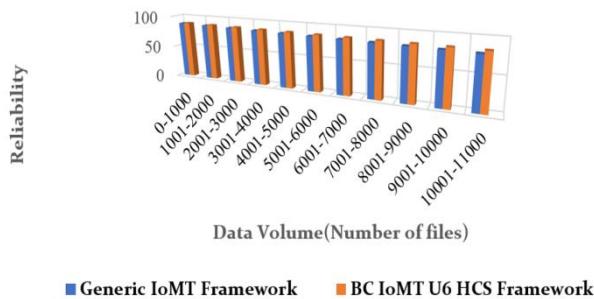


Fig-4 Data Volume Vs Reliability

Figure 4, shows the efficiency obtained by the BC IoMT U6 HCS framework, in contrast with the conservative frameworks. With increase in the quantity of les, the reliability is more or less obstinate in both the earlier and proposed frameworks.

Figure 5, shows the efficiency obtained by the BC IoMT U6 HCS framework, in contrast with the conservative frameworks. With increase in the quantity of records, the efficiency appears to be more or less persistent in both the earlier and proposed ones. The size of attributes in a record is kept persistent and the number of records is progressively enlarged to meter the competence of the framework. It is observed that rise in the amount of records the BC IoMT U6 HCS framework are competent and adeptly attains secure auditing, privacy, integrity and surpasses the erstwhile Generic IoMT framework.

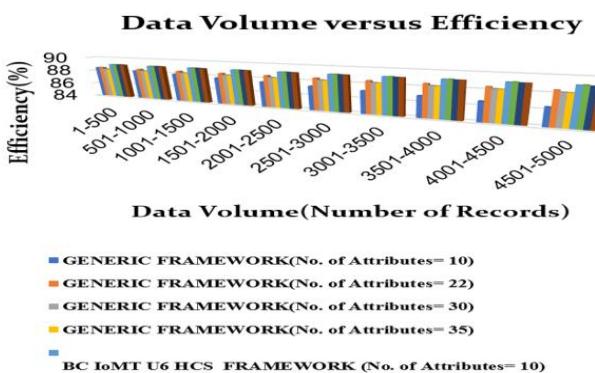


Fig-5 Data Volume Vs Efficiency

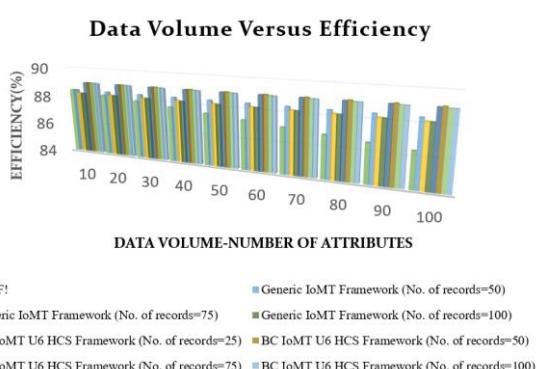


Fig-6 Data Volume Vs Efficiency

Figure 6, shows the efficiency obtained by the BC IoMT U6 HCS framework in contrast with the conservative frameworks. Even with a rise in the quantity of attributes; efficiency is more or less same in both the existing and proposed frameworks. Keeping the amount of records a constant; increasing the number of attributes the efficiency of the framework is measured. It is observed that as we increase the number of attributes the BC IoMT U6 HCS framework more competently and capably achieves secure auditing, privacy, integrity and excels the former Generic IoMT framework. The time taken to run rises with an increase in data volume and is more or less same for both the frameworks - BC IoMT U6 HCS framework, Generic IoMT framework. The amount of time taken to recover the user data-running time, is just very few seconds. After the execution of the project, the time consumed by the challenge and response is calculated. It is noted that with increase in le size, time spent also upsurges. Time duration of diverse le sizes fluctuates only in a few milliseconds and this is very negligible for the user /verier to not observe the alteration in challenge and reply.

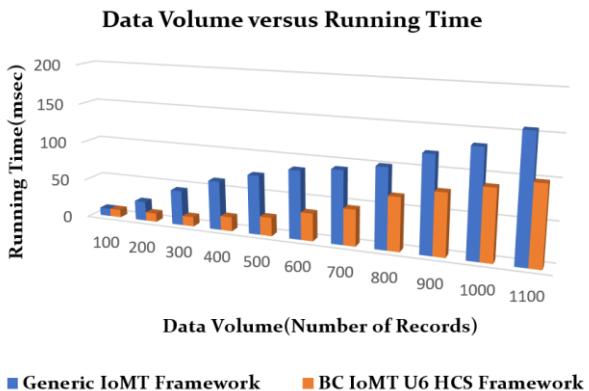


Fig-7 Data Volume Vs Running Time

Figure 7, shows the efficiency obtained by the BC IoMT U6 HCS framework, in comparison with the conventional layered architecture. With an increase in the size of les, the reliability appears to be more or less obstinate in both the previous and proposed layered architecture.

VI CONCLUSION AND FUTURE WORK

The consensus algorithm has the following constraints that does not allow its adaptation and utilization in many of the existing IoMT- frameworks. Future research work can be undertaken in along the following lines like (i) The time taken endorse the blocks is non-compliant with IoMT-QoS; (ii)The high computational resources, are needed for the consensus algorithms which cannot be afforded by the IoMT; (iii) Sharing of cryptographic key in a dispersed WBAN is yet to be resolved;(iv) threats arising due to identity-based network layer is yet to be resolved. The research gaps that are to be resolved are identified brief as

- (i) escalating initial expenditure in adopting the new technology;
- (ii)Research Gaps in Philosophy the global community, has to adopt to the purchase of the technology;
- (iii) Research Gaps in Energy- BlockChain for sustaining its operations uses a network of nodes, and ensuing extensive computing power; (iv) Research Gaps in Integration at inception be co-existent with present technologies, and later get integrated overtime; and (v) Research Gaps in Regulating authorities to regularise and settle down the issues of regulatory over BlockChain technology.

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Screening System For Early Detection Of Diabetic Retinopathy

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ABSTRACT: In today's world, Diabetes is a very common disease which affects a lot of people's health. As the number of diabetic patients is increasing significantly in India, there is a rise in numerous associated diseases that have disturbed the society. Diabetic Retinopathy (DR) is considered to be one of such silent diseases which occur as a result of either Type 1 or Type 2 diabetes. Late diagnosis of this disease may lead to permanent eye blindness. Thus, for early diagnosis of Diabetic Retinopathy, a software-based algorithm is designed here. This technique can be promising for the pre-detection of DR without any involvement of an expert doctor and hence will save both time and money. Here, CNN based image processing is used which exploits the knowledge of Computer Science and Biomedical Engineering to identify whitish lesions, cotton wool spots and hard exudates associated with DR. Based on the value of pixel counts, the image of the patient's eye under examination is classified as a Diabetic Retinopathic eye or a Non-Diabetic Retinopathic eye.

KEYWORDS: Deep learning, convolutional neural network, Diabetic retinopathy.

I. INTRODUCTION

Based on the level of production of insulin, there are two types of diabetes i.e. Type 1 and type 2 which can be tested by fasting plasma glucose (FPG) test or the A1C (hemoglobin a1c) test. A significant portion of people having type 1 and type 2 diabetes suffer from a silent eye blindness disease known as diabetic retinopathy. In this disease, the blood vessels of the eyes might be damaged due to high blood sugar level. Since vision is gradually reduced in most cases, early diagnosis of diabetes can increase the chance of preventing blindness and blurred vision. Here, CNN based image processing is used. The convolution neural network (CNN) is a class of deep learning neural networks. CNN's represent a huge breakthrough in image recognition. A Convolutional neural network (CNN) is a neural network that has one or more convolutional layers and are used mainly for image processing, classification, segmentation and also for other auto correlated data. They are most commonly used to analyse visual imagery and are frequent working behind the scenes in image classification.

II. RELATED WORK

There are already several algorithms for the detection of diabetic retinopathy using Support Vector Machine, Conventional Neural Network and Digital Image Processing. But efficacy of those techniques is questionable and is moreover complex in nature. Therefore, in this manuscript, the main aim is to build an application by which the brighter spots which occurs in the eye retina caused by Diabetic Retinopathy can be detected. These spots are basically the hard exudates, cotton wool spots and whitish lesions. Here, colored fundus images are used for processing. Based on the pixel count of the image, the image is identified as a Diabetic Retinopathic eye image or not.

Different researchers have proposed various methods to predict the Diabetes disease in the patients using their health/personal data.

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III. METHODOLOGY

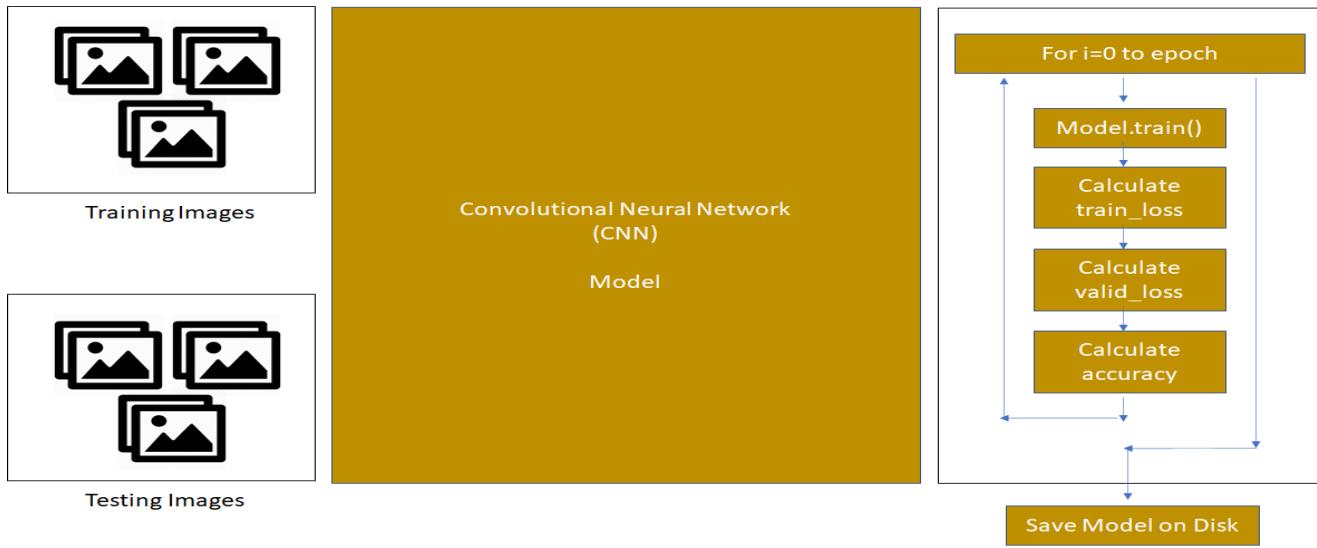


Fig 3.1: Module Implementation – Training, Testing, and Saving the model

In deep learning, a convolutional neural network (CNN, or ConvNet) is a class of deep neural networks, most commonly applied to analyzing visual imagery. They are also known as shift invariant or space invariant artificial neural networks (SIANN), based on their shared-weights architecture and translation invariance characteristics. They have applications in image and video recognition, recommender systems, image classification, medical image analysis, natural language processing, and financial time series. CNNs use relatively little pre-processing compared to other image classification algorithms. This means that the network learns the filters that in traditional algorithms were hand-engineered. This independence from prior knowledge and human effort in feature design is a major advantage.

In this module, the sample third party application has been implemented to demonstrate the usage of the web services to the customers. In this application, we implement four steps:

Step 1: User Identity: We collect the user's first name and the last name.

Step 2: Contact Information: We collect the email ID and mobile number of client.

Step 3: Proof: We will send an OTP to customer and ask them to enter it to prove the identity.

Step 4: Execution: User uploads an input image here and clicking on Run button will invoke the web service implemented in the previous module. The downloadable image link will be displayed back to the client once the result is available.

IV. ALGORITHM

Step 1: Start

Step 2: Load required libraries

Step 3: Read input image and read output path

Step 4: Define CNN Model

Step 5: Load the saved model from the disk

Step 6: Run the model against input image

Step 7: Send the result

Step 8: Stop

V. RESULTS

An ML model which accepts a retina image as an input and outputs the analysis of the retina for the diabetes. A web service layer which exposes this model to the outside world for integration with the third party app. A prototype application to demonstrate the integration of model with the third party application. This technique can be promising for the pre-detection of DR without any involvement of an expert doctor and hence will save both time and money (0-No DR, 1-Mild, 2-Moderate, 3-Severe, 4-Proliferative DR).

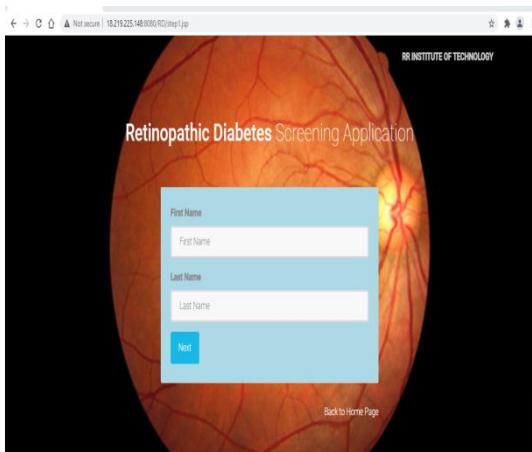


Fig 5.1: Login Page

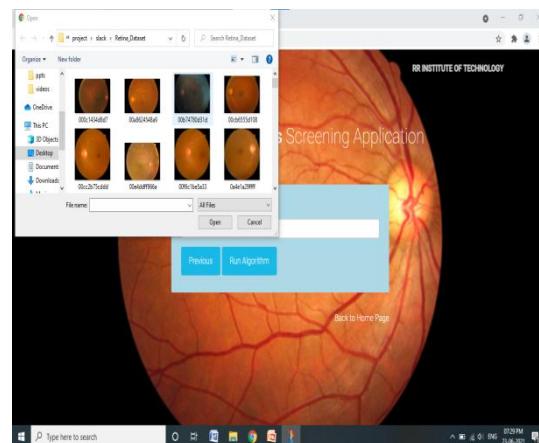


Fig 5.2: Image uploading

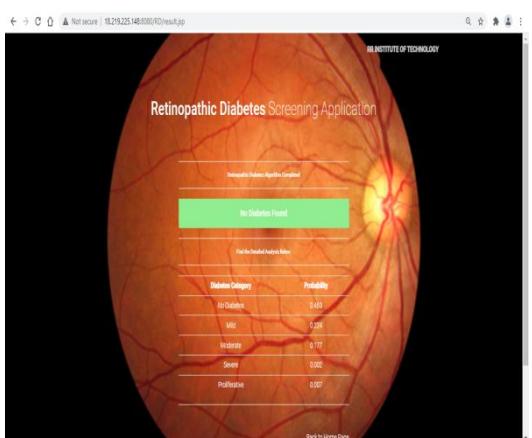


Fig 5.3: Result page as No Diabetes

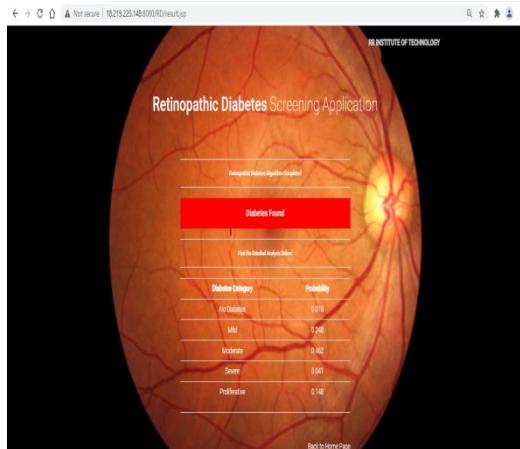


Fig 5.4: Result page as Diabetic Retinopathy

VI. CONCLUSION

In this project, CNN based image processing is used which exploits the knowledge of Computer Science and Biomedical Engineering to identify whitish lesions, cotton wool spots and hard exudates associated with DR. Based on the value of pixel counts, the image of the patient's eye under examination is classified as a Diabetic Retinopathic eye or a Non-Diabetic Retinopathic eye. This technique can be promising for the pre-detection of DR without any involvement of an expert doctor and hence will save both time and money.

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Network Intrusion Detection Using Supervised Machine Learning Technique With Feature Selection

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ABSTRACT: A novel supervised machine learning system is developed to classify network traffic whether it is malicious or benign. To find the best model considering detection success rate, combination of supervised learning algorithm and feature selection method have been used.

Through this study, it is found that Random forest Algorithm based machine learning with wrapper feature selection outperform support vector machine (SVM) technique while classifying network traffic. To evaluate the performance, NSL-KDD dataset is used to classify network traffic using SVM and Random forest techniques. Comparative study shows that the proposed model is efficient than other existing models with respect to intrusion detection success rate.

Keywords: Intrusion Detection, Supervised Machine Learning

1.INTRODUCTION

With the wide spreading usages of internet and increases in access to online contents, cybercrime is also happening at an increasing rate. Intrusion detection is the first step to prevent security attack. Hence the security solutions such as Firewall, Intrusion Detection System (IDS), Unified Threat Modeling (UTM) and Intrusion Prevention System (IPS) are getting much attention in studies.

IDS detects attacks from a variety of systems and network sources by collecting information and then analyzes the information for possible security breaches. The network based IDS analyzes the data packets that travel over a network and this analysis are carried out in two ways. Till today anomaly based detection is far behind than the detection that works based on signature and hence anomaly based detection still remains a major area for research.

The challenges with anomaly based intrusion detection are that it needs to deal with novel attack for which there is no prior knowledge to identify the anomaly. Hence the system somehow needs to have the intelligence to segregate which traffic is harmless and which one is malicious or anomalous and for that machine learning techniques are being explored by the researchers over the last few years. IDS however is not an answer to all security related problems. For example, IDS cannot compensate weak identification and authentication mechanisms or if there is a weakness in the network protocols.

The main objective of this project is to solve the problems face by existing NIDS techniques. In response to this we have proposed our novel NDAE method for unsupervised feature learning. We have then built upon this by proposing a novel classification model constructed the RF classification algorithm.

2.LITERATURE SURVEY

2.1 Network Intrusion Detection System (NIDS) using Machine Learning Perspective

Many intrusion detection systems are rule based which cannot detect novel attacks. Moreover, rule based technique is time consuming due to the encoded rule manually and it highly depend on the prior knowledge of the known attacks. Therefore, we proposed network based intrusion detection system (NIDS) using machine learning technique. NIDS is meant to be a device or a system application that monitor a network traffic and event occurring in a computer system. In network security intrusion detection system play a major role to detect different kinds of attacks. The machine learning technique can be used to increase the attack detection performance. In this paper Network intrusion detection system is proposed with the method of principle component analysis (PCA) and support vector machine (SVM). This proposed method was tested on KDD Cup dataset and attack detection accuracy is compared to decision tree and naive bayes algorithms.

2.2 Real Time Intrusion Detection System using Machine Learning

Today, world has come closer due to rapid increase intemet. As technology has been developed many threats are emerged for the data security which is not at all good for sensitive data transactions, but as we know that the network security also posses equal importance in the computer infrastructure. Because of the intruders the security of the network has become serious problem. Thus to overcome this we are proposing this paper which is based on machine learning algorithm for intrusion detection using Naive Bayesian Classifier, which is based on probabilistic model.

This algorithm performs balance detections and keeps false positive rate at acceptable level for different types of real time networking attacks. In this, the system is trained by arranging the data attributes in a characterized format which eliminates the redundancy resulting in the reduction.

2.3 Network Intrusion Detection Using Machine Learning

In the network communications, network intrusion is the most important concern nowadays. The increasing occurrence of network attacks is a devastating problem for network services. Various research works are already conducted to find an effective and efficient solution to prevent intrusion in the network in order to ensure network security and privacy. Machine learning is an effective analysis tool to detect any anomalous events occurred in the network traffic flow. In this paper, a combination of two machine learning algorithms is proposed to classify any anomalous behavior in the network traffic. The overall efficiency of the proposed method is dignified by evaluating the detection accuracy, false positive rate, false negative rate and time taken to detect the intrusion. The proposed method demonstrates the effectiveness of the algorithm in detecting the intrusion with higher detection accuracy of 98.76% and lower false positive rate of 0.09% and false negative rate of 1.15%, whereas the normal SVM based scheme achieved a detection accuracy of 88.03% and false positive rate of 4.2% and false negative rate of 7.77%.

2.4 An Intrusion Detection System Using Machine Learning Algorithm

Security of data in a network based computer system has become a major challenge in the world today. With the high increase of network traffic, hackers and malicious users are devising new ways of network intrusion. In order to address this problem, an intrusion detection system (IDS) is developed which will detect attacks in a computer network. In this research, the KDDCup99 Test datasets is analyzed using certain machine learning algorithms (Bayes Net, J48, Random Forest, and Random Tree) to determine the accuracy of these algorithms by classifying these attacks into their various classes. A constructive research methodology is adopted throughout this research. The experimental results show that the Random Forest and Random Tree algorithms appear to be the most efficient in performing the classification technique on the Test dataset. The experimental tool used is WEKA which is used to perform a correlation based feature selection on the dataset with a Best First search method, and the parameters used for the computation are Precision, Recall and F-measure.

2.5 Evaluation of Machine Learning Algorithms for Intrusion Detection system

Intrusion detection system (IDS) is one of the implemented solutions against harmful attacks. Furthermore, attackers always keep changing their tools and techniques. However, implementing an accepted IDS system is also a challenging task. In this paper, Several experiments.

2.6 Evaluation of Machine Learning Algorithms for Intrusion Detection system

Intrusion detection system (IDS) is one of the implemented solutions against harmful attacks. Furthermore, attackers always keep changing their tools and techniques. However, implementing an accepted IDS system is also a challenging task. In this paper, several experiments have been performed and evaluated to assess various machine learning classifiers based on KDD intrusion dataset. It succeeded to compute several performance metrics in order to evaluate the selected classifiers. The focus was on false negative and false positive performance metrics in order to enhance the detection rate of the intrusion detection system. The implemented experiments demonstrated that the decision table classifier achieved the lowest value of false negative while the random forest classifier has achieved the highest average accuracy rate.

3 System Architecture

In this system, we propose a novel deep learning model to enable NIDS operation within modern networks. The model we propose is a combination of deep and shallow learning, capable of correctly analyzing a wide-range of network traffic. More specifically, we combine the power of stacking our proposed Non-symmetric Deep Auto-Encoder (NDAE) (deep learning) and the accuracy and speed of Random Forest (RF) (shallow learning). We have practically evaluated our model using GPU- enabled Tensor Flow and obtained promising results from analyzing the KDD Cup '99 and NSL-KDD datasets. We are aware of the limitations of these datasets but they remain widely-used benchmarks amongst similar works, enabling us to draw direct comparisons.

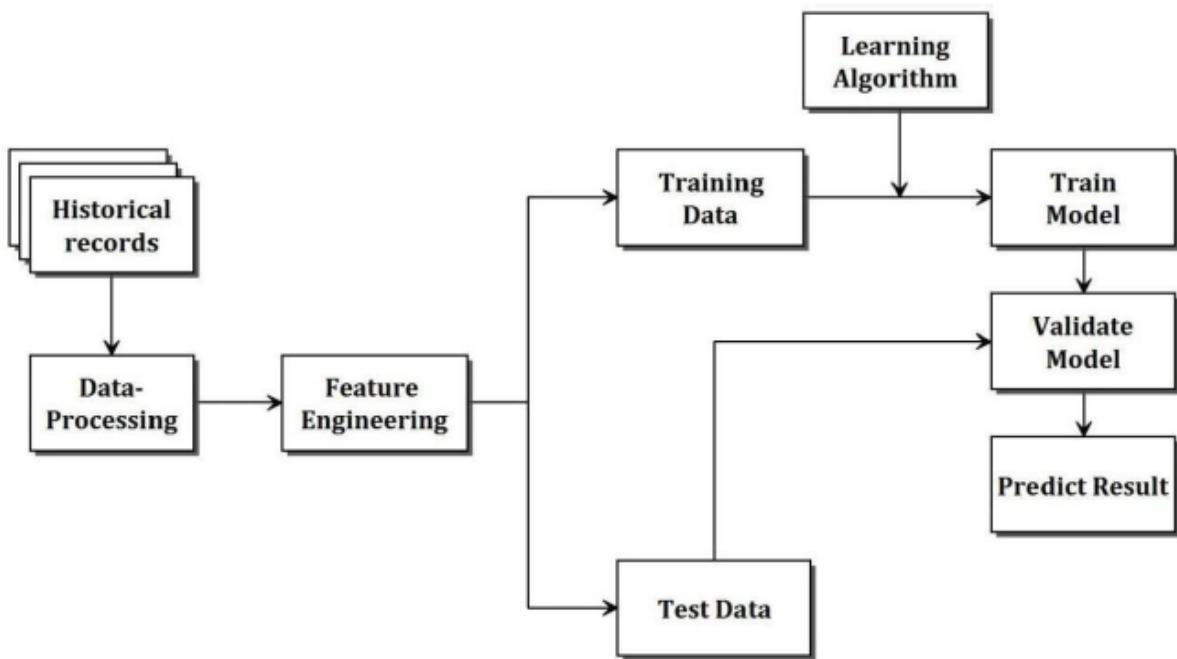


Fig 1: System Architecture

This paper offers the following novel contributions:

- 1) A new NDAE technique for unsupervised feature learning, which unlike typical auto-encoder approaches provides non-symmetric data dimensionality reduction. Hence, our technique is able to facilitate improved classification results when compared with leading methods such as Deep Belief Networks (DBNs).
- 2) A novel classifier model that utilises stacked NDAEs and the RF classification algorithm. By combining both deep and shallow learning techniques to exploit their respective strengths and reduce analytical overheads. We are able to better or at least match results from similar research, whilst significantly reducing the training time.

Data flow diagram

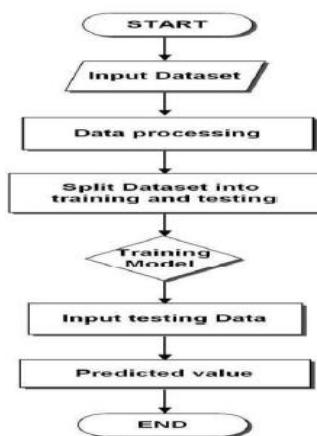


Fig 2: Dataflow diagram

Data collection and preprocessing

In this module data are uploaded into pandas data frame and it will enter into pre-processing to correct the missing data.

Training data and testing data split

Once data are preprocessed this system has to split data into division training data and testing data. Usually training should be large for accurate result.

Training process methodology

In this method the training data set with label has to give to any one of the machine learning technique like random forest, this module will extract the feature from the label data keep it ready prediction process.

Prediction methodology

In this method the test data without label has to give prediction module which generate using training method this prediction module accept the test data and process. Finally it will produce the accuracy module.

Data visualization

This method uses mat plot lib python tool for producing graph from training data as well as testing data set.

4.Results

Test ID	Test Input	Excepted Result	Actual Result	Remarks
T_0 1	upload dataset	Uploaded data has to be stored in data frame.	Uploaded data will store in data frame.	Pass
T_0 2	Cleaning Process	During this process the data in data frame has to be verified and remove the all null values	The data in data frame will be verified and remove the all null values	Pass
T_0 3	Labe ling proces s	During this process the uploaded twits has to labeled whether it is spam or not	The uploaded twits will be labeled whether it is spam or not	Pass
T_0 4	Data splitting	During this process the data set has to split into training and test data set	The data set will split into training and test data set	Pass
T_0 5	Training Process	This process has to read all the training dataset and create valid data model	This process will read all the training dataset and create valid data model	Pass
T_0 6	Testing Process	This process has to read test data and pass it to validation model and display whether the twit is spam or not	This process will read test data and pass it to validation model and display whether the twit is spam or not	Pass

5.Conclusion and Future Enhancement

we have presented different machine learning models using different machine learning algorithms and different feature selection methods to find best model. The analysis of the result shows that the model built using SVM and Random Forest and wrapper feature selection outperformed all other models in classifying network traffic correctly with detection rate of 94.02%.

The intusion detection system exist today can only detect known attacks. Detecting new attacks or zero day attack still remains a research topic for future scope.

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A Survey Of Scanning Techniques For 3D Reconstruction

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ABSTRACT: 3D reconstruction technologies have evolved over the years. In this paper we try to highlight the evolution of scanning technologies. The idea of a survey came up with our decision to look at 3D reconstruction methods. Little has been written about the methods in general, yet many developments have taken place in this area. This survey will prove useful for those intending to embark on research in 3D reconstruction technologies or are considering acquiring a 3D scanner. The survey takes a look at the major reconstruction methods, which are; Laser triangulation, Stereoscopy, Conoscopic holography and Moiré Interferometry. A review of the major producers of scanning technology for 3D reconstruction is also carried out.

KEYWORDS: 3D Reconstruction, Triangulation, Holography, Stereoscopy, Conoscopic holography.

I INTRODUCTION

3D reconstruction methods are classified into passive and active. Passive methods do not involve interaction with the object, whereas active methods use contact or a projection of some form of energy onto the object. Our main focus in this paper is given to the active methods that use the projection of a form of energy onto the objects, light in our case. Active methods involving contact with the object are being phased out due to their slow reconstruction process and the need for less contact with the object to avoid them getting damaged (Curless, B). In this paper, our main focus will be on the optical non contact methods that offer faster reconstructions since they are commonly applied in the manufacturing industry. In the field, the main method used to realise reconstructions is optical laser triangulation. Section two deals with the various methods of 3D reconstruction, whereas section 3 analyses the 3D scanners on the market.

We make comparisons based on the technical specifications provided by the manufacturers. The last section contains a summary of all the results from the survey. Given the importance of faster prototyping in modern industry, one can easily appreciate the amount of time and money that is saved when 3D scanning methods are used. At present many of the leading manufacturing industries have incorporated in their production lines systems for 3D scanning. This has helped increase their productivity and save on the time it takes for a product to be released on the market. On the whole, the benefit of these scanning systems is the improved product quality, time to market and the reduction of the overall production cost.

II RECONSTRUCTION METHODOLOGIES

2.1 Laser triangulation

Laser triangulation is the most common method used in commercial 3D scanners. The principle of operation of Laser triangulation involves the projection of a ray of light over an object in the form of a point. If the object is to be captured by a camera, only a bright spot should be detected. Therefore knowing with precision the relative angle of projection with respect to the base line, it is possible to determine the position of the point in space. The variants of laser triangulation are based on the many ways of projecting and detecting the light rays. In the case of a point source, the whole scene has to be scanned both vertically and horizontally to obtain the depth.

If instead of projecting a point, a line is projected, the depth of all the points on the line can be obtained at the same time. This explains why techniques based on the projection of a line are much faster than the projection of a single point. One may use various methods to project the light onto the scene, each one with its merits and demerits. The precision, the presence of blind spots, where triangulation is made impossible, and the speed of scanning the scene are the principle factors to be taken into account when choosing the kind of technique

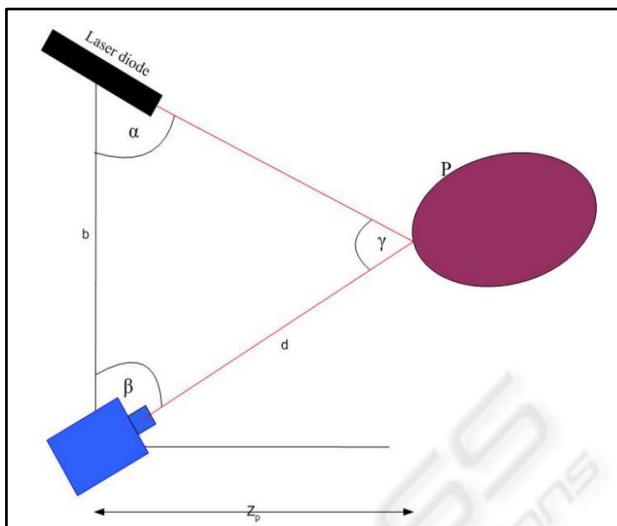


Fig. 2.1 Triangulation setup

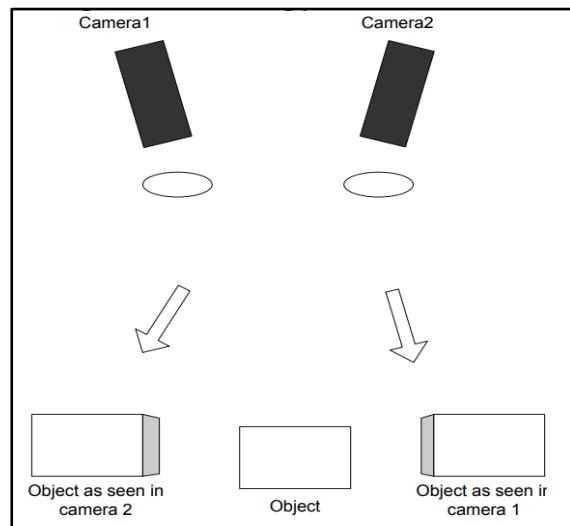


Fig. 2.2 Stereo setup

2.2 Stereoscopy

Stereo vision refers to the ability to deduce information on the 3D structure and distance of a scene from two or more images taken from different viewpoints. The name stereoscopy was given to this method by Sir Charles Wheatstone (Wheatstone, C). Stereo vision involves two processes: the binocular fusion observed by the two eyes, and the reconstruction of the three-dimensional image. The preimage of the matching points can be found at the intersection of the rays passing through these points and the associated pupil centres or pinholes. In a stereo system, we look for correspondences existent between the two images i.e. which parts in both images are projections of the same scene. Having obtained the correspondences, the 3D structure is determined using epipolar geometry. By estimating the disparity between two images, the height of each point is evaluated. The robustness of the process is ensured by modeling and taking into account the geometric nature of the elements observed.

As was mentioned above, stereo vision involves the matching of points observed in two images captured by two cameras. This matching is done using epipolar geometry. Epipolar geometry involves the observation of a single point in two images and relating the coordinates in each of the images. (Owen, R)

2.3 Holography

Holography is a technique by which a wave front can be recorded and subsequently reconstructed in the absence of the original wave front. The method was proposed and demonstrated by Gabor in 1948 long before the laser came into existence. Observation of this reconstructed wave front gives exactly the same physical effect as the observation of the original wave front. On illuminating the scene after removing the object, a three dimensional image is observed as though the object was still present. Leith and Upatnieks were the pioneers in applying holography to three dimensional imagery way back in 1964. This depended largely on the availability of the HeNe laser, which had an excellent temporal and spatial coherence (Goodman, C).

Coherent light illuminates the scene of interest. A portion of the light is reflected from a mirror onto the photographic plate. This reflected light serves to form the 3D hologram of the object on the photographic plate by interfering with the light rays from the object. The reconstruction of the scene is carried out as follows; there are two possible configurations, one giving the virtual image and the other giving the real image. To obtain the virtual image, the object is removed from the setup in figure 3a) and the photographic plate is illuminated by the same light source that was used while capturing. A virtual image of the object results as can be seen in Figure 3b). Lastly, if the photographic plate is illuminated from the opposite side i.e. different from the one that was used to capture the hologram, a real image of the object can be observed. These images both virtual and real are used in the reconstruction of objects in three dimensions (Goodman, C).

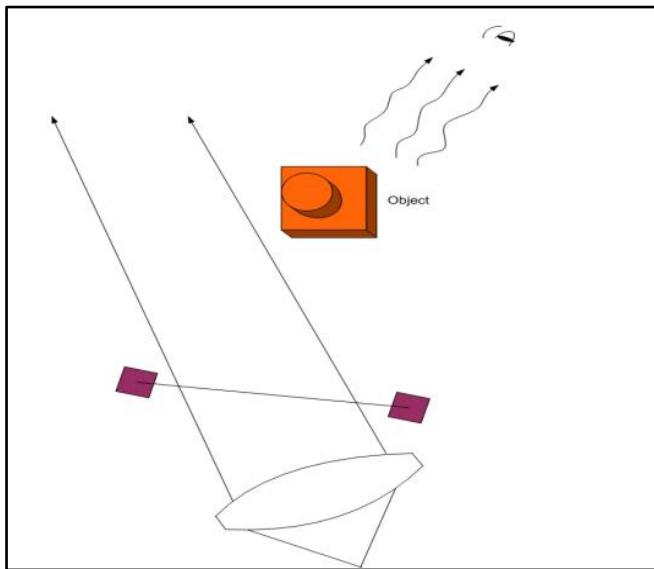


Fig. 2.3 Holography Observing the real image

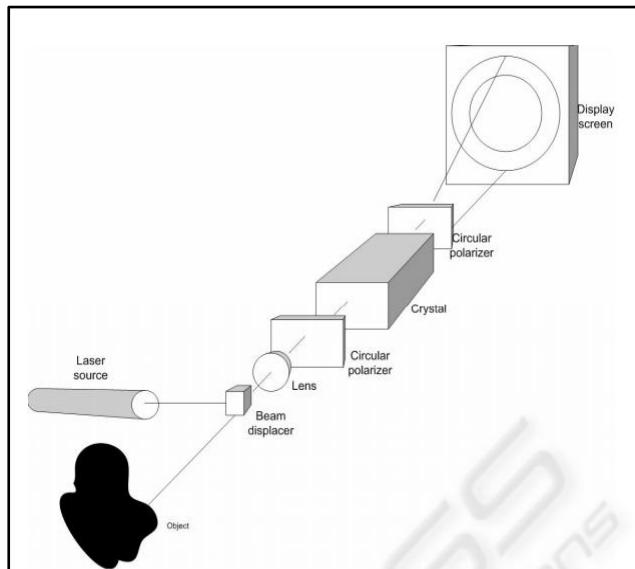


Fig. 2.4 Conoscopic holography setup

2.4 Conoscopic holography

Conoscopic holography is a relatively new non contact method used to reconstruct objects in three dimensions. It was discovered by Gabriel Sirat and Demetri Psaltis in 1985 as a modification to coherent holography for three dimensional data recording and imaging (Sirat, G., Psaltis, D., 1985). It is based on the propagation of light in anisotropic crystals. The property that enables the crystal to split the light rays into ordinary and extraordinary rays is referred to as birefringence. Birefringence is a property of certain crystals, which when a ray of light travels through their different optical axes, travels at different velocities. This behaviour is characteristic of anisotropic crystals given that they possess varying indices of refraction caused by the nature of the crystal lattice. Having split the light ray into an extraordinary and ordinary beam they are made to interfere thus and give measurements of high precision

2.5 Moiré Interferometry

The term Moiré refers to an irregular wavy finish usually produced on a fabric by pressing between engraved rollers. In optics, it refers to a beat pattern produced between two gratings of approximately equal spacing. Moiré is a technique to study strains and deformations of structural elements with very high accuracy. It requires a highly stable environment and has mainly been a laboratory tool. Recently attempts have been made to develop a 3D scanner that uses moiré interferometry (Dubowsky, S.). The method can be grouped under two major classifications that depend on the optical arrangement used: projection and shadow. Projection moiré involves the projection of a matching pair of gratings. The projection grating is placed in front of the light source and the reference grating is placed in front of the camera. The projected beam light is amplitude modulated with the pitch of the grating. When the beam falls on the surface of the object, the phase of the spatial carrier is modulated by the shape of the object surface.

The reference grating is phase shifted against the projection grating. Shadow moiré involves positioning a grating close to an object and observing its shadow on the object through the same grating. Moiré is considered a very good method for 3D reconstructions because it amplifies small errors, thus enabling their detection. It requires less computer time, and so has a great potential for rapid online registration and inspection.

The parameters of a moiré can easily be changed. Moiré however has not been fully exploited owing to the difficulties encountered in designing and adjusting a system based on it. In moiré interferometry, light is projected onto an object's surface through two equally spaced fringes. The resulting patterns are viewed at an angle different from that at which the fringes are projected. The contour interval depends on the spacing of the fringes projected on the surface and the projection viewing angle. A detailed mathematical analysis of the formation of the moiré fringes may be found in (Creath, K., Wyant, J.).

III. COMPARISON OF 3D SCANNERS IN THE MARKET

The manufacturers of 3D scanning equipment can be grouped in three categories; those that provide the hardware, those that write the software and those that implement both systems. We looked at the leading manufacturers of 3D scanners and this enabled us to make a comparison of their various products. Given that these use different technologies these results are not easily compared since we have to identify uniform parameters for comparison in each of the methods. Owing to the variations in software available on the market, the survey has been limited to the comparison of the hardware and its performance. Definitely their performance depends greatly on the software, but that will be dealt with in another article. The providers of scanners that we have been able to identify that use each of the various technologies for 3D reconstruction are diverse. A look is taken at those who provide the datasheets on their products. Using these, a comparison of similar parameters is carried out to come up with unbiased conclusions. The scanners are commercial, implying that we have had to rely on the information provided by their manufacturers, as it is close to impossible to have all scanners in the university laboratory considering their high cost.

Company	Type scanner	Scanning technique	Working range (mm)	Speed (points/second)	Accuracy (mm)	Type of surface
Konica Minolta	Vivid 700	Triangulation	600-25,000	n/a	0.11	Diffuse
Optimet	Conoline	Conoscopic holography	45	4,000	0.047	Diffuse to shiny
3D Scanners	MMZ Laser	Triangulation	50-150	n/a	0.1	Diffuse
Opton	Mini Moire scanner	Moiré interferometry	15	150,000	0.025	Diffuse to shiny
Roland DGA	Pix30 Laser	Triangulation	0.2-406	n/a	n/a	Diffuse
3rdTech	Deltasphere 3000	Time of Flight	300- 12,000	25,000	n/a	Diffuse
IQ instruments	CMMaster	Moiré interferometry	n/a	80,000	< 0.025	Diffuse to Shiny
Nub 3d	SIDIO	Laser Triangulation	700		0.08	Diffuse
Coherix	Shapix	Phase shifting interferometry	450	17,476	< 0.02	Diffuse to shiny
Geodetic systems	Vstars(E4X)	Stereoscopy	n/a	n/a	0.008	Diffuse
Faro Technologies	Faro laser scanner	Interferometry	120,000	120,000	0.025	Diffuse to shiny
Brueckmann	OptoTOPHE	Structured light	25-400	1,555,555	0.045-0.45	Diffuse
Perceptron	Scanworks	Laser Triangulation	23-71	23,040	0.035	Diffuse

Table 3.1: 3D Scanners' parameters.

The parameters taken into consideration were; the operating range, accuracy, speed of capture, and the types of surfaces. Each scanner will be compared with a series of cameras in the same range. This will be followed by a comparison of the results from other scanning techniques. The survey looked at products from the following companies: 3D Scanners

(MMZ), Konica Minolta (VIVID 700), Optimet technologies (Conoline), Opton formerly EOIS (Moiré scanners), Roland (Pix 30) among others. Table 1. shows these parameters in several commercial scanners. Judging from the results presented, several observations about the various technologies can be made. Laser triangulation is the commonest method used in 3D scanners, as seen in the table most scanners use triangulation. The reasons that are put forward for its popularity are; it's easy setup, its low cost as compared to other methods, its speed which enables real time scans and reconstructions on the production line. Laser triangulation is limited when very high precision and accuracy are required. It is also marred by speckle and inability to scan reflective surfaces. Stereo is passive and does not emit any radio or light energy.

Recording on site can be done very fast and as such it can be used on-line. However, the matching of the points in the two images captured by the cameras in stereo is tedious. Whereas they can adjust for component size, stereo cannot easily accommodate free form surfaces. In addition, the requirement for one of the two cameras to be fixed at a specific angle restricts the inspection region and presents difficulty in inspecting the entire component. The scene has to be rigid to begin reconstruction which makes it difficult for on-line implementation. Moiré is considered a very good method for 3D reconstructions because it amplifies small errors, thus enabling their detection. It requires less computer time than other methods like laser triangulation during capture, once it has been properly set up, and so has a great potential for rapid on-line registration and inspection. The parameters of a moiré can easily be changed. Moiré limitations can be cited in the difficulty in its design and in adjusting the setup to capture data. Its very high precision makes the acquisition costs extremely prohibitive (Dubowsky , S).

Holography performs much better than laser triangulation when it comes to precision and accuracy. Readings of up to several microns can be taken. However it is limited as far as speed is concerned. A lot of precaution has to be taken when recording the holograms since lengthy exposure requires a high level of stability in order to obtain good results in the processing. The range for recording the holograms also has to be well chosen in order to get a good reconstruction. Holography has not been fully taken on in industry in spite of being very accurate, given the complication in adjustments that have to be made while taking readings. Conoscopic holography being a modification to holography sorts out the speed problem. It features a high precision in its readings and reconstructions of up to 47 microns using an objective of focal length 100mm. The accuracy and range depend on the objectives used on the conoline. Conoscopic holography has clearly enabled holography to be applied to the manufacturing industry. Of the benefits we are able to note using the conoline is the ability to measure several surfaces and reach an angle of incidence up to 85°, which not many methods are capable of doing. Conoscopic holography could still benefit from an increase in its speed of capture in order to be adapted to more real time applications. (Optimet)

IV. CONCLUSION AND FUTURE WORK

This paper provides a comprehensive survey of the past five years developments in the field of image-based 3D object reconstruction using deep learning techniques. We classified the state-of-the-art into volumetric, surface-based, and point-based techniques. We then discussed methods in each category based on their input, the network architectures, and the training mechanisms they use. We have also discussed and compared the performance of some key methods.

This survey focused on methods that define 3D reconstruction as the problem of recovering the 3D geometry of objects from one or multiple RGB images. There are, however, many other related problems that share similar solutions. The closest topics include depth reconstruction from RGB images, which has been recently addressed using deep learning techniques, 3D shape completion, 3D reconstruction from depth images, which can be seen as a 3D fusion and completion problem, 3D reconstruction and modelling from hand-drawn 2D sketches, novel view synthesis, and 3D shape structure recovery. These topics have been extensively investigated in the past five years and require separate survey papers.

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A Comprehensive Study On CloudComputing Paradigm

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ABSTRACT: Cloud computing is regarded as massively scalable, an on-demand configurable resources computing model and is one of the latest topics in the information sector. It offers the cloud infrastructure in a distributed rather than dedicated infrastructure where clients can have full access to the scalable, reliable resources with high performance, everything is provided to the clients as a utility service over the internet. Data generated by IoT tagged objects is high, cloud is key to store the unpredictable data generated by these tagged devices and it is the forward stepped towards the green computing, it eliminates the setups and installation steps as the cloud client accessing the hardware resources co-exist on different platform in distributed way, Energy optimization, reduction in excessive heat and power consumption in cloud environment differentiates it from the traditional computing, which greatly proves to be the eco-friendly.

KEYWORDS: Cloud Computing, On-demand, Distributed, Dedicated, Utility, Energy Optimization, Eco- friendly

I. INTRODUCTION

As the academic research is dynamic in nature, so the conceptual terms, frameworks and definitions are not finite, different authors put forward different opinions on cloud computing terminologies. Gartner's cited definition as Cloud computing is a style of computing where adaptable and versatile information technology - empowered capacities are given as an administration to numerous outside clients utilizing Internet advances. Cloud computing is a ubiquitous paradigm where everything offered to the cloud client is treated as service and it is regarded as a utility computing model which offers the wide range of services to the users on-demand bases in a distributed fashion, due to its versatility, agility both medium and large-scale emerging and developing technologies are adopting the cloud. As per the definition provided by the National Institute for Standards and Technology (NIST) "cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction".

II. CLOUD COMPUTING EVOLUTION

Every entity that is being part of a system is having a definite evolution, As far as Cloud Computing is concerned, there is no exact date which mentions the evolution of it, However in 1960s, John McCarthy, Douglas Parkhill, and others explored the idea of computing as a public utility, because of the existence of mainframe computers, during that period, the clients were accessing the central computing power through dummy terminals, which enable the clients to access the mainframe computer. With high cost and maintenance, it was not feasible for the organizations to buy these critical resources, and was the most challenging task for the big companies and organization to stay in the business market, and then there arose the concept of shared access to the single computing system in order to save the cost of buying separate machines. Evolution in Information Technology is not all of a sudden process rather it is a step-by-step transformation that brings a lot to cherish for organizations, companies. IBM launch the operating system in 1970 known as Virtual Machine (VM), this enabled the companies and organizations to run their operations on the operating systems simultaneously on more than one system with own memory and processing unit, VM became the initial phase towards the evolution of new technology known as Virtualization, collective collaboration of different computing platforms like Centralized, Parallel, Cluster, Distributed and Grid Computing gave birth of today's most talked computing paradigm known as Cloud Computing.

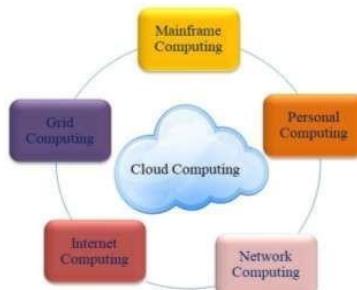


Figure.1 Cloud Computing Evolution

III. CLOUD SERVER MODELS

Software-as-a-Service (SaaS): It is a software distribution model where a third-party provider hosts applications and makes them available to customers over the high-speed internet connection.

Platform-as-a-Service (PaaS): It is a middle layer which gives the organizations, institutions or companies a freedom and framework for developers to develop their own applications and deploy them and make customers within their company to access the resources.

Infrastructure-as-a-Service (IaaS): Infrastructure is most vital among the three service models because it is the basic need to launch the organization's services over the internet in a cloud platform, to make their services available to clients and applications to run them smoothly.

IV. CLOUD COMPUTING DEPLOYMENT MODELS

Public Cloud: The cloud services are easier to install and less expensive or even charge free, the applications, hardware and bandwidth are provided by the service provider, and are scalable, the user can only those services that they are interested.

Private Cloud: As the name suggests, its services, infrastructure is solely operated and maintained by an organization. The services are made available on proper authentication, priority is being given towards the client's data security.

Community Cloud: Here the cloud resources are shared by an organization which is of common interest for every participant which is being part of a community, whose needs are similar.

Hybrid Cloud: It is a combination of two or more cloud deployment models like (public, private, community) it enables cloud application portability, multi-tenant, resource sharing.

V. CLOUD COMPUTING CHARACTERISTICS

On-demand self-service: A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically.

Measured service: Public cloud providers like Amazon allow companies to avoid large upfront infrastructure investment, so the small companies can afford the workloads as per their requirement.

Broad network access: Capabilities are available over the network that promotes use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).

Rapid elasticity: Capabilities can be elastically provisioned and released, scale rapidly outward and inward commensurate with demand dynamically.

Resource pooling: The resources like storage, servers, memory, Processing Unit, Network and virtual machines can be pooled and utilized by multi-tenant fashion with dynamically provisioning and de-provisioning of resources.

VI. NIST CLOUD COMPUTING ACTORS

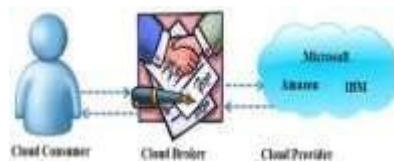
The NIST based reference model of cloud computing explains the major participants, their actions and functions, essentialities, uses, characteristics and standards of each participant in cloud paradigm. It defines five major actors in cloud architecture i.e. cloud consumer, cloud provider, cloud carrier, cloud auditor and cloud broker. Every individual participant is an entity that participates in any cloud-based transaction, processor, performs tasks in cloud computing. The architectural structure of cloud is the combination of the cloud services and deployment models with pre-defined essential characteristics of cloud reference model are given in the below-given cloud reference model. Some of the entities based on participation in cloud computing are as;

Cloud Provider: An entity or an organization that plays role in making any cloud service available to the desired party.



Cloud Consumer: An entity or an organization that is responsible for maintaining a business relationship uses service from Cloud Providers.

Cloud Broker: An entity responsible for the usage, performance and delivery of cloud services, facilitates relationships among the other participants.



Cloud Carrier: It acts as an intermediary between Cloud Providers to Cloud Consumers, provides connectivity and transport of cloud services from.



Cloud Auditor: An individual which can make independent assessment of cloud services, information system operations, performance and security of the cloud implementation



VII. WHY CLOUD COMPUTING

Cloud Computing is an internet network-based computing where the clients can access their resources remotely across the globe in a distributed manner, can upload and download the vital documents from cloud server and to their physical machine on the go with ease and comfort. What if, the social sites i.e. Facebook, Twitter, WhatsApp, Instagram, Snap chat, Wechat users on updating the statuses, photos, videos have to store them on their individual physical machines, another same case is about e-mails, balance sheets users have to store them on their personal computers and mobiles, what would be the possible scenario, simply will face storage limitations, So Cloud is the solution to this unfavorable situation as it offers them unlimited cloud-storage where they can store the information hassle free, As 24x7 hours availability, Clients can access, make an updation or deletion of their resources with some web applications hence can manage the workloads accordingly. Most of the companies, organizations, small or large scale industries are adopting the cloud as it an efficient way of computing and offers the more and more benefits. The cloud computing characteristics, provides the clients on demand services were clients are at their own will when to use and release the services, and can manage their resources with a remote access anytime from anywhere on the globe with high-speed bandwidth network, the pay as you grow feature of cloud is the most exciting one where only availed and used services are charged, clients can hold resources and any point of time can release them when no further needed.

Secure Storage Management: the data stored and accessed over the cloud is being provided with the high secure authentication mechanism so that unauthorised emendation is not possible.

Pay as you Grow: the rented service are liable to charge, the cloud client is at its ease to pay for only utilized services, can shrink and expand the resources as per the requirement.

Sustainability: the sustainability the endurance of cloud environment is one of the exciting features, remain diverse and productive infinitely

Reliable: cloud computing is a reliable computing paradigm where clouds can trust and rely on the services offered by cloud provides enormous services to cloud clients, as reliability is

Scalability: resources can be scale-up and scale-down at any point in time because of the auto-scaling methods.

Utility Computing: offers services and infrastructure are rented to the cloud client only when need and charges as per the services availed with efficient use of resources and minimize the costs.

Availability: Cloud possesses the property of being available 24X7 hours. The availability feature makes cloud every organization their first choice to run the business. The e-commerce giants like Amazon, Flipkart, and Snapdeal etc. are dependent on the availability of cloud.

VIII. CLOUD COMPUTING ADVANTAGE

Cloud Computing is an attractive and exciting paradigm that comes with innumerable benefits, its flexibility, agility and advantageous features make it the first priority to adopt it. Some of the advantages are as;

Desirable Costs: Using cloud it allows the cloud clients to avoid investing larger expenditure on the infrastructure like hardware and their up-gradation. It improves the cost efficiency of providing the choice and plan of utilizing the cloud services.

Flexible with Demand: the demands are unpredictable, the cloud offers ease to cloud clients to avail the services like infrastructure, software and platform as the demand arises, in order to match up the required demands of users, Resources can be withdrawn any point of time when no more required.

Smooth Running of the Business: Cloud provides the infrastructure 24x7 and monitors it at the back end. Cloud maintains and monitors the infrastructure so that the client may not suffer. Keeps the data safe and secure so that the customer's business runs smoothly. The cloud service providers offer the flexible IT resources so that different project of a business unit can be deployed in a jiffy.

Enhanced security mechanism: The survey reports conducted on cloud computing highlighted the security concern on the first priority. Security is the biggest challenge that cloud is facing, but with highly encrypted algorithms, the Cloud Customers can be worry free as the service providers provide the resiliency and agility at the infrastructure levelin order to minimize the security risk factors, any fluctuation or compliance issues, the service providers handle it without the intervention of cloud users.

Performance: Most of the cloud service providers are giving attention towards the availability and neglecting the performance. It is a good idea for the companies to include the performance requirements in an SLA contract with a service provider, the companies have to keep regular checks on it and if any violation, should be brought in to the consideration for further improvement.

Scalable Storage: The storage is no more a limitation when clients are using cloud platform and they don't have to buy now the blocky and costly hardware components like servers and storage devices etc. Scalability is the unique feature of cloud computing where dynamic provisioning of the resources is being done by the clients themselves within the real-time slice.

Mobility: Mobility provides the cloud with the "on the go" feature. It makes cloud easy to operate from anywhere on the globe and clients can access their applications and other resources from various devices like smartphones, tabs, desktops etc.

High-speed bandwidth: As the cloud is related to the internet so in order to run smoothly and without the interrupts, high-speed bandwidth is more important. This feature can be achieved if and only if cloud service providers provide the clients with high-speed bandwidth, due to this high amount data can be transferred. As the networks are enhanced and improved the speed and bandwidth flaws are much better than everbefore.

Backup and Disaster Recovery: Gone are the days of tape back-up where clients used to store their vital data. The cloud vendors provide their clients platforms back up data, at any point in disastrous situations, the vendorsoffer them the ease to recover their lost data anytime.

IX. CLOUD COMPUTING LIMITATIONS

Since the use of the Internet connection to both applications and documents, so without a high-speed internet connection, access to the resources is not possible. Some of the limitations of cloud computing are as;

- i. Cloud computing cannot run without the internet connection.
- ii. Lack of technical support, sometimes if cloud provider's server is unavailable, it can damage ones workprogress.
- iii. Slowness, unreliable Internet connection is not sufficient to access the cloud services. Accounts hacking is one of the worst scenarios of cloud computing.
- iv. Malware violations are undetectable as the malicious software as a valid SaaS, once run these software harmand damage the cloud clients vital data.
- v. Data Breaching is also common in cloud computing which can be fatal in nature.
- vi. Insecure API's, abuse of cloud services, denial of service attacks and insufficient diligence are some otherflaws of Cloud Computing.
- vii. QoS is the matter of concem as cloud offers tremendous advantageous features to their clients, but QoS is notmaintained properly.

X. CONCLUSION

By Cloud computing is an emerged trend as a combination of many already existing computer technologies like the internet, networking, operating systems, hardware, software, middleware, virtualization, multi-tenancy, etc. On integration, it gets maximum utilization these technologies. It is finding the place in every aspect of life, it is empowering the business of small and large-scale companies, organizations, by providing them with the platform where they can run their services with fewer charges and get maximum benefits. As said, "two sides of a coin", cloud computing is having advantageous features but it also brings with it, lots of challenges, these challenges are proving to be disastrous, damaging the vital data the cloud service users. The data in Cloud Vendors Data-centers are very sensitive and need to be provided full proof security measures. Some of the exciting features like load balancing, scalability, and energy optimization are topics of much interest.

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Survey on Early Detection of Diabetic Retinopathy

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ABSTRACT: Visual perception is very important for human life. Although several medical conditions can cause retinal disease, the most common cause is diabetes. Diabetic Retinopathy (DR) can be identified using retinal fundus images. Detection and classification of deformation in Diabetic retinopathy is a challenging task since it is symptomless. Several algorithms were analyzed for the identification of abnormality. The analysis of different models in detecting the abnormalities from the image is done which includes various preprocessing techniques to standardize the image and post-processing techniques are applied for morphological adjustments, segmentation algorithms for segmenting the Lesion of Interest(LOI) namely white lesions and red lesions, further feature extraction methods extracts the features like Micro Aneurysms, Hemorrhages, Exudates and Cotton Wool Spots and so on finally, classification methods were utilized which concludes the presence or absence of DR symptoms along with the severity based on the count of the features extracted in the given retinal image. This survey study aims to develop a novel algorithm to identify and detect types of above mentioned diseases and find out the severity of those diseases also examine with 100% accuracy.

KEYWORDS: Diabetic Retinopathy; Micro Aneurysms; Hemorrhages; Exudates; Cotton Wool Spots; Lesion of Interest.

I. INTRODUCTION

According to WHO, in the year 2000, Diabetes Mellitus (DM) has affected over about 31.7 million people in India and this statistics is estimated to rise up to 79.4 million by 2030. Most of the population of the world in their working age might suffer from diabetes which is caused by aging and growth, physical inactivity and increase in obesity level. Based on the level of production of insulin, there are two types of Diabetes i.e. Type 1 and Type 2 which can be tested by fasting plasma glucose (FPG) test or the A1C (Hemoglobin A1c) test. Diabetic Retinopathy (DR) is a general term used to express vascular problems in the retina of the diabetic patients. A significant portion of people having Type 1 and Type 2 diabetes suffer from a silent eye blindness disease known as Diabetic Retinopathy. In this disease, the blood vessels of the eyes might be damaged due to high blood sugar level. Since vision is gradually reduced in most cases, early diagnosis of diabetes can increase the chance of preventing blindness and blurred vision. Here, CNN based image processing is used. The convolution neural network (CNN) is a class of deep learning neural networks. CNN's represent a huge breakthrough in image recognition. They are most commonly used to analyse visual imagery and are frequent working behind the scenes in image classification. A Convolutional neural network (CNN) is a neural network that has one or more convolutional layers and is used mainly for image processing, classification, segmentation and also for other auto correlated data.

II. LITERARY REVIEW

Muhammad Mateen, Junhao Wen , Nasnullah Nasnullah,Song Sun, and Shaukat Hayat (2020) published paper titled "Exudate Detection for Diabetic Retinopathy Using Pretrained Convolutional Neural Networks"

has proposed framework, three well-reputed pre-trained network architectures are combined together to perform feature fusion, as different architectures can capture different features. The outcomes are a pre-trained convolutional neural network- (CNN-) based framework is proposed for the detection of retinal exudates in fundus images using transfer learning.

Sugasri.M, Vibitha.V, Paveshkumar.M, Sree sanjanaa Bose.S (2020) published paper titled "Screening System for Early Detection of Diabetic Retinopathy" has proposed Image VKRZV following method of applying image processing which includes image acquisition, pre-processing like filtering(Median/Wiener/Gaussian), contrast enhancement and outcomes are the finding of optic disc is made by means of skin locus techniques, blood

vessel segmentation and exudates detection by means of intensity computation, thresholding, and feature extraction .The exudates are classified with the help of SVM classifier.

Anjan Nikhil Repaka, Sai Deepak Ravikanti, Ramya G Franklin (2019) published paper titled “Design And Implementing Diabetes Disease Prediction Using Naives Bayesian” has proposed the research focuses on Diabetes disease diagnosis by considering previous data and information. To achieve this (Smart Diabetes Disease Prediction) is built via Navies Bayesian in order to predict risk factors concerning Diabetes disease. The outcomes are good results with accuracy, doesn’t handle the emergency cases, and it’s a Standalone solution. Latha R, Vettrivelan P (2019) published paper titled “Blood Viscosity based Diabetes Disease Risk Prediction Model in Edge/Fog Computing”. In this paper, Diabetes disease prediction modeled using partially observable markov decision process (POMDP) is proposed. In emergency, the patient is alerted through the doctor by fog computing. Ambulance sent to the location of patient at critical situations. The doctor gets the data through fog computing iFogSim. The outcomes are it handles the emergency cases, It’s a standalone solution, consumes lot of server resources.

Abderrahmane Ed-daoudy, Khalil Maalmi(2019) published paper titled “Real-time machine learning for early detection of Diabetes disease using big data approach”. This paper propose a real time Diabetes disease prediction system based on apache Spark which stand as a strong large scale distributed computing platform that can be used successfully for streaming data event against machine learning through in-memory computations. The outcome are scalable to any extent, it’s a standalone solution.

Sayali Ambekar, Rashmi Phalnikar (2018) published paper titled “Disease Risk Prediction by Using Convolutional Neural Network”. To overcome the problem of missing medical data, this paper perform data cleaning and imputation to transform the incomplete data to complete data. They are working on Diabetes disease prediction on the basis of the dataset with help of Naïve bayes and KNN algorithm. The outcomes are this method is applicable for patients with missing medical data, doesn’t handle the emergency cases, it’s a standalone solution

III. CONCLUSION

An MLmodel which accepts a retina image as an input and outputs the analysis of the retina for the diabetes. A web service layer which exposes this model to the outside world for integration with the third party app. A prototype application to demonstrate the integration of model with the third party application. This technique can be promising for the pre-detection of DR without any involvement of an expert doctor and hence will save both time and money (0-No DR, 1-Mild, 2-Moderate, 3-Severe,4-ProliferativeDR). In this project, CNN based image processing is used which exploits the knowledge of Computer Science and Biomedical Engineering to identify whitish lesions ,cotton wool spots and hard exudates associated with DR. Based on the value of pixel counts, the image of the patient’s eye under examination is classified as a Diabetic Retinopathic eye or a Non-Diabetic Retinopathic eye. This technique can be promising for the pre-detection of DR without any involvement of an expert doctor and hence will save both time and money.

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Pneumonia From Chest X-Ray Convolutional Neural Network

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ABSTRACT: Corona Virus continues to possess its effects on people's lives across the world. The screening of infected persons is a vital step because it is fast and low-cost way. Chest X-ray images play a major crucial role and it is used for examination in the detection of CORONA VIRUS(COVID-19). Here radiological chest X-rays are easily available with low cost only. In this a survey paper, we are using a Convolutional Neural Network(CNN) based solution that will benefit in detection of the Covid-19 Positive patients using radiography chest X-Ray images. To test the efficiency of the solution, we are using public available X-Ray images of Corona Virus-Positive cases and negative cases. Images of Positive Corona Virus patients and pictures of healthy person images are divided into testing images and trainable images. The solution which we are providing will give good results in classification accuracy within the test set-up. Here we are going to develop a GUI application for medical Examination areas. This GUI application can be used on any computer and performed by any medical examiner or technician to determine Corona Virus positive patients using radiography X-ray images. The result will be shown or provided by this application is really fast and done within a few seconds. **Keywords:** Deep Learning, CNN, Convolutional neural networks, Deep CNN, Detection

KEYWORDS: Deep Learning, CNN, Convolutional neural networks, Deep CNN.

I. INTRODUCTION

The risk of Covid-19 is immense for many, especially in developing nations where billions face energy poverty and rely on polluting forms of energy. The WHO estimates that over 4 million premature deaths occur annually from household air pollution-related diseases including Covid-19. Over 150 million people get infected with Covid-19 on an annual basis especially children under 5 years old. In such regions, the problem can be further aggravated due to the dearth of medical resources and personnel. For example, in Africa's 57 nations, a gap of 2.3 million doctors and nurses exists. For these populations, accurate and fast diagnosis means everything. It can guarantee timely access to treatment and save much needed time and money for those already experiencing poverty.

In recent times, CNN-motivated deep learning algorithms have become the standard choice for medical image classifications although the state-of-the-art CNN-based classification techniques pose similar fixated network architectures of the trial-and-error system which have been their designing principle. U-Net, Seg-Net, and Cardiac-Net are some of the prominent architectures for medical image examination. To design these models, specialists often have a large number of choices to make design decisions, and intuition significantly guides manual search process. Models like evolutionary-based algorithms and reinforcement learning (RL) have been introduced to locate optimum network hyperparameters during training. However, these techniques are computationally expensive, gulping a ton of processing power.

CNNs have an edge over DNNs by possessing a visual processing scheme that is equivalent to that of humans and extremely optimized structure for handling images and 2D and 3D shapes, as well as ability to extract abstract 2D features through learning. The max-pooling layer of the convolutional neural network is effective in variant shape absorptions and comprises sparse connections in conjunction with tied weights. When compared with fully connected (FC) networks of equivalent size, CNNs have a considerably smaller amount of parameters. Most importantly, gradient based learning algorithms are employed in training CNNs and they are less prone to diminishing gradient problem. Since the gradient-based algorithm is responsible for training the whole network in order to directly diminish an error criterion, highly optimized weights can be produced by CNNs.

II. PROBLEM DESCRIPTION

In efforts for regulating spreading of corona virus, an outsized percent of suspicious cases need to be examined for correct medication and quarantine. Pathogenic research government facility testing provides highest accuracy outcome, even though sometimes it predicts wrong or negative results [4]. Fast & accurate techniques are badly required to overcome this pandemics situation. During this pandemic situation creating model that diagnos is covid gives more advantages to us for following social distance ,as covid virus attacks epithelial cells that are present in respiratory tracks of lungs , we thought of creating model that identifies these cells and predict he is positive or not [3]. Here the model would extract the features like identifying these cells , So giving results even faster than pathogenic test So by increasing the chances of saving life's and time to control the disease by predicting the person results faster than before. After doing survey we concluded on using Deep Convolutional Neural Network (DCNN), a model that mainly focus on classifying radiography X-ray images by using classification techniques of Deep Leamung [5]. As the project main motive to save life's, accuracy takes important role for doing this, so by adding more X-ray images for training the model and performing more iterations on the model ,the Deep Convolutional Neural Network(DCNN) accuracy are often improved more for the model [1].

III RELATED WORK

The process of identifying and detecting COVID virus has become more importance all-around the world for some months. Covid virus has taken the first place for spreading so fast that has become hard to control .Covid has become so hard for detecting as the person are not showing symptoms immediately. Thus it is more important to find new methods to differentiate the covid positive people with normal people to eliminate the possibility . Artificial Learning can be used to examine a person for COVID-19 as an alternative to traditional time-consuming and expensive methods [4]. Even'tho there are many papers on covid virus ,this paper is focused on detecting covid virus using Artificial Learning classification techniques using X-ray pictures and predict the people is positive to covid virus or not. Several research areas have implemented Artificial Intelligence. One of the most advantages of AI is that they are often implemented during a trained model to classify unseen images [3]. In this study, Artificial Intelligence was used to detect whether a patient is positive for covid-virus by analysing their lungs X-ray pictures [3]. Artificial intelligence can also be used to predict the status of person like he is positive to covid or not by using existing evidence. Thus, predicting possibilities within the immediate future can help authorities to adopt the required measures. Wynants et al. mainly stressed on 2 important concepts: the first concept is to get idea of techniques that are used to diagnos is the covid –virus and the second concept is to forecast the number of cases that can come in upcoming days. The paper also suggests that existing models are delicate and unpredictable.COVID-19 Diagnosis Using Deep Leamung, the advantages of Machine Leamung (ML) are increasing quickly in various fields such as malware detection, mobile malware detection, medicine, and knowledge retrieval. Deeplearning algorithms enable computational models composed of multiple processing layers to find out data representation through several abstraction layers. They trained a computer model to perform classification tasks directly from pictures. According to LeCun et al., deep-leamung models feature high accuracies and may improve human output in certain instances [2].

IV. MATERIALS AND METHODS

a) Data Collection

To validate the proposed method, we require two types of chest related x-ray images they are common xray image and the other one is covid affected patient x-ray image [1]. While chest X-ray images of common category had been collected from a GitHub or from Kaggle dataset which contains some images selected from Chest X-ray dataset. Granting them in a notable number of infected COVID-19 patients universally, but chest x-ray images that are accessible online are not mostly significant and dispersed. Kaggle chest Xray data is a far-fetched popular database containing chest X-ray images of normal or healthy, viral, and bacterial- pneumonia.

Positive and negative CORONA VIRUS images were acquired in open available resources. Lungs X-ray images for regular and effected with pneumonia were used from this gathering to generate the up to date database collection.



Fig:- Sample Dataset X-ray images

b) The CNN architecture

This model aims to organize a given chest X-ray image into common or COVID-19 category which contains few various stages gathering, pre-processing, feature selection, feature extraction, training [4]. The detailed information of each stage has been in the following sections. The first stage is gathering, in this process we can collect the overall x-ray images in which it consists of both covid and non-covid x-ray images [6]. Preprocessing refers to all transformation of the image before it is fed to the machine, training a CNN on the images. The Techniques Provided in Data Pre-processing. Data Cleansing. Cleaning “dirty” data [2]. Realworld data tend to be incomplete, inconsistent and noisy. Data Integration, combining data from multiple sources, Data Transformation. Constructing data cube, Data Reduction. Reducing representation of data set [5]. Data which tends to be incomplete leads to inconsistency and noise that affects the remaining part of the data containing x-ray attributes. Data cleaning can be adopted to resolve these issues.

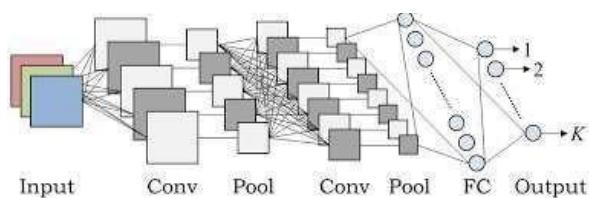
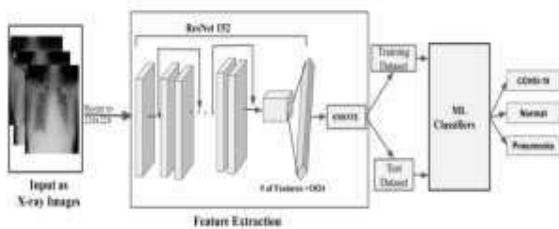


Fig:- Architecture of CNN

A selection algorithm can be seen for presenting new characteristics subsets, along with an approximation measure which tells the different detail subsets [9]. Feature selection is used to simplify the models to make them easier to be interpreted, and used to enhance generalization by decreasing over fitting, avoid the curse of dimensionality [7].

Feature extraction is also involved in minimizing the amount of available sources needed to describe a huge set of information. One of the major problems, while performing or analyzing the complex data is the problem arise from the amount of variables involved in it [4]. By examining of huge amount of the variables we required a huge amount of memory and power, and it also causes a sorting algorithm of over fitting samples and observe poorly to latest samples.

**Fig:-Flow Diagram of Proposed Method**

CNN is very efficient algorithm which is used for image processing and pattern recognition. It has some features such as simple structure, less training parameters and adaptable [3]. To train this model we required to indicate input training data source, required data transformation instructions, name of the information allocate that data to be anticipated.

V. CONCLUSION

From the above all paper, it is evident that recent advances have been made in the diagnosis of COVID-19 detection it lacks the early diagnostic tools. Even though there are several methods achieved noticeable advancements with high sensitivity or less false positive. There are many challenges to be addressed, to overcome all these challenges we are proposing Deep CNN method. The reason to choose CNN is that it can extract the spatial from the data using kernels, which other networks are not capable of. The proposed method uses D-CNN for the detection of COVID-19 based on the chest radiography X-ray images. A DCNN is collection of numerous fully connected and thresholding layers, followed by different layers that determines the result.

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A Security and Privacy concepts in Fog Computing

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ABSTRACT: Cloud computing is presently a mainstream processing worldview that can give end clients admittance to configurable assets on any gadget, from anyplace, whenever. During the previous years, distributed computing has been created drastically. In any case, with the advancement of the Internet of Things, the detriments (like high inactivity) of cloud processing are continuously uncovered because of the significant distance between the cloud and end clients. Fog Computing is proposed to tackle this issue by stretching out the cloud to the edge of the organization. Specifically, fog computing presents an halfway layer considered fog that is intended to handle the correspondence information between the cloud and end clients. Henceforth, fog computing is typically considered as an augmentation of distributed computing. In this article, we talk about the plan issues for information security and protection in fog computing. Extraordinarily, we present the remarkable information security and protection configuration challenges introduced by the fog layer and feature the reasons why the information security strategies in distributed computing can't be straightforwardly applied in Fog computing.

KEYWORDS: Energy efficient algorithm; Mantes; total transmission energy; maximum number of hops; network lifetime

I. INTODUCTION

Cloud computing as quite possibly the most well known processing ideal models has been grown significantly during the previous years. As revealed by IDC [1], overall spending on open cloud computing has been developing at a rate 4.5 occasions quicker than that of IT spending. This speedy advancement is predominantly due to the "AAA" property of distributed computing. In particular, the cloud could give end clients admittance to configurable processing assets on any gadget, from anyplace, whenever. Moreover, cloud specialist organizations are normally furnished with proficient tasks and support groups, which ensures the dependability, network, and security of the assets and decreases IT framework costs on the client side. In the interim, as the Internet of Things (IoT) is growing quickly, loads of wearable gadgets, smart meters, remote sensors, associated vehicles and other keen gadgets have gotten drenched in our every day lives. Gartner, Inc. [2] gauges that 20.4 billion associated things will be being used worldwide by 2020. Bunches of information will be created by these gadgets [3], while IoT gadgets need more registering assets to handle these information. To settle this issue, cloud computing is normally included during information handling. Specifically, this gigantic volume of information are transferred to and handled in the far off cloud

II. FOGCOMPUTING OVERVIEW

Definition: There are a couple of terms like fog computing, for example, mobile cloud computing, portable edge processing, and so on, Beneath we clarify every one of them.

1) **Local Cloud:** Local cloud is a cloud implicit a neighborhood organization. It comprises of cloud-empowering programming running on neighborhood workers and generally upholds transaction with distant cloud. Nearby cloud is correlative to distant cloud by running committed administrations locally to upgrade the control of information security.

2) **Cloudlet:** Cloudlet is "a server farm in a container", which follows cloud computing worldview in a more thought way and depends on high-volume workers [4]. Cloudlet zeros in additional on offering types of assistance to delay-delicate, bandwidth limited applications in area.

3) **Mobile Edge Computing:** Mobile edge processing [5] is basically the same as Cloudlet aside from that it is principally situated in versatile base stations.

4) **Fog Computing:** Fog computing is a topographically appropriated figuring design with an asset pool comprises

of at least one universally associated heterogeneous gadgets (counting edge gadgets) at the edge of organization and not only flawlessly sponsored by cloud administrations, to cooperatively give flexible calculation, stockpiling and correspondence (and numerous other new administrations and undertakings) in confined conditions to a huge size of customers in vicinity.

III. BENEFITS OF FOG COMPUTING

Fog computing expands cloud computing model to the edge of the organization. Although the fog and the cloud use comparative assets (systems administration, processing and capacity) and offer a considerable lot of similar instruments and qualities (virtualization, multi-occupancy), fog computing brings numerous advantages for IoT gadgets. These advantages can be summed up as follows:

- Greater business agility: With the utilization of the right apparatuses, fog computing applications can be immediately evolved also, sent. Likewise, these applications can program the machine to work as per the client needs.
- Low latency: The fog can uphold ongoing administrations (e.g., gaming, video real time).
- Geographical and large-scale distribution: Fog computing can give disseminated figuring and capacity assets to huge and broadly conveyed applications.
- Lower operating expense: Saving organization transfer speed by handling chosen information locally as opposed to sending them to the cloud for examination.
- Flexibility and heterogeneity: Fog computing permits the joint effort of various actual conditions and frameworks among various administrations.

IV. RELATED WORKS

I. Traffic Congestion Estimation in VANET

Vehicular ad-hoc network (VANETs) are variations of mobile ad-hoc networks (MANETs). The essential segment in VANETs are vehicles that can collaborate with one another, yet additionally with roadside units (RSUs) through VANETs. Due to this property, VANETs can be utilized in numerous applications, for example, course arranging. The vital segment of this application is gridlock assessment. To acknowledge gridlock assessment in distributed computing, all accessible vehicles in the objective region ought to transfer their speed and area information to the cloud, and all the processing tasks for the assessment are executed in the cloud. Be that as it may, the inappropriateness between the data transmission

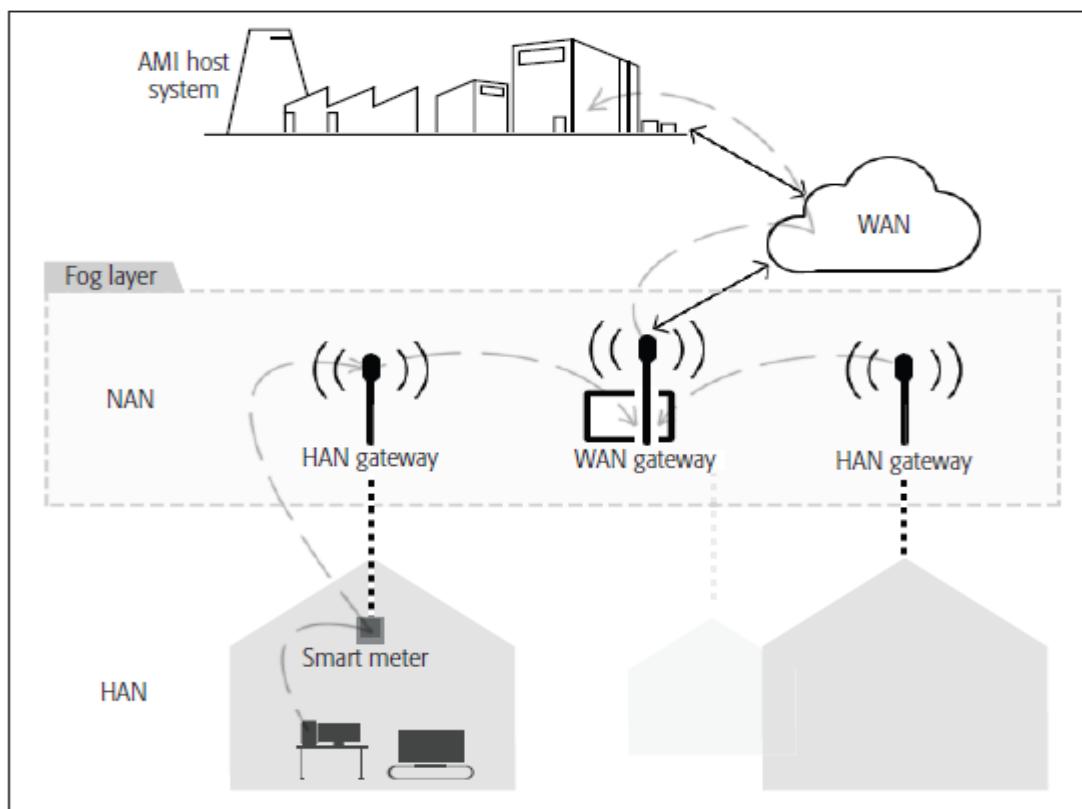


FIGURE1. Basic structure of AMI.

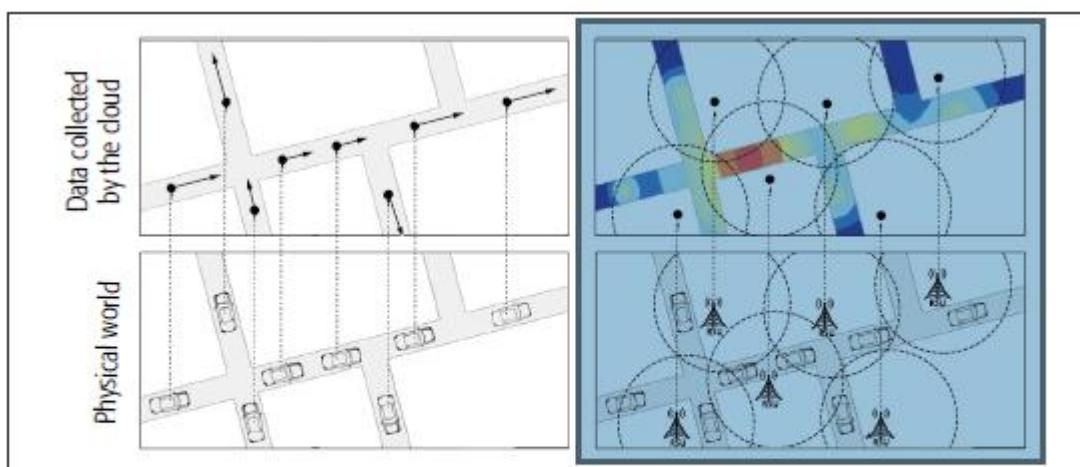


FIGURE2. Traffic congestion estimation in VANETs: a) estimation system implemented using cloud computing; b) estimation system implemented using fog computing.

in VANETs and the measure of the information makes the subsequent gauge wasteful. Besides, the driver's security would be another worry since all the information are put away in the cloud. Conversely, haze registering can utilize RSUs as fog hubs to deal with the traffic information prior to transferring them to the cloud. Specifically, rather than straightforwardly sending all the gotten information to the cloud, the RSU could

just send the gauge dependent on the information to the cloud. On the off chance that the RSU can generally be trusted, this methodology gives great security of the driver's protection, and furthermore diminishes the tension on the cloud. Be that as it may, when the RSU is debased, the information initially from vehicles ought to be ensured, and the information handled by the RSU ought to be approved. Undeniable level portrayals of gridlock assessment in distributed computing and mist processing are given in Figs. 2a and 2b, individually.

II. Multi-Camera Pedestrian Tracking

Huge loads of reconnaissance cameras, creating an enormous volume of video information consistently, have been carried out in numerous public also, government areas. One of the conspicuous utilizations of these cameras is passerby following, where the clients' action track can be sorted out by the video information. In cloud computing, all video information are should have been transferred to the cloud which could give passerby following later in view of the investigation of the information, which requires a tremendous volume of Internet traffic going to the cloud and heavy computation task on the cloud. Fog computing, notwithstanding, doesn't need a particularly immense volume of Internet traffic going to the cloud. The mist hubs store the video information produced by the cameras close by, and can give the nearby common following help as per the put away information. Besides, the haze hubs can associate with other neighboring haze hubs to do between region following and push the path of every common to the cloud. Since the video information are constantly identified with the protection of people on foot, it ought to be scrambled constantly and just got to by approved substances. A significant level portrayal of multi-camera walker following is given in Fig. 3.

III. Data Security and Privacy in Fog Computing

From the previously mentioned applications, we can obviously see that fog computing isn't a replacement for cloud computing, be that as it may, an expansion and an enhancement of cloud computing. Like cloud computing, there are for the most part four sorts of information administrations in fog computing: information stockpiling, information sharing, information question and information calculation. Comparing to these four information administrations, they individually request distinctive interesting information security and protection necessities, which are summed up in Table 2

Data services	Different from cloud computing	Privacy and security requirements
Storage	The data content will be changed after processing by the fog layer, and unknown to the data owner.	Integrity verification Minimum overhead Public auditing Dynamics support
Sharing	Access control on the data will be changed after processing by the fog layer.	Fine-grained access control Authorization revocation Access efficiency
Query	The keywords of the data will be changed after processing by the fog layer.	Secure searchability Dynamics support Refined result
Computation	The relationship between the data and computing tasks will be changed after processing by the fog layer.	Confidentiality of inputs, outputs and computing tasks Verifiability of outputs

TABLE 2. Privacy and security requirements in fog computing.

V. SIMULATION RESULTS

A. Data Storage:

Information stockpiling is the significant use of cloud computing, and it is likewise the essential assistance for information sharing and information inquiry. With the assistance of information stockpiling administrations, the information proprietor can lighten the weight of nearby information stockpiling and upkeep by re-appropriating the information to the distant cloud. Be that as it may, meanwhile, the information proprietor additionally loses physical control of the information, and the cloud would change the information because of financial reasons or inside assaults. All in all, the rightness and trustworthiness of the rethought information is in danger once the information is moved to the cloud.

1. Minimum Overhead: The expense of the auditability to the end clients and cloud ought to never exceed the advantages due to the pay-more only as costs arise nature of cloud computing. Contrasted with cloud computing, fog computing moreover demands that the additional weight on the information proprietor and cloud to accomplish check capacity ought to be pretty much as low as could really be expected. In a perfect world, the information proprietor could appreciate the information stockpiling in fog computing as in cloud computing without stresses over the rightness and trustworthiness of the information put away in the cloud.

2. Public Auditing: The measure of information put away in the cloud has been significantly decreased contrasted and the first information from the end client, yet it is still huge. To review this tremendous volume of

information, the information proprietor actually needs significant overhead on the off chance that it is performed without anyone else. The present circumstance is inadmissible in asset compelled conditions, particularly for IoT, which is the primary inspiration for fog computing. Thus, it is very vital for public inspecting like in cloud computing. Notwithstanding, public inspecting in mist processing also contains the public confirmation ability on the information that fog hubs ship off the cloud. This public check ability would be helpful particularly when the information proprietor and cloud can't accomplish agreement on the information to be put away in the cloud.

3. Support Dynamics: As in cloud computing, the information proprietor will progressively refresh their information. Besides, because of the attributes of IoT, end clients will likewise progressively change, which would influence the information preparing by the fog hubs. Henceforth, auditability should join this essential attribute of elements in fog computing.

B. Data sharing:

The information sharing assistance empowers the information proprietor to store their information in the far off cloud worker and offer the information with clients approved by the information proprietor. To acknowledge access control of the common information under the condition that the information is actually out of the information proprietor's control, some high level cryptographic natives are proposed, for example, characteristic based encryption [9]. This sort of new cryptographic crude understands the entrance control on figure messages. Specifically, the information proprietor can encode the information as per the entrance strategy prior to transferring to the cloud, and just clients whose credits fulfill the entrance strategy can decode the code text.

1. **Fine-Grained Access Control:** The pattern for the entrance control component on the common information in haze figuring is to give fine-grained admittance control of the common information. Planning such an entrance control system is a lot harder than that in cloud computing. Notwithstanding the rich articulation issue of access strategy in distributed computing, the entrance control instrument in mist processing should additionally ensure that the access strategy stays as before after the mist hubs' handling of the code messages.
2. **Authorization Revocation:** Due to the idea of the Internet of Things, end clients in fog computing may change drastically. For example, in the second application in the past area, the vehicle would powerfully join or then again leave a gathering constrained by one RSU, which demands the information proprietor can repudiate the entrance rights.
3. **Access Efficiency:** In fog computing, the end client would utilize asset compelled gadgets to get to the information, while the entrance control system on figure writings is basically a public key strategy, which isn't exactly reasonable for asset obliged gadgets. In cloud computing, the representative capable calculation method [11] is considered as the promising answer for this issue. Be that as it may, the issue turns out to be more troublesome in fog computing, on the grounds that the information has been prepared by mist hubs prior to being transferred to the cloud, and the end client has no information on the information. The obviousness in the delegable calculation can't work for this situation.

C. Data Query:

After the information is put away in the cloud, the client ordinarily recovers a few pieces of them instead of all the information as per some particular catchphrases. In the interim, as referenced in information sharing, the information is encoded by some encryption conspire that is outlandish for search capacity. To manage this issue, accessible encryption [12] is proposed. By utilizing this sort of encryption, the information proprietor can empower the cloud to look on the encoded information without uncovering the hidden catchphrases.

1. **Secure Search ability:** Secure hunt capacity requires the secrecy of the questioned information, yet additionally the classification of the fundamental watchwords. These two necessities can be productively accomplished in cloud processing as a rule; nonetheless, it is still very testing in mist registering. To start with, the end client can't embed the watchword data into figure messages, since it would be changed subsequent to handling by the haze hub. Second, regardless of whether the catchphrase data embedded by the end client can continue as before, the watchword comparing the prepared information.
2. **Support Dynamics:** As referenced previously, the information put away in the cloud will be progressively changed by the information proprietor or other approved clients. Besides, the end client will likewise powerfully change their traits, as we have found in the past area. Subsequently,

search capacity in fog computing ought to likewise consent to this vital normal for elements of fog computing.

3. **Refined Result:** It is conceivable that the cloud would return huge loads of indexed lists as per the hunt question. For this situation, the questioning client would like to get the arranged outcome as per some request rule. Be that as it may, it is very difficult in fog computing. The principle reason is that neither the end client nor the haze hub has any information on the handled information yield by the fog hub. The request rule can't be applied to the handled information with no pre-embedded data in the handled information.

VI CONCLUSION

In this article, we have examined the primary difficulties in tackling information security and protection issues in fog computing, and brought up the reasons why the information security procedures in distributed computing can't be straightforwardly applied in fog computing. This article is planned to give a beginning stage to creating secure information administrations in fog computing. We have moreover introduced the plan and execution of a prototyping stage for fog computing. There is additionally mist based application examination like Smart Home applications, Smart traffic signal and so on

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REVIEW ON UBIQUITOUS COMPUTING

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ABSTRACT: This paintings affords a survey of ubiquitous computing studies that's the emerging area that implements conversation technologies into everyday life sports. This research paper provides a class of the studies regions at the ubiquitous computing paradigm. In this paper, we gift not unusual architecture ideas of ubiquitous systems and examine vital factors in context-aware ubiquitous systems. In addition, this research paintings provides a unique structure of ubiquitous computing system and a survey of sensors wished for packages in ubiquitous computing. The desires of this studies work are threefold: i) function a guideline for researchers who're new to ubiquitous computing and need to make a contribution to this research location, ii) provide a novel device structure for ubiquitous computing machine, and iii) provides in addition research instructions required into first-class-ofservice assurance of ubiquitous computing.

KEYWORDS: Ubiquitous Computing Paradigm, Context-Aware Systems, Pervasive Computing Middlewares

1. INTRODUCTION

The fundamental focus of ubiquitous computing is on the powerful and efficient use of smart areas, invisibility, localized scalability, and context-consciousness. The goal of ubiquitous computing research is to refine devices to the factor in which their use is obvious. For many programs transparent operation requires that the tool be context-aware. Unfortunately, the context-conscious gadgets of an man or woman can be used to infer fantastically private facts. Hence, those gadgets must be cautiously designed; otherwise they will become a ubiquitous surveillance system. Therefore, current modern ubiquitous systems want to be examined from the angle of assaults which may be fairly expected in opposition to these structures.

1.1 WHAT IS UBIQUITOUS COMPUTING?

Ubiquitous computing is a idea where computing is made to seem anywhere using any tool, in any region and in any format.

In ubiquitous computing environments computation is embedded. With improvements in pc technological know-how and generation the pc applications are seamlessly included into our daily lives. The devices worked in networked and standalone surroundings and able to verbal exchange with the human and with every others. These devices guide context-conscious application, nomadic customers, place aware offerings, and cell information access. Ubiquitous structures offer everywhere and every time access to records and numerous services whilst making the presence of the device "invisible" to the consumer.

1.2 PROPERTIES OF UBIQUITOUS COMPUTING SYSTEMS

Three predominant homes for UbiCom Systems were proposed with the aid of M. Weiser [28], [29] specifically distributed computation, invisibility, and context-awareness. The

distributed computation approach the computers/systems need to be networked, disbursed and transparently available. They can interact with humans as well as with each others. The invisibility belongings way that the laptop interaction with humans wishes to be extra hidden, and in the end the third property proposed by means of weiser is context-cognizance that implies that with a view to optimize gadget operation of their physical and human environment it's miles important to make the structures privy to environmental context.

Kang and Pisan [16] argue that the precept intention of ubiquitous computing is to be consumer-centric that permits customers to interact with the device in herbal and non-intrusive manner. Abowd et al. [3] proposed that ubiquitous computing aim is to help customers in ordinary lifestyles.

The Fig.1 summarizes 5 center houses of the ever-present computing solutions [21]. It isn't required for ubiquitous computing answers to fully assist all 5 properties. It may not be useful or usable in lots of instances in exercise to support all 5 center residences.

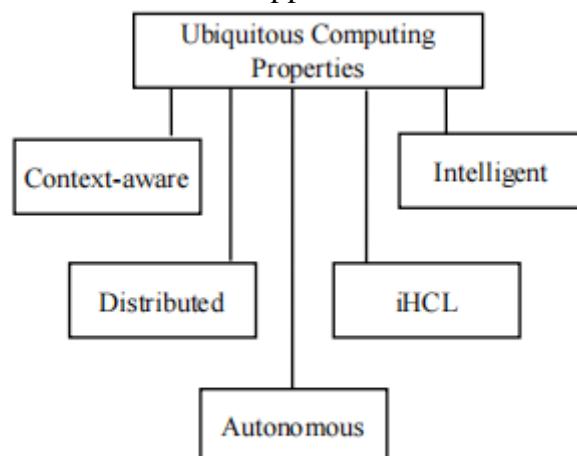


Fig.1. Five Properties of Ubiquitous Computing

1.3 OBSERVATIONS

We observed that the goal of ubiquitous computing to decorate and aid in daily sports of human beings. For instance, mechanically carry out positive task that meets the consumer's intention in a nondisruptive manner, offer new responsibilities to users via transparently integrating multiple offerings. To attain this intention ubiquitous computing structures want to combine communique devices in non-evident manner in human's day by day lives, offer offerings to authenticated users to keep away from leakage of consumer private statistics. To become aware of communique devices or sensors in most cases used in ubiquitous structures, we done a examine of twenty existing applications. We identified seven standard forms of sensors are required for ubiquitous systems namely: motion, light, force, temperature, audio, humidity and proximity. In common ubiquitous applications one or more of those sensors are normally required to derive context statistics.

Ubiquitous computing can be localized inside a context and available to customers when it's far required rather than making the computing services handy anywhere for all gadgets. Automatic interactions and decisions are needed to lessen the bottleneck of human interactions; consequently, explicit human interactions are not necessary in all gadgets and could be much less sensible with micro-sized devices.

1.4 CONTRIBUTIONS

In summary, this research paper makes the following contributions:

- Classifies state-of-the-art research performed in ubiquitous computing.
- Provides analysis of important aspects in context-aware ubiquitous systems.
- Presents novel system architecture, a distributed frame-work designed to support ubiquitous computing applications.
- Presents a survey of sensors that are required for ubiquitous systems.
- Provides guidelines and further research directions required in the ubiquitous computing area. The rest of this research paper is organized as follows: Section 2 describes our motivation. Section 3 discusses the literature survey. Section 4 provides user survey and analysis. Section 5 presents system architecture for ubiquitous applications. Section 6 suggests open research question in ubiquitous computing, and we conclude the paper in Section 7.

2. MOTIVATION

We had been influenced to perform this survey if you want to enumerate and compare modern research that proposed techniques in the ubiquitous computing area. This examine paper presents analysis and summarizes architecture concepts of ubiquitous computing. This research paintings offers a singular gadget architecture, a disbursed framework designed to aid ubiquitous computing packages. This paper can end up the place to begin for every body trying to recognize, evaluate and broaden strategies for ubiquitous computing.

3. LITERATURE SURVEY

3. 1 SERVICE COMPOSITION MECHANISMS

The concept of ubiquitous (pervasive) computing is to offer new offerings to customers by using combining the prevailing offerings. Researchers have substantially studied and explore a characteristic of the ever present computing that allows transparently compose the offerings from numerous devices in a greater or less ad-hoc way.

In Amigo [12], the focal point of the service composition mechanism used become to build a “worldwide” automaton machine. Using OWL-S [5] offerings are said as semantic Web offerings within the Amigo carrier composition mechanism [4]. In that, the atomic tactics have the QoS attributes with values acquired from runtime measurements.

ICrafter [24] is an example that allows users to combine offerings from exceptional gadgets and feature an aggregated person interface generated. With UbiDev [23] an application developer affords consumer interfaces, ontology, and classifiers for offerings blanketed in an application. The classifiers are used to map resources on gadgets into ideas in the ontology.

We located that during carrier composition three traits are needed specifically, usability, adaptability and performance. The usability is a issue approximately how easy for

users to perform a favored project the use of the system. The adaptability is the capability of the device to conform to unique environment and context. The efficiency is the belongings of the system to offer suitable reaction and overall performance to the person requests or moves within a stipulated time. The 3 characteristics we've got outlined in this paper are not explored in advance provider compositions mechanisms. Therefore, there is a need and possibility of studies available in the service composition mechanisms.

3.2 CONTEXT AWARE SYSTEMS AND DESIGN PRINCIPLES

Location statistics primarily based context-conscious structures are widely utilized by users in their each day activities and call for them is also growing due to growth in popularity of mobile devices. For instance, various traveler manual tasks [6], [10], [13], [19] that provide statistics (which includes hotels, eating places, museums, live shows halls, and many others) to the customers based on their modern-day places. To gather region records various sensors and modules are to be had along with GPS satellites, cellular cellphone towers, proximity detector sensors, cameras, barcode and magnetic card readers. These proximity sensors or devices are generally used in the systems to identify the region of the person and provide offerings to the user based on the detected location.

In context-aware machine mission majority of them used and focused only on the location attention however context-awareness can be improved with the aid of using distinctive context aware sensors inclusive of noise detectors, movement detector, light and smoke detectors. Integrating these elements and utilizing the information accumulated from one or more of those sensors can allow to layout and broaden greater beneficial, adaptive, green and usable systems. Munoz et al. [2] supplied a context-conscious structures infrastructure that adds context recognition to aid records control in hospitals with the aid of using immediate messaging paradigm. Devaraju et al. [1] proposed a framework for a context gathering that uses the sensor data version, messaging system, communiqué protocols and alertness programming interfaces (API). He also analyzes methods for sensory information acquisition for sensory information acquisition.

The concepts of the context-aware system designing include techniques of context facts acquisition and context management fashions. Chen et al. [7] presented 3 special techniques of context facts acquisitions: Direct Sensor Access, Middleware Infrastructure and Context Server. Winograd [31] described three distinctive context management fashions: Widgets, Networked services and Blackboard model.

We found that the prevailing solutions and studies efforts specifically centered and used bodily sensors for context consciousness. However, we believed that logical and virtual sensors also are useful and able to presenting more contextual information. Virtual and logical sensors need to be incorporated in ongoing research answers and structures.

3.3 PERVASIVE COMPUTING MIDDLEWARES

The aim of pervasive computing is to create a smart environment the usage of embedded sensors and networked computing devices that offer customers obvious get admission to of services. Examples of current pervasive computing middleware structures are Aura [11], [25], Gaia [8], [22], CORTEX [26], Scenes [15] and Universal Intelligent Objects (UIO) [27]. Abhijeet [17] affords a comprehensive survey of cellular healthcare troubles and want of may want to help pervasive gadgets.

We found that pervasive computing middlewares helps builders to layout the utility in multiple methods. It's most crucial characteristic is, it gives device abstraction to builders that help them to recognition handiest on the software common sense instead of stressful approximately low-stage implementation details. Another feature of pervasive middleware structures is to offer control of device sources including service control, context control and facts control of context the use of ontology permits the software of diverse measures of semantic similarity based at the structure of the ontology.

4. SYSTEM ARCHITECTURE

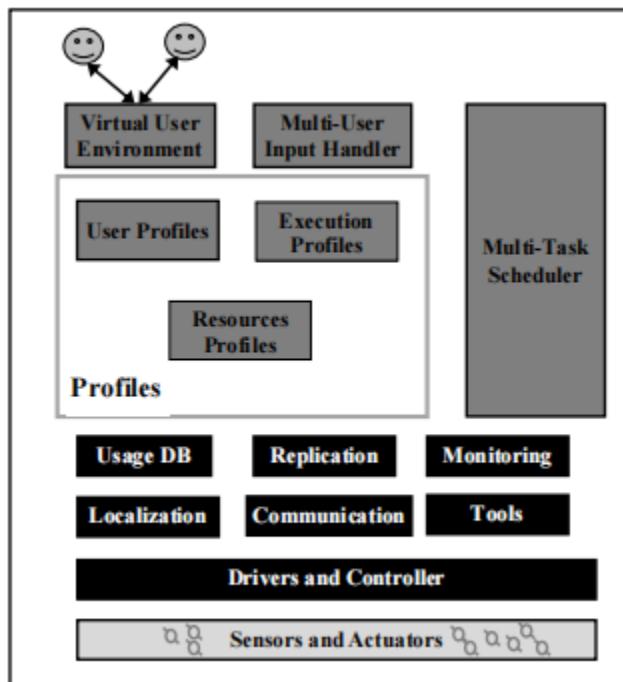


FIG 2: SYSTEM ARCHITECTURE FOR UBIQUITOUS COMPUTING

5.1 APPLICATIONS

This section gives a novel device structure designed to guide ubiquitous computing programs. Ubiquitous computing is categorised by the interplay of numerous heterogeneous devices, ranging from excessive-end servers to tiny mobile sensors. Devices can be related to every other the usage of wi-fi conversation technologies like Bluetooth, IrDA or WiFi (IEEE 802.11).

The Fig.2 indicates the major components of the proposed structure. It consists of diverse types of sensors and actuators and drivers and controllers to deal with them, it is also various profiles together with resource profiles to address resources optimally, person profiles to manage consumer settings and preferences, execution profiles to govern execution of procedures. The multi-task scheduler module is used to deal with more than one obligations efficaciously and support multi-assignment environment inside the utility. The multi-person enter handler and digital person surroundings modules presents aid to multi-user in addition to context and user design management. The User DB module helps to authenticate customers. The other modules such as equipment, monitoring, replication, communiqué, localization helps numerous functions inside the ubiquitous computing packages.

5. CONCLUSION

This research paintings presented a survey of a ubiquitous computing studies. We furnished a class of the research regions on the ubiquitous computing paradigm and provided commonplace structure ideas of ubiquitous structures and analyze crucial components in context-conscious ubiquitous structures. This works also provided novel device structure, a disbursed framework designed to assist ubiquitous computing packages. This research paper serves as a guiding principle for researchers who're new to ubiquitous computing and want to contribute to this studies vicinity.

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Brain Tumour Detection using Convolutional Neural Network

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ABSTRACT: The brain tumors, are the most common and aggressive disease, leading to an exceptionally short future in their most elevated evaluation. Consequently, treatment planning is a key stage to improve the quality of life of patients. For the most part, various imagetechniques such as Computed Tomography (CT), Magnetic Resonance Imaging (MRI)and ultrasound image are utilized to assess the tumour in a brain, lung, liver, breast, prostate, etc. Particularly, in this work X-ray pictures are utilized to analyse tumour in the brain. However, the tremendous measure of information created by X-ray examination defeats manual characterization of tumors versus non-tumour in a specific time

KEYWORDS: Magnetic Resonance Imaging (MRI); Computed Tomography (CT); ultrasound image

INTRODUCTION

Cancer is a disease in which some of the body's cells grow uncontrollably and spread to other parts of the body. Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and multiply (through a process called cell division) to form new cells as the body needs them. When cells grow old or become damaged, they die, and new cells take their place. Sometimes this orderly process breaks down, and abnormal or damaged cells grow and multiply when they shouldn't. These cells may form tumors, which are lumps of tissue. Tumors can be cancerous or not cancerous (benign). Cancerous tumors spread into, or invade, nearby tissues and can travel to distant places in the body to form new tumors (a process called metastasis). Cancerous tumors may also be called malignant tumors. Many cancers form solid tumors, but cancers of the blood, such as leukaemia's, generally do not.

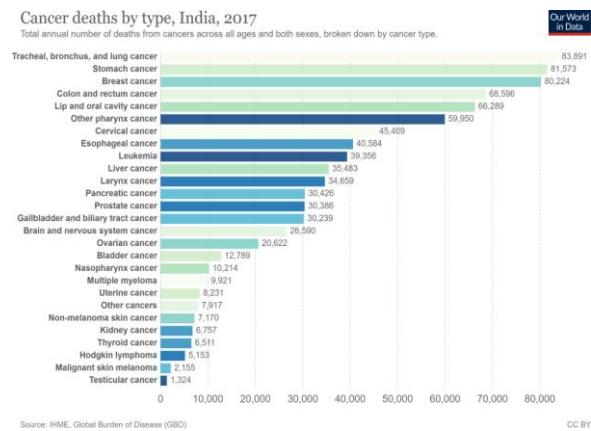
Cancer is the second leading cause of death globally, according to the WHO [1]. Early detection of cancer can prevent death, but this is not always possible. Unlike cancer, a tumor could be benign, pre-carcinoma, or malign. Benign tumors differ from malign in that benign generally do not spread to other organs and tissues and can be surgically removed. Some of the primary brain tumors are gliomas, meningiomas, and pituitary tumors. Gliomas are a general term for tumors that arise from brain tissues other than nerve cells and blood vessels on the other hand, meningiomas arise from the membranes that cover the brain and surround the central nervous system, whereas pituitary tumors are lumps that sit inside the skull. The most important difference between these three types of tumors is that meningiomas are typically benign, and gliomas are most commonly malignant. Pituitary tumors, even if benign, can cause other medical damage, unlike meningiomas, which are slow-growing tumors. Because of the information mentioned above, the precise differentiation between these three types of tumors represents a very important step of the clinical diagnostic process and later effective assessment of patients.

The most common method for differential diagnostics of tumor type is MRI. However, it is susceptible to human subjectivity, and a large amount of data is difficult for human observation. Early brain-tumor detection mostly depends on the experience of the radiologist. The diagnostics of the tumor could not be complete before establishing whether it is benign or malignant. In order to examine whether the tissue is benign or malignant, a biopsy is usually performed. Unlike tumors elsewhere in the body, the biopsy of the brain tumor is not usually obtained before definitive brain surgery. In order to obtain precise diagnostics, and to avoid surgery and subjectivity, it is important to develop an effective diagnostics tool for tumor segmentation and classification from MRI images. The development of new technologies, especially artificial intelligence and machine learning, as had a significant impact on medical field, providing an important support tool for many medical branches,

including imaging. Different machine-learning methods for image segmentation and classification are applied in MRI image processing to provide radiologists with a second opinion.

One of the most crucial tasks in any brain tumor detection system is the isolation of abnormal tissues from normal brain tissues. Interestingly, domain of brain tumor analysis has effectively utilized the concepts of medical image processing, particularly on MR images, to automate the core steps, i.e. extraction, segmentation, classification for proximate detection of tumor. Research is more inclined towards MR for its non-invasive imaging properties. Computer aided diagnosis or detection systems are becoming challenging and are still an open problem due to variability in shapes, areas, and sizes of tumor. The past works of many researchers under medical image processing and soft computing have made noteworthy review analysis on automatic brain tumor detection techniques focusing segmentation as well as classification and their combinations.

In the past few years because of AI and Deep learning, significant advancement has been made in the medical science like Medical Image processing technique which helps doctors to diagnose disease early and easily, before that, it was tedious and time consuming. So, to resolve such kind of limitations computer-aided technology is much needed because Medical Field needs efficient and reliable techniques to diagnose life-threatening diseases like cancer, which is the leading cause of mortality globally for patients. The machine learning based approaches like Deep ConvNets in radiology and other medical science fields plays an important role to diagnose the disease in much simpler way as never done before and hence providing a feasible alternative



to surgical biopsy for brain tumours.

Figure 1: CANCER DEATH TYPES

II RELATED WORK

Nilesh Bhaskarao Bahadure, Arun Kumar Ray, and Har Pal Thethi [2] presented MRI based brain tumor detection and feature extraction techniques. To improve the performance and reduce the complexity involves in the medical image segmentation process, they introduced Berkeley wavelet transformation (BWT) based brain tumour segmentation. SVM based classifier is used to improve the accuracy and quality rate. The experimental results of proposed technique have been evaluated and validated for performance and quality analysis on magnetic resonance brain images, based on accuracy, sensitivity and specificity.

Andras Jakab, Stefan Bauer, et al. [3] introduced a multi modal brain tumour image segmentation (BRATS) technique. They found that different algorithms worked best for different sub-regions, but that no single algorithm ranked in the top for all sub-regions simultaneously. Also, they try to fuse several good algorithms using a hierarchical majority vote yielded segmentations that consistently ranked above all individual algorithms, indicating remaining opportunities for further methodological improvements. The BRATS image data and manual annotations are used as publicly and it is available only through an online evaluation system. The first step of the proposed approach they evaluate the variability between the segmentations to quantify the difficulty of the different segmentation tasks. At last, they perform an experiment that applies the hierarchical fusion algorithm to the automatic segmentations.

Prateek Katiyar, Mathew R. Divine, et al. [5] explored an unsupervised segmentation approach tumour tissue population for multiparametric MRI. This proposed approach they aimed to accurately guess the intra-tumoral heterogeneity using a technique called spatially regularized spectral clustering (SRSC) on multiparametric MRI

data. Also compare the efficacy of SRSC with the previously reported segmentation techniques in MRI studies. In these methods overestimated peri-necrotic and underesimated viable fractions, SRSC accurately predicted the fractional population of all three tumor tissue types and exhibited strong correlations with the histology. The accurate identification of necrotic, peri-necrotic and viable areas using SRSC may really assist in cancer treatment planning and add a new dimension to MRI-guided tumor biopsy procedures. The efficiency of SRSC on multi-parametric MRI data and delivered an accurate segmentation.

Zeynettin Akkus, et al. [6] implemented a deep learning technique for brain MRI segmentation. This technique they aim to provide an overview of current deep learning-based segmentation approaches for quantitative brain MRI. The performance of the deep learning methods depends highly on several key steps such as pre-processing, initialization, and post processing. The deep learning models that are highly robust to variations in brain MRI or have unsupervised learning capability with less requirement on groundtruth labels are needed.

Anupurba Nandi [7] introduced a brain tumor detection using segmentation and morphological operators. This work uses K-Means clustering where the detected tumor shows some abnormality which is then rectified by the use of operators. Also, basic image processing techniques to meet the goal of separating the tumor cells from the normal cells. The goal is obtained by applying thresholding, watershed segmentation and morphological operators. The factor used in thresholding is difficult to determine because the factor used for one image may not work for image. But this factor may be different for different images.

R. Telrandhe, Amit Pimpalkar and Ankita Kendhe [8] proposed brain tumor detection for MRI images using segmentation and SVM. The SVM is used in unsupervised manner which will use to create and maintain the pattern for future use. Also, to make this system an adaptive using SVM. Find out the texture feature and color features of MRI images. The proposed a system that can be used for segmentation of brain MR Images for Detection and identification of brain tumor. Find area of tumor and its type of tumor. The experimental results of the proposed system will give better result in comparison to other existing systems. This proposed system using K-Means segmentation with pre-processing of image.

Komal Sharma, Akwinder Kaur and Shuti Gujral [9] presented a brain tumor detection using machine learning algorithm. The proposed work is divided into three parts. The first part is pre-processing are applied on brain MRI images. Then second is texture features are extracted using Gray Level Co-occurrence Matrix (GLCM). Classification is made using machine learning algorithm. The MRI brain tumor detection is difficult task due to density and difference of tumors. Automated tumor detection methods are developed as it would save time and MR images involves feature extraction and classification using machine learning algorithm. Proposed Method for Brain Tumor Detection in MR images consist of different steps, image acquisition, pre-processing, feature extraction and classification. The Machine learning algorithms are used for classification of MR brain image and get either as normal or abnormal. Feature is formed by using Multi-Layer Perceptron (MLP) and Naive Bayes for classification.

Neha Rani and Sharda Vashisth [10] implemented brain tumour detection and classification techniques using feed forward back-prop neural network. This work statistical analysis morphological and thresholding techniques are used to process the images obtained by MRI. The Feed-forward back-prop neural network is used for classification and to classify the performance of tumors part of the image.

Vrushali Borase, Gayatri Naik, Vaishali Londhe [11] proposed MRI based brain tumor detection technique using artificial neural network. This method uses computer-based procedures to detect tumor blocks and classify the types of tumor using Artificial Neural Network Algorithm for MRI images of different patients. Different image processing techniques such as image segmentation, image enhancement and feature extraction are used for detection of the brain tumor in the MRI images of the cancer affected patients. The neural network techniques are used to improve the performance of detecting and classifying brain tumor in MRI images. The advantages of neural network system that take place from its ability to recognize and model nonlinear relationships between data. One of the important goals of Artificial Neural Networks is the processing of information similar to human interaction the neural network is used when there is a need for brain capabilities and machine idealistic.

Gladis Pushpa Rathi and Palani [12] explored MRI based brain tumor detection and classification using deep learning algorithm. In this method, tumor classification using multiple kernel-based probabilistic clustering and deep learning classifier is proposed. The proposed technique consists of three modules, segmentation, feature extraction and classification. MRI image is pre-processed to make it fit for segmentation and the median filter is user for de-noising process. Then, pre-processed image is used to segment using the technique called multiple kernels based probabilistic clustering (MKPC). Features are extracted for every segment based on the shape, texture and intensity; important features will be selected using Linear Discriminant Analysis (LDA). Deep

learning classifier is employed for classification into tumor or non-tumor. And this technique is evaluated using sensitivity, specificity, accuracy. The proposed technique achieved an average sensitivity, specificity and accuracy.

Israel D. Gebru, Xavier Alameda-Pineda, Florence Forbes and Radu [4] presented a weighted-data Gaussian mixture model. This model proposes a new mixture model that associates a weight with each observed point and introduce the weighted-data Gaussian mixture and derive two EM algorithms. In this proposed method they derived a maximum-likelihood formulation and devised two EM algorithms, one that uses fixed weights (FWDEM) and another one with weights modeled as random variables (WD-EM). The first algorithm appears to be a straightforward generalization of standard EM for Gaussian mixtures; the second one has a more complex structure. The proposed WD-EM admits closed-form solutions and the algorithm is extremely efficient. They also demonstrate the effectiveness and robustness of the proposed clustering technique in the presence of heterogeneous data, namely audio-visual scene analysis.

Lemasson, Pannetier et al., [14] implemented MRI based fingerprinting approaches for the brain tumor models. This technique they designed to provide high-resolution parametric maps of micro vascular architecture and function by using the evaluation of fingerprinting approach. The fingerprinting technique can forcefully differentiate between healthy brain tissues with dissimilar behaviours in tumor and stroke models. To study micro vascular properties of brain diseases, use an efficient technique called MR vascular fingerprinting. Multiple improvements can be seen and might improve the disease diagnosis and prediction. In multidimensional approach the multiple dimensions are used to generate the fingerprints are not only obtained with MRI, but also other imaging modalities can be used. Positron emission tomography or near infrared spectroscopy are the important modalities. It can provide a better vision of brain disorders.

III PROPOSED ALGORITHM

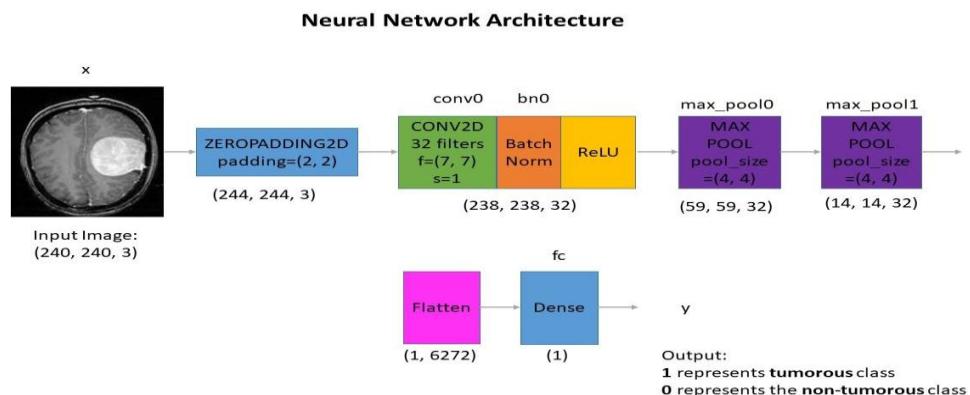


FIGURE 2: PROPOSED SYSTEM ARCHITECTURE

Each input x (image) has a shape of (240, 240, 3) and is fed into the neural network. And, it goes through the following layers:

- A Zero Padding layer with a pool size of (2, 2).
- A convolutional layer with 32 filters, with a filter size of (7, 7) and a stride equal to 1.
- A batch normalization layer to normalize pixel values to speed up computation.
- A ReLU activation layer.
- A Max Pooling layer with $f=4$ and $s=4$.
- A Max Pooling layer with $f=4$ and $s=4$, same as before. I have added another pooling layer in order to have less computation cost.
- A Flatten layer in order to flatten the 3-dimensional matrix into a one-dimensional vector.
- A Dense (output unit) fully connected layer with one neuron with a sigmoid activation (since this is a binary classification task).

At the right end of the figure, it has also been stated that, while testing an image if the array gives the value of 1 it means that image is tumorous and if the array gives the value 0 then the image tested is not tumorous
For every image, the following pre-processing steps were applied:

- Read the image.
- Crop the part of the image that contains only the brain (which is the most important part of the image): I used a cropping technique to find the extreme top, bottom, left and right points of the brain. It was done using OpenCV where extreme points were found using contours.
- Resize the image to have a shape of (240, 240, 3) = (image width, image height, number of channels): because images in the dataset come in different sizes. So, all images should have the same shape to feed it as an input to the neural network.
- Apply normalization: to scale pixel values to the range 0–1.
- Append the image to X and its label to y. After that, Shuffle X and Y, because the data is ordered (meaning the arrays contain the first part belonging to one class and the second part belonging to the other class, and we don't want that). Finally, Return X and Y.

Let us see how the data looked after applying the above

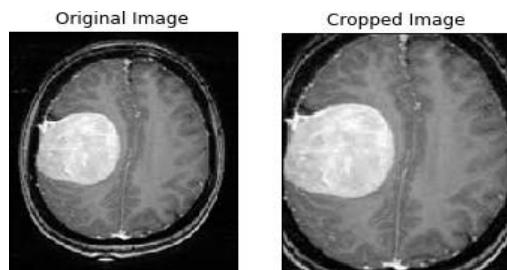


Figure 3: AFTER APPLYING CROPPING TECHNIQUE
Data Split:

The data was split in the following way:

1. 70% of the data for training.
2. 15% of the data for validation (development).
3. 15% of the data for testing.

IV. SIMULATION RESULTS

After training the model for **24 epochs** the loss and accuracy graphs were plotted. The respective graphs are stated in figure 5.

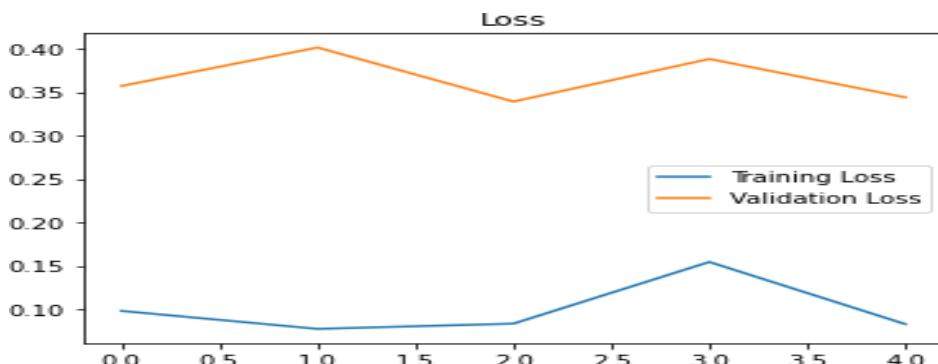
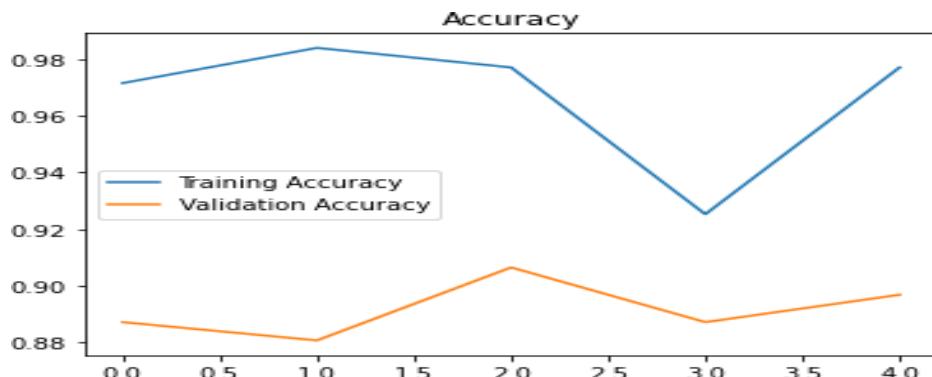


Figure 4: THE TRAINING AND VALIDATION LOSS ACROSS THE EPOCHS

**Figure 5 THE TRAINING AND VALIDATION ACCURACY ACROSS THE EPOCHS**

As shown in the figure 6, the model with the best validation accuracy (which is 90.8%) was achieved on the 23rd epoch. So, the best model which was obtained on 3rd epoch was loaded again and accuracy and F1 score was calculated again. It was found out that now, the model detects brain tumor with: 88.7% accuracy on the test set. 0.902 f1 score on the test set. These results are very good considering that the data is balanced.

V.CONCLUSION AND FUTURE WORK

Detection of brain tumour manually is very time consuming and it may not be efficient as well. And early detection is very important in this case for the survival of the patient. There are many technologies tried before to make this detection automatic. But no technique is universally accepted till now. Authors have tried to implement the system using CNN which is a deep learning algorithm being used in many fields. There is no need to apply separate method for feature extraction and classification. It is used both for feature extraction and classification. Even after training from scratch it gave better results which were reasonable. The advantages of this system are it improves the segmentation level and spatial localization of the image and also improves the efficiency compared to the other system. It consumes less time for computation and becomes easier to train with fewer parameters than other network.

Need to build an app-based user interface in hospitals which allows doctors to easily determine the impact of tumor and suggest treatment accordingly. Since performance and complexity of ConvNets depend on the input data representation we can try to predict the location as well as stage of the tumor from Volume based 3D images. By creating three dimensional (3D) anatomical models from individual patients, training, planning and computer guidance during surgery is improved.

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Online Invigilator

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ABSTRACT: Learning and teaching is transforming away from the conventional lecture theatre designed to seat 100 to 10,000 passive students towards more active learning environments. In our current situation, this is worsened by COVID-19 responses, where thousands of students are involved in online adaptions of face-to-face examinations (e.g., online Zoom rooms with all microphones and videos locked on). Since the outbreak of this pandemic the whole education system has witnessed drastic changes as the mode of education was shifted from physical classes to online classes. This posed a serious challenge for teachers and students as they had to come up with a new way for taking assessment and exams. Educational institutes are making use of online platforms such as Zoom, Google meet etc., for taking exams and some have changed it to an assignment form where students can easily copy. Considering this to be a new norm there needs to be some solution to keep the entire process fair.

KEYWORDS: Proctoring, OpenCV, TensorFlow, face Landmarks, Gaze

I INTRODUCTION

The e-learning has always been the most useful and convenient way to provide education to all kind of people in different parts of the world and now with the arrival of COVID-19 pandemic, it's evident that e-learning is the future and we have to think the online mode of learning as a primary way to provide education to all. Exams are the key aspects of learning and we need to make sure that when it comes to monitoring of exams, as an institution we need to be step ahead to make sure it's fair.

Online Proctored Exams are now the only source for the conduction of exams timely. Many Organizations have adopted the basic methodology where examinee needs to open their webcams and a proctor is sitting at the other end looking for the behaviour during the process. It's really difficult for the proctor to analyse each and every aspect as the whole process is bounded to a frame. For instance, a proctor will ask not to move the head or eye or even ask to show the environment around the test taker. All these restrictions will make the whole process quite tedious for both examinee and proctor.

The ongoing pandemic has made it evident that the online test is the best way to progress the education and the health and safety of students as well as teachers should be given utmost priority. It's the need of the hour, considering the fact that there's a unsurity that the period of pandemic can be stretched to any time period and the education shouldn't be delayed when we have technology which can assure fair and convenient tests. Therefore, a proper methodology is required for the online proctoring of the test.

In this Paper, we introduce an automated proctoring approach by utilizing the knowledge of computer vision, Machine learning, Deep learning and the library present such as OpenCV and TensorFlow framework. The overall goal of the project is to come up with a solution that eliminates the possibility of cheating to a certain extent. We have divided the project into modules where each module work on a certain feature to track the user behaviour during test and give back the result at the end where the proctor can look at the result for each individual and be able to conclude whether there's any unfair or malpractice happened during the test.

II RELATED WORK

The main objective of online proctoring is to make sure that there's a way for the examiner to fairly evaluate the performance of test-takers. There are many ways out there or we can say the educational institutions are trying their way out to conduct the exams as fair as possible. Most of the institutions are using the online platform such as Meet, MS Team etc to conduct the whole process. The proctor sits at the other end and continually look at the screen until the process is over. It's fairly simple and more like the offline monitoring in a physical classroom to an extent. There's also some way where the webcam automatically captures the image at a certain time interval and sends to the proctor who can later analyse if the test-taker is involved in some malpractice. At present the first method is extensively used due to its simplicity and easy to use nature.

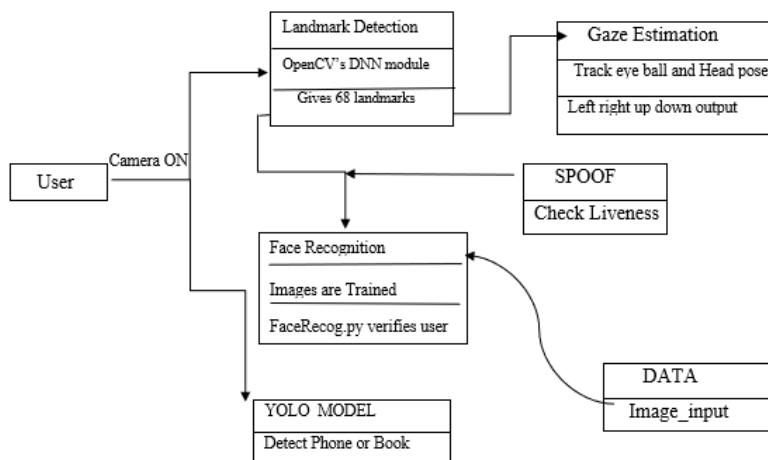
Although it hardly guarantees that the conduction is fair as malpractice is very easy as it only shows a limited frame to the proctor.

Proctor may make any request to the user if any suspicious activity is concluded and it can make the process more time consuming and inflexible for all the users taking the test in that chatroom. All this could be avoided if there's a more robust system can be developed which can analyse the behaviour or just keep a note to the behaviour of the test-taker during the whole process. There has been method developed to do the monitoring but require a lot of equipment setup to achieve a 100 percent result but that won't work as most of the examinee won't have that.

III PROPOSED ALGORITHM

In this Paper, we have aimed to develop a system which has been divide into few modules that can detect a wide variety of cheating behaviour. Firstly, we have done the verification phase of the process where we authenticate the user by taking the live feed through the webcam of the system. Input images of the users are trained so that system can identify the individual who has been schedule for the exam and once verification will be done, the system can let in for the rest of the process.

In the next few steps, we have implemented the methods to check if the user is looking away from screen by tracking the eyeballs and head pose estimation. We have also tried to look at the aspects of spoof in the picture or the live feed we are getting through webcam. If the user is trying to get help from any phone or textbook, it will detect and notify the presence of possible cheating material.



IV. PSEUDO CODE

Step 1: Detect the Faces Present in the frame.

Step 2: Select the ROI and find the facial Landmarks of the examinee.

Step 3: Check for the actual examinee by recognizing the face in the frame via the Database.

Step 4: Check the below condition:

```

if (face_encoding == face_encoding of image in database) && Face spoofing is not there
    Start the Process of proctoring.
else
    Throw a message saying face verification couldn't happen.
end
  
```

Step 5: Attendance is marked at the time user verification is done.

Step 5: Start the Process of Proctoring.

Step 6: Check for the movement of eye and Head and give warning a few numbers of times to the user.

Step 7: Check if there's phone or book present in the frame and make a note.

Step 8: End.

V. SIMULATION RESULTS

Detecting Faces in the picture or a frame is one of the most important aspects of computer vision. To detect the frontal face of the interested image, there's many algorithms and pretrained model. At first, we look for the ROI and then draw the key facial structure. Initially we implemented it using dlib and OpenCV. The pretrained landmark detector of dlib library identifies the 68 points that maps to the different parts of the face. The problem we came across with this process is that it doesn't work well with faces at a different angle and hence it is quite inefficient. So, we then try to use the caffe model of OpenCV's Deep neural network module to identify the faces. Next for the facial landmark we have used a TensorFlow CNN trained model. It gives the stability that we needed and the result when the faces are at angles. The model later helps in correctly tracking eye balls for a proper gaze estimation.

Recognition of faces has now been used extensively from unlocking a smart phone to verification or attendance in tech-companies. We also tried to incorporate this technology to verify if the user is authentic or if it's really the examinee who is taking test. As we know how Machine learning plays a role in solving many real time problems after proper training via a dataset. The Process of facial recognition works as follows.

- First, we look at the pictures and find faces in it.
- Second, we try to pick out facial features of each.
- At last, we compare the unique features of each one.

Once we detect the faces in the frame as we did earlier in Facial landmark detection, we now need to encode the faces and the way we have achieved this is by extracting a few basic measurements from each face. Deep learning figures out which facial measure is essential. One Solution is that we train a CNN which can generate measurements for each face. We have used a pretrained network that will generate 128 facial measures for each face. Once we have the measurements, we just have to compare the images already there in our database. We can easily use any Machine learning classification algorithm to find out the identification of test image. We have used SVM Classifier.

Spoofing can be a potential cheating behavior considering the fact that it has been a common practice as if it weren't for liveness of the image, the phone lock won't guarantee that the privacy of the user is secured at maximum. To check if it's really the user who is taking the exam not a live video of the user running at loop of just a poster of the user, we need to check for the spoof the data flow is shown in the figure (4).

The method we have implemented is based on a paper "Image Based Object spoofing Detection". In the paper an anti-spoofing project has been developed for a wine anti-counterfeiting system. The proposed method relies in two different color spaces: CIE L*u*v* and YCrCb to eliminate the probability of a spoofed image being presented. Since we are using OpenCV in our project so we already have a function to do the math behind the paper and produce the output. Generally, in Physical exams, Movement of head and eye can be classified as a strong indication of potential cheating. In the very same way, we have tried to implement it as the movement of eye balls and head away from screen. Although it may not be considered as a very correct indication but it might give an idea to the proctor that the user has been looking away for significant amount of time and it could raise a potential suspicion. Practically it could be a real challenge as the test taker may always not put their focus on the screen all the time.

With the help of facial landmark that we found earlier, we first find the points and position of both the eyes in ROI. Image Processing plays a vital role in estimating eye position and later we calculate the central position of eye ball to track the eye balls of test-taker. For frontal face detection we have used CNN model, so even for angled face we are able to track eye balls. The frames are being processed with the help of OpenCV and we create a black mask with the help of python's NumPy and find the 2-D coordinates of the points of the left and right eyes. Thresholding plays an important role here in creating a binary mask and we set a right threshold based on the lighting condition by first capturing a frame. We have made use of YOLOV3 and OpenCV to perform object detection. YOLOV3 is a real time open detection algorithm that identifies objects in videos, live feeds or images. Given an input image or video frame the output of will be a bounding box and a label. We use YOLOV3 with OpenCV as OpenCV allows us to see object detections in real time rather than saving in a file first and then opening the file. YOLOV3 was trained on coco datasets. We collect the names of these classes by and configure our object detection system by loading the YOLOV3 config file and weights file. It makes use of probabilities and class names in the dataset to detect objects. Since there will not be only a single detection for an object, the system overcomes this by making use of Intersection over Union and Non-max suppression

approach. When the algorithm detects an object, it predicts confidence value that the object belongs to a particular class. We define a threshold for confidence values, anything above the confidence value will be detected. Rectangular bounding boxes are created around the detected objects using the coordinates of the objects

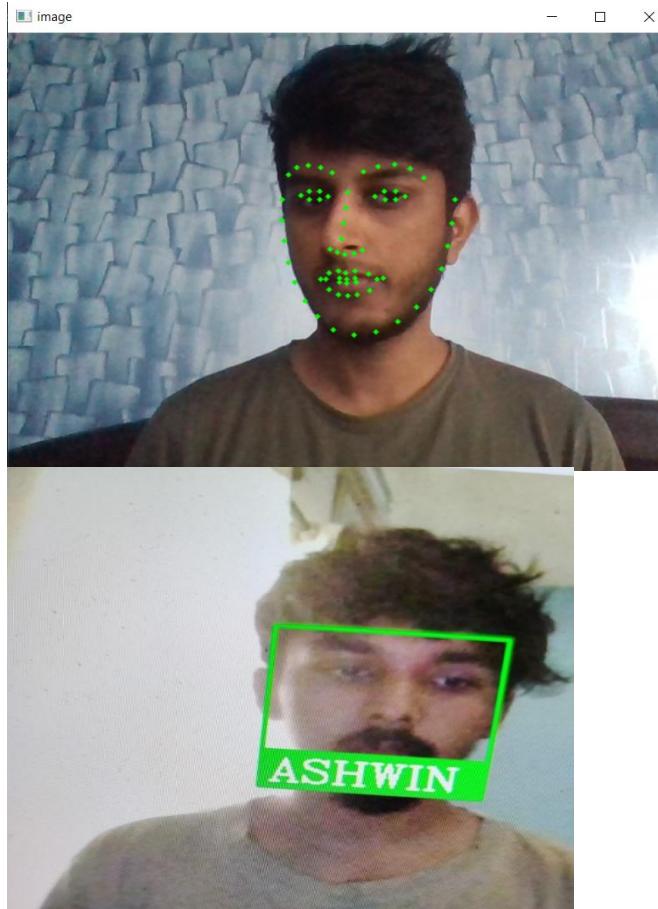


Fig.1. Facial landmarks
Recognition

Fig. 2. Face

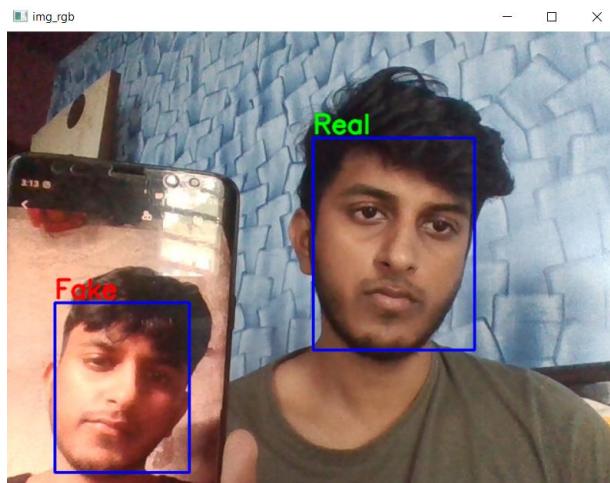


Fig. 3. Face Spoof Test

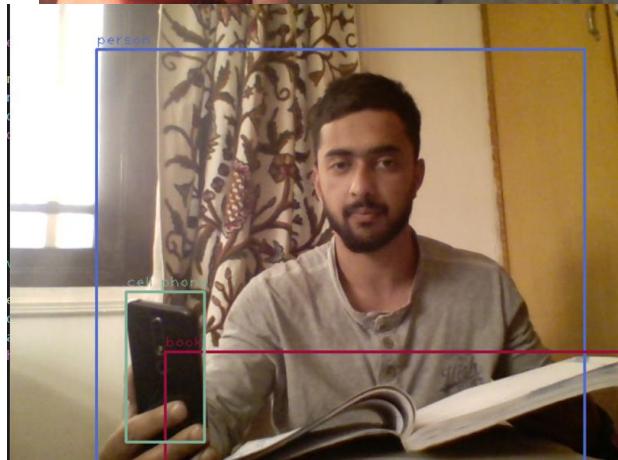


Fig 4. Object Detection

VI CONCLUSION AND FUTURE WORK

Online teaching still does not offer complete remote teaching in most cases, since there are many institutions that, in the evaluation process, continue to require the physical presence of the student in a specific place to unite the student and the examiner in said place, for supervisory reasons. It is a new trend in the education system and because of this it opened the door to many possibilities in online assessment sector-proctoring tools present allows process to be carried out remotely. The study helped to locate motivational factors determining implementation of education system. If we compare online proctoring with conventional methods, it is very much faster, cheaper and fairer. With the help of online proctoring the examination can be conducted in a safe manner without any problem and the it also ensures integrity and it also removes the chances of human errors and helps the conduction of exam in a much safer way which is good for both the students and the proctors. In Future we can develop a web base platform where we will be able to perform proctoring without any hassle.

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IOT Based Ubiquitous Health System

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ABSTRACT: The Internet of Things (IoT), is an idea and a model that incorporates an assortment of things or items that can communicate with each other through remote associations, link, cable wires and can work with others things or objects to make new administrations and applications to accomplish shared objectives, particularly in the biomedical field. This article proposes a m-IoT framework for distant observing of clinical signs. Clinical information can be obtained at the patient's home; information is recovered by an application on the cell phone and after an underlying handling, information is communicated to a cloud server. The family doctor or medical clinic specialists can counsel the information on this cloud server to follow the patient's advancement over the long run.

KEYWORDS: IoT (Internet of things),sensors.

I INTRODUCTION

In view of the way that in our every day life schedules the innovations,technologies become further developed, we can discover that we have the chance to work on the method of medical care in day by day life. For instance, it is very costly to go consistently to the family doctor, because of the time bumed-through for planning to a standard counsel for various sicknesses and indications, for example, pulse, blood glucose, weight, holding up before the bureau to be taken by the treating doctor, and to wrap things up, the hanging tight an ideal opportunity for the result of the examinations. Lately, PC innovation had a fast rising, its improvement is hazardous, being utilized today in every aspect of movement. Portability is vital these days. Cell phones are getting increasingly more open through cost, quality and execution. Android-based applications can turn out to be exceptionally valuable when they can interface with workers that store and oversee information bases by means of an Internet connection.The Internet of Things (IoT) is an idea and certainly a model that consider the pervasive presence of an assortment of things or articles that collaborate with one another through remote or wired associations with special tending to plans. These can work with others things or objects to make new administrations and applications to accomplish shared objectives. the primary objective of the IoT is to permit the things and objects to be associated whenever and anyplace with any client. Since gadgets can give data about them, the items can be perceived, can learn and take setting related choices. They can get to data that has been taken over by an association with different things, or they can be portions of complex administrations. The actuation of IoT advancements, for example, sensor organizations, RFID, M2M, portable web, semantic inquiry, information mix, IPv6 can be gathered into three classes, innovations that permit the getting of the relevant data, advances that permit the preparing of the context oriented data, advances that work on the security and secrecy of information (for instance clinical information for patients). This article proposes a m-IoT framework for far off checking of clinical signs. Hence, clinical information can be obtained at the patient's home; and are communicated to a cloud worker. The family doctor or clinic specialists can counsel the information on this cloud worker to follow the patient's development over the long run.

II RELATED WORK

[1]The Internet of things (IoT) can be perceived as a far-reaching vision with technological and societal implications. From the perspective of technical standardization, the IoT can be viewed as a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies (ICT). Through the exploitation of identification, data capture, processing and communication capabilities, the IoT makes full use of "things" to offer services to all kinds of applications, whilst ensuring that security and privacy requirements are fulfilled. NOTE – The IoT is expected to greatly integrate leading technologies, such as technologies related to advanced machine-to-machine communication, autonomic networking, data mining and decision-making, security and privacy protection and cloud computing, with technologies for advanced sensing and actuation.[2]

Utilization of information and communication technologies such as mobile phones and wireless sensor networks becomes more and more common in the field of telemonitoring for chronic diseases. Providing elderly people with a mobile-phone based patient terminal requires a barrier-free design of the overall user interface including the setup of wireless communication links to sensor devices. To easily manage the connection between a mobile phone and wireless sensor devices, a concept based on the combination of Bluetooth and near-field communication technology has been developed. It allows us initiating communication between two devices just by bringing them close together for a few seconds without manually configuring the communication link. This concept has been piloted with a sensor device and evaluated in terms of usability and feasibility. Results indicate that this solution has the potential to simplify the handling of wireless sensor networks for people with limited technical skills.[3] Management of chronic diseases is important to self-management for health. The IoT concept plays a significant role in self-management for health. In order to accomplish it, personal health devices need two functions such as application network protocol and intelligent service. But, most of them have only simple function such as indicating measured data and storing data temporarily. In this research, we proposed an intelligent service model for healthcare which gives an effective feedback to an individual. In order to do this, we introduced the collaboration protocol which transfers risk factors between IoT personal health devices. In addition to this, we proposed intellectualized service application algorithm which will be operated in the personal health device. Finally, based on the findings of the experiment, the effectiveness was confirmed on proposed model.[4] A body sensor network is a network of small sensor devices (biosensors) that sense health parameters of an individual, allowing 24/7 monitoring, providing biofeedback services. These networks have typically two layers: the sensor array and a sink node. The sink node manages the network, gathering sensor data continuously. However, raw sensor data is not enough to achieve biofeedback. One of the challenges body sensor networks present is the processing of raw biosensor data, in order to achieve a proper medical visualization of monitored parameters. This paper surveys some of the current approaches, proposes an interface classification based on features, and presents a solution based on a mobile device. The mobile application can run on a Java and Bluetooth enabled phone, allowing data retrieval, storage, and analysis in a single solution. The mobile application proposes a three-layer approach to BSN operation, adding the mobile device to the solution. The final system provides the user with a completely functional health-monitoring platform, which is easy to use and setup, validated through a complete series of tests on different mobile devices.[5] Internet of Things based health care systems play a significant role in Information and Communication Technologies and has contribution in development of medical information systems. The developing of IoT-based health care systems must ensure and increase the safety of patients, the quality of life and other health care activities. The tracking, tracing and monitoring of patients and health care actors' activities are challenging research directions. In this paper we propose a general architecture of a health care system for monitoring of patients at risk in smart Intensive Care Units. The system advices and alerts in real time the doctors/medical assistants about the changing of vital parameters or the movement of the patients and also about important changes in environmental parameters, in order to take preventive measures.

III. ARCHITECTURE OF INTELLIGENT SENSORS USED IN UBIQUITOUS HEALTHCARE

Distinguishing falling occasions for the older or those with locomotor handicaps is a generally ongoing worries of biomedical examination. The principal such framework was planned and carried out in the mid 2000s . The development of the human body is unpredictable, both by the volume involved during the development by the 6 levels of opportunity and by the extraordinary variety in the amplitudes of the developments. Additionally, contingent upon the anthropometric qualities of the various clients, the outcomes created by the sensors fit contrastingly in the field that relates to a specific class of occasions (for example fall, sliding, abrupt development, climbing steps, ground floor, and so forth) The improvement of the MEMS (miniature electromechanical movement sensor) exemplified moving sensors (speed increase) made it conceivable to do gadgets for checking human body development. Distinguishing occasions during patient exercises is resolvable by utilizing a few methods, liking to utilize the least difficult and best choice. The development of the human body can be dissected by video , acoustic or convenient sensors . SENLY is a mechatronic stage for surveying the fall hazard for the old by falsely presenting upsetting elements during the tests and breaking down the subject's capacity to control . The Intelligent Acceleration Unit (IAU) depends on speed increase sensors (ADXL202 created by Analog Devices), which produce signs to the PIC16LC66 microcontroller, the whole circuit being fueled by a 3V battery during the accelerometer information move.

The detection calculation for fall events is portrayed by the conditions beneath:

$$r = \sum_{i=1}^4 (af_i \text{ AND } ff_i)$$

$$af_i = [|a_i| > A](t, t + t_h)$$

$$ff_i = \left[(E_{HP,i} > E_{MIN}) \text{ AND } \left(\frac{E_{HP,i}}{E_{AC,i}} > F_{MIN} \right) \right] (t, t + t_h)$$

This calculation is based on the following assumptions:

a)the accelerometer module (IAU) put over the patient's support produces a sign surpassing the worth of +/- 2g at the hour of the fall, and

b)the recurrence band of this sign is 20 Hz . In the event that the speed increase limit An is surpassed by the worth artificial intelligence, speed increase on the I-hub, then, at that point the afi banner is enacted (high). Translation of sign recurrence is a touch more troublesome. On the off chance that the EHP (signal speed increase energy for a recurrence more noteworthy than 5Hz) supersedes the EMIN energy limit, the EHP will be more prominent than FMIN. An admonition condition might be embedded if r is more noteworthy than a foreordained worth if this compares to a circumstance less genuine than the fall.

For a superior exactness of occasions produced by the fall global positioning framework, they have utilized calculations on two degrees of translation. Subsequently, there are two stages in the fall occasion acknowledgment measure: in the initial step a pre-arrangement is performed utilizing the 1-class SVM (Support Vector Machine) calculation, then, at that point, for a more thorough order, the signs are prepared by the KFD (Kernel Fisher Discriminant) calculations and" k-NN (Nearest Neighbor) . The organigram explicit to this calculation is displayed in the Fig. 1.

Accelerometer signals are obtained from a three-hub sensor that is mounted on a cell phone. It began from the possibility that the cell phone is forever worn by the client for quite a while, not at all like garments that change starting with one season then onto the next as well as at times they are supplanted even every day.

Simple signs from the accelerometers are changed over into advanced signs and afterward dissected by the MCU. On the off chance that a fall occasion is recognized, the MCU will send a bundle of information to the worker by radio. Worker one is the expert and worker two is the reinforcement.

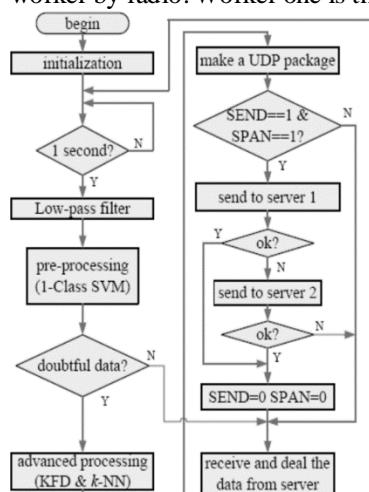


Fig .1. Flow interpretation of the fall events on two levels of analysis

Categories of events:

- Regular every day activities (walk, normal walk, etc.);
- low risk falls;
- high risk falls;
- critical movements;
- daily activities of higher intensity (gymnastics, running);
- Special moves (keeping the phone in your hand).

Reception of the cell phone as a host for a physiological boundary observing framework, for this situation for the checking of falls, has a few offices, for example, the presence of a force source (telephone battery) for driving the framework, an interchanges organization, utilizing the telephone show for certain messages. The size and weight of the telephone actually make it awkward to be worn continually during every day exercises; besides, for certain patients with cardiovascular conditions who are pacemaker clients, the cell phone can be a wellspring of the aggravation. Checking physiological boundaries open up the augmenting of the application field of compact electronic gadgets. Today, a wide scope of convenient gadgets are financially accessible, a large number of which are in the exploration stage . The greater part of these gadgets and hardware are intended for entertainment, not suggested for clinical checking of high-hazard patients. In the structure of an EU-subsidized consortium, the FP6 program imagined and fostered the model of an Advanced Medical Monitor (AMON) , this framework is considered as a feature of the up and coming age of convenient clinical checking PCs. AMON was planned as a clinical gadget for high-hazard patients who need perpetual checking, investigation, and securing of fundamental physiological information. The principle inventive element of this gadget is the capacity to screen different biomedical boundaries. The framework persistently screens and stores the upsides of the sore, oxygen immersion of the blood, and the patient's temperature. It is additionally outfitted with a speed increase sensor to demonstrate the degree of actual work of the patient. The framework sends continuous essential boundary esteems to a clinical centrum utilizing a cell phone association. There is likewise a chance of manual caution if the patient wants to request help. Correspondence is bidirectional, and furthermore the clinical staff can send instant messages. The battery that takes care of the electronic circuits has a 24-hour lifetime. Notwithstanding clinical use, AMON may likewise be utilized in quiet observing at home (as a homegrown clinical gadget). This suggests the improvement of functional highlights, for example, the execution of neighborhood information pre-handling calculations, the nearby choice to alarm clinical staff, and the utilization of a more extended battery. The design of the AMON framework incorporates the accompanying segments: the simple subsystem, comprising of a sensor, a UI subsystem, a correspondence subsystem, an advanced information preparing unit, and a force the board subsystem. The main sensor of the AMON gadget is a blood oxygen sensor and a heartbeat sensor. Skin temperature is estimated by a thermopile temperature sensor.

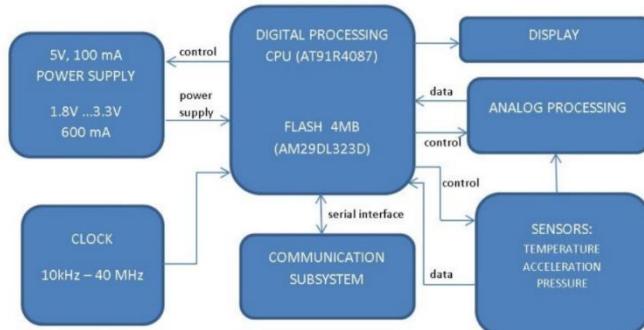


Fig .2. The Architecture of the AMON device

The UI is made in a basic manner to work with admittance to orders and for the old who are curious about current innovation. Messages got from the clinical centrum are shown on a 128x64 LCD show, and for messages to be sent physically, the patient will utilize four catches. For speaking with the clinical centrum, a Siemens, TC 35 GSM module is utilized, which has a low force utilization (35 mA) .The primary errand of the preparing unit is to control the ADC sensors and converters, UI control and correspondence with the clinical centrum. As a preparing unit, a microcontroller with an ARM 7 center is utilized, and it fuses sufficient RAM (135KB) and streak memory (4MB) to execute the whole calculation. The insight given by a savvy sensor is much more precise and intricate as it depends on a more extensive scope of information. By incorporating the information (quantitative) of a sensor, it is planned to acquire a subjective measurement. To permit Realtime estimation and assessment of human biometrics, a compelling and negligibly obtrusive body sensor organization (BSN) is required. BSNs are a vital innovation for the clinical transformation that permits patients to get to their physiological status information while performing typical exercises. BSNs frequently comprise of sensors that

can be connected to the human body and can communicate physiological data. The capacity to interface these gadgets to the body and conceivable combination with existing and future IT framework would bring about a ubiquitous climate that can send wellbeing data among clients and medical care suppliers. This, thus, will permit the improvement of a bunch of biomedical applications, bringing about expanded proficiency and accessibility of wellbeing administrations. The UWB (Ultra-Wide Band) sensor network offers awesome information move for short-range applications and minimal expense makes it ideal for multimodal sensor organizations. The framework can likewise be connected to the Internet, guaranteeing an adequate degree of individual data. The information procured from the sensors will be communicated to a focal passage (like the client's cell phone). The UWB framework should work in various conditions and a psychological methodology will be considered to make a shrewd method to move information from the client's cell phone. To permit distant online correspondence among sensors and facilities, the UWB collector will be associated with a got streaming organization inside the 5G stage.

IV. THE ARCHITECTURE OF THE PROPOSED M-IOT SYSTEM

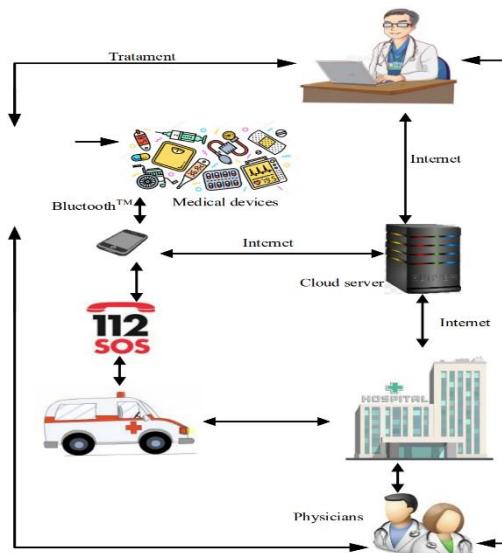


Fig .3.The Architecture of the proposed m-IoT System

The engineering of the proposed framework for far off checking of clinical information. This begins with the utilization of IoT advancements in medical care. Such a framework can be utilized by doctors to gather clinical information from hypertensive, diabetic and grim fat patients that can't be movable. In addition, there are individuals with visual weaknesses who experience the ill effects of diabetes, hypertension and weight, not being free and unfit to tally their information, take preventive measures and intercessions of the essential treatment, such a framework can be useful. The engineering of the proposed framework is introduced in Fig. 3. The buy application is executed on a cell phone or tablet with the Android working framework, web association (4G/5G or WiFi) and Bluetooth association for taking information from clinical gadgets. Truth be told, the Android application fills in as an IoT entryway that downloads information from a neighborhood organization (for our situation by means of Bluetooth from clinical gadgets), measures information at the edge of the organization (edge registering) and sends this information to a cloud worker where the information is incorporated. The bought information is investigated, and if the information isn't in the ordinariness diagram, surpassing a specific proclaimed worth, it is cautioned, contingent upon the seriousness of the boundaries being surpassed, the family specialist or in the most pessimistic scenario the crisis administration from the telephone's GPS, or on the off chance that it's anything but dynamic, the location set in the application). One of the principle issues of the patients with visual inabilities is that Android-controlled telephones and tablets don't have actual keys, regardless of whether there are applications that show the area of your finger on the screen (they are not really helpful when you're wet on your hands, demonstrating the area wrong and it gets confused). For this situation, you can utilize the administrations given by Android to coordinate the voice order part of the application into your application. The Fig. 3 outlines the usefulness of the proposed framework. Considering that clinical gadgets associate with the telephone through Bluetooth TM and the application deciphers the

information they can send over the Internet, we can say that it is essential for the Internet of Things, the application addressing an IoT hub at the edge of the organization. It puts the information in cloud worker utilizing a safe association, and the emergency clinic can recover this information intermittently or trigger an alert. In this cloud worker, there are saved all information for every persistent, addressing a background marked by understanding development. Various calculations can be applied to these information to decide the danger of sickness. At first, the application will recover information from the meter, circulatory strain gadget, shower scale, yet other clinical information procurement gadgets that help Bluetooth TM availability can be coordinated.

V. CASE STUDY-ACQUISITION OF BIOMEDICAL DATA

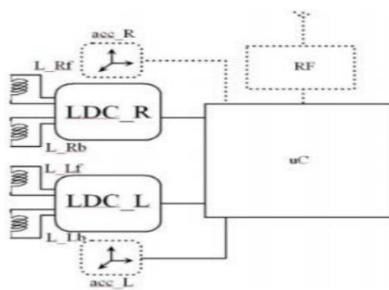


Fig .4. Inductive proximity sensors network-block scheme

In a starter research, there was proposed another strategy for surveying of step boundaries utilizing inductive sensors that are inserted in garments. An exploratory model was created to demonstrate the technique situating two planar inductive sensors close to the knee. The gained signals from sensors are unmistakably and could be utilized for step investigations without the need of sifting. In the primer exploration, there are fostering an inserted gadget that incorporates inductive and accelerometric sensors that are remembered for the wearable garments. The gained information are handled de-installed gadgets an in moved to a door utilizing a RF module. The new innovation used to foster progressed inductive sensors organization (see Fig. 4) along with ADC convertors opens the likelihood to foster wearable gadgets that are inserted in the garments. Along with a little microcontroller can be created savvy implanted gadgets. These gadgets can be utilized to play out a fundamental preparing of the information prior to being shipped off the entryway. In this part, it is introduced the application from the cell phone that procures information from a strain measure and from a wise sensor organization. Circulatory strain estimation utilizes a Bluetooth TM association with a pulse gadget that permits the client to save their estimation information in-application and store them on a cloud worker. In this manner, the client can see a chart with every one of the outcomes saved in the application. The family specialist can interface with the cloud worker and view graphically the development of circulatory strain over the long run. Toward the beginning of the application should be chosen a client. For this reason, it's anything but a popup window that asks which clients are enlisted or regardless of whether we need another client. The application can get to information from a pulse gadget and from other biomedical information procurement sensors by means of Bluetooth TM. In the client window, there is a textbox, where we compose the name, a radio catch where we select whether the client is male or female, and for age, stature and weight, a numeric textbox, in the wake of embeddings the information press the SAVE catch to save or DELETE to erase the client. The deliberate information are sent progressively to the application. The Fig. 5 shows the deliberate outcomes. In this window, we have the choice to save or overlook the estimation in the event that we didn't follow the signs and resume the estimation.

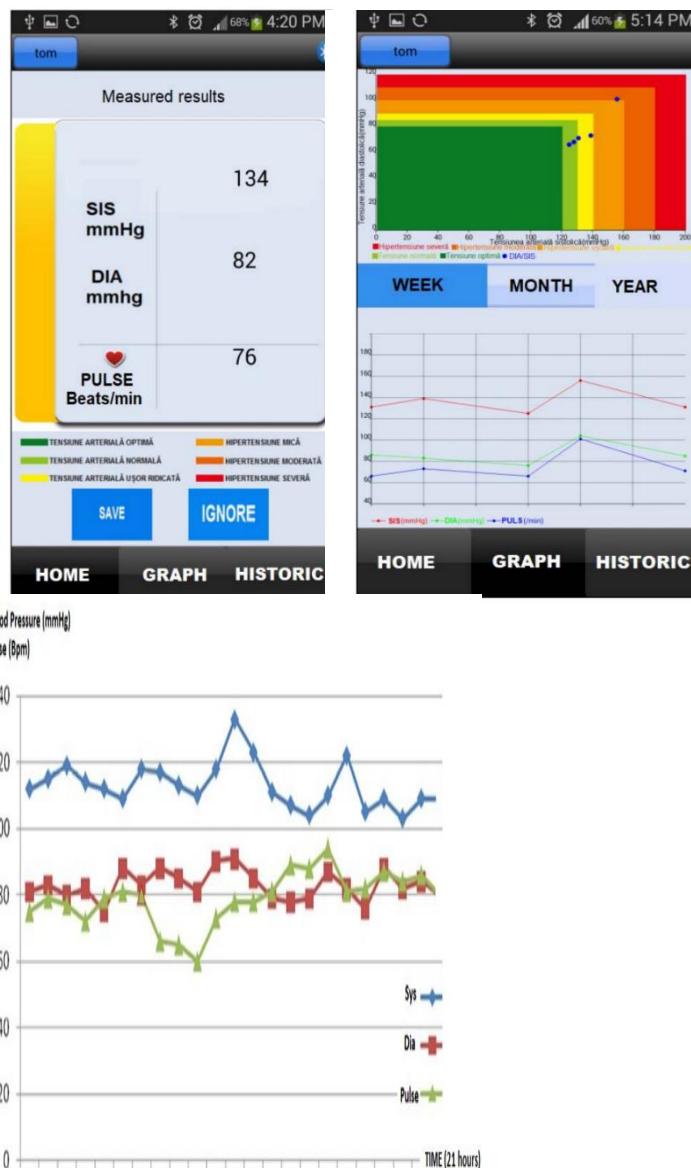


Fig 5. Displaying the measurement data Fig .6.Measurinng chartt per week Fig 7.Measuring data per hours

Pressing the GRAPH button is opened the illustrations window where a diagram of the deliberate history is drawn utilizing the week, month, and year buttons, depending on the deliberated information .

VI CONCLUSION AND FUTURE WORK

We have developed an application on the Android stage that intends to record the information estimated by the electronic circulatory strain gadget. The clinical information are sent to the BluetoothTM correspondence procedure where the client can enter the individual information to have a right register when sending all the information (counting estimated information) to his doctor. The client can alter the record data whenever by tapping the "alter" button. Because of the effortlessness of utilizing the clinical gadget to gauge pulse and ongoing information transmission, anybody without clinical preparing can utilize this application. Later on, we work on the appfor dazzle individuals, by adjusting Google's "TextToSpeech" motor created by Google Inc., the information to be sent by the gadget is string-like, and can be adjusted to different gadgets like the meter and the scale restroom. One thought that could prompt propelling innovation in this field would be the utilization in

emergency clinics and family specialists of such an application, having data set proof and additionally changing the current one with hypertensive, diabetic and the individuals who experience the ill effects of weight

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QUIC - Improving The Transport and Security Of The Domain Name System

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ABSTRACT: In the cutting edge world, individuals are progressively sending information over the network in the real world, which means tremendous benefit. Anything involves the transfer through the network of sensitive details such as passport information and credit card data, in the form of online shopping, paying the penalty, and booking a ticket in the film. The heart of the internet is known as the Domain Name System (DNS). Today, it is one of the foundational elements of the internet. DNS is one of the key components in the internet which acts as a starting point and informs you of the relevant IP addresses associated with domain names in day-to-day communication. The usage of DNS is not only for translating names and addresses and vice-versa but also for various security service improvements. Hence, protecting and securing the Domain Name System is one of the key interests in the arena of Cyber Security. The security of the transmission of the data relies upon the chance of the further presentation of PC advances in human existence. The paper presents an analysis and application of various protocols for improving the security and transport of the DNS System making the secure deployment and configuration procedures for the system that will be used in production. A new experimental transport protocol QUIC is developed, the system should not offer a client to wait for a longer time to get its response, also not degrading the security. Balance between the security and performance has to be achieved. The increasing level of applications and devices should require a well-defined application that generates a balance.

KEYWORDS: Domain Name System; Transport Layer Security; Quick UDP Internet Connections; DNS Over TLS; DNS over HTTPS; Transmission Control and User Datagram Protocol; Domain Name Systems Security Extensions; DNS Over QUIC; Transaction Signature; Application Layer Protocol Negotiation

I INTRODUCTION

People are transmitting data more and more across the network in the real world, which means tremendous benefit. Anything involves the transfer through the network of sensitive details such as passport information and credit card data, in the form of online shopping, paying the penalty, and booking a ticket in the film [1]. The safety of this knowledge depends on the likelihood that computing devices may further be introduced in human life. Data networks now use many protocols to ensure secure communication transmission, but in all cases, they cannot provide full security [2]. One of the basic building blocks of Internet Protocol (IP) communications is the Domain Name System (DNS). DNS focuses on the improved usability of the IP Communications System. One of the very generic uses of the system is to enable users to use user-friendly domain names, instead of complex numbers. In order to participate in the IP communication, numeric addresses are preferred. Hence, DNS here plays a key role in enabling the user to use a friendly name and the Domain Name System helps in mapping it to numeric addresses.

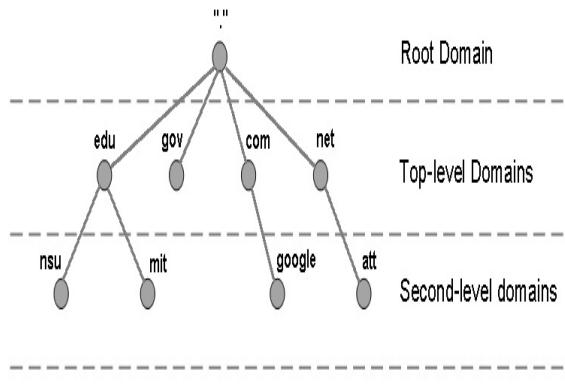


FIG-1 – DNS HIERARCHY

The system also helps the administrators to map names and numbers with ease. By handling the activity to the DNS. Using the DNS fig-1, we would be able to map 192.0.1.8 today and later change it to 192.0.1.9 without affecting any end users. The system solves by enabling them to do a DNS lookup, thus further enabling them to communicate. The IP Addresses can be changed as needed whenever and wherever possible. Being a Network Service, DNS has evolved from a simple lookup utility that serves name and IP Addresses, to a very complex supporting data, multimedia, voice and even security applications. The DNS is extremely scalable for such uses and applications.

Hence there exist a lot of loopholes in the system which paves a way for attackers to make changes, thereby posing a threat to confidentiality, integrity and availability of the service. If the DNS server is not set properly, the DNS problems exist. A vital role is played by DNS and name servers in internet communication overall. DNS is in widespread usage on different platforms, across multiple operating systems, with varied software applications, various operators, and a wide range of technical expertise. For security, the system must be made immune to hostile threats and attacks. Security problems will be overcome by using a well-planned secure deployment strategy.

TLS - TRANSPORT LAYER SECURITY

The Transport Layer Security (TLS) protocol secures the Internet by providing cryptographic services. This data transmission is done by setting up a simple TCP connection over an encrypted channel. When the client trusts the web server, the server will be verified using the digital certificate, thus proving the validity of the web server.



FIG-2 TRANSPORT LAYER SECURITY

In fig-2, the handshake protocol, the trust is built via a secret key established by negotiating a handshake between a web client and web server. It allows users to maintain control of their personal data and to help guarantee a secure transaction.

Before the TLS protocol all transactions were using the SSL protocol and due to too many security flaws they introduced TLS protocol with existing features as well as SSL 3.0 features. TLS relies on key exchange mechanisms to establish secure sessions. TLS just sits on top and secures the handshake process. TLS v1.3 is way faster and the handshake is also simpler and faster than its predecessors.

II PROBLEM DEFINITION

The current transactions of the Domain Name System happen largely over UDP. The generic transaction mechanism which it has is totally “un-encrypted”! Any malicious actor can tamper with the data and apply and reply accordingly. This creates very big and strong loopholes in the form of various server-side attacks, transit-level attacks & client-side attack in the system causing the issues in Confidentiality, Integrity and Availability of the system. These issues have been addressed by employing DNS security extensions such as DNS over HTTPS (DoH), DNS over TLS (DoT), and several other security enhancements to the system. A lot of security mechanisms including the encryption system which is used in the transport may cause overheads. The overhead elimination has to be carried at the other level than the client level.

The proposed work in paper aims to deliver a guide that mainly focuses on the secure deployment and improved transport protocol for the safe and low-latency transactions on the Domain Name System. The work provides an idea of the implementation strategy of the newer protocols at the both server side and client side, thus making the system more fast and secure, and also delivers the configuration and delivery of knowledge of various protocols and applications which are industry-standard, which aim at safe and best practices.

III QUIC - THE FUTURISTIC PROTOCOL

Unlike TCP, which has a high latency, QUIC (Quick UDP Internet Connection) is an upgrade which is designed to lower latency. A UDP-based protocol very similar to TCP, TLS, and HTTP/2 is being implemented as QUIC. TCP uses 3-step handshake protocol and if you combine it with TLS it increases the number fig-3. QUIC uses UDP as its basis, optimized for HTTP/2 semantics and TLSv1.3 by default.

The new transport is based on UDP, and therefore it has equal flow control, in the same manner as HTTP/2, and also comparable security, comparable to TLS and Record layer encryption. When it comes to reliability, features like efficiency, congestion semantics and advanced handling of network congestion are quite comparable to TCP.

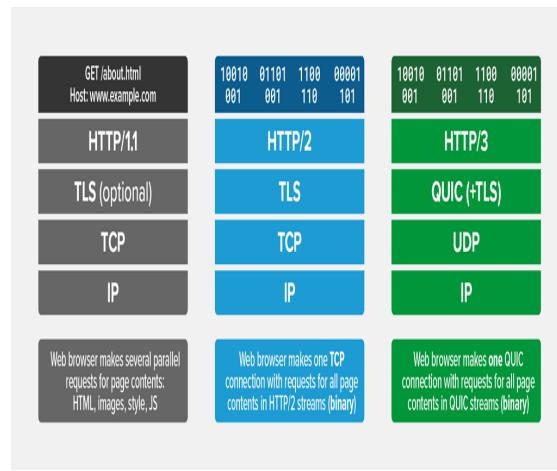


FIG-3 Comparision between HTTP/1.1, HTTP/2, HTTP/3

QUIC for DoH and a new DoQ:

- i. TLS + TCP + Streams = Functionality.
- ii. TLS version 1.3 used to establish and encrypt all packets (Include ACKs) and session keys.
- iii. The DoH can make use of HTTP/3 for very efficient data transfer over others.

- iv. The DoQ can make use of QUIC - Streams for very efficient data transfer over others.
- v. RTT connection establishment ratio is 0% when we compare with the TLS.

IV. IMPLEMENTATION

The Hardware setup: Virtual Machines have their specifications 2.3 GHz, 1 GiB RAM, 8 GiB of storage. The Operating System installed is a Linux-based distribution, Ubuntu 20.04 LTS. Network bandwidth is 100 Mbps.

The Dual Stack Network: AWS is one of the CSPs to offer IPv6 support natively.

Upgrades and Patching: Operating System needs patching at the kernel and application level. The patches are periodically done by unattended upgrades, which is handled by an application.

Domain Name Registration: The domain name “team-h.ml” has been registered to suit. Glue records are the means to attach our nameservers at the registrar so that we would be able to act as Name Server, but only for acting as Authoritative Name Server.

The Server Software Installation: Server software is one of the prime software that has the capability to answer client’s queries. Considering the NGINX application, BIND9 application is packaged and is available at major Linux-based distributions. Both server software have been installed and security measures have been considered even during installation.

Subdomain decisions for various uses: subdomains for offering services.

DoH - dns.team-h.ml

DoT - dot.team-h.ml

DoQ - doq.team-h.ml

Elliptic Curve Cryptography (ECC) and getting signed by a trusted CA: ECC is very fast when compared to the RSA algorithm. It has smaller key sizes and thus introduces lower overheads when compared to the RSA algorithm.

subject=CN = doq.team-h.ml

issuer=C = US, O = Let's Encrypt, CN = R3

subject=CN = dns.team-h.ml

issuer=C = US, O = Let's Encrypt, CN = R3

subject=CN = dot.team-h.ml

issuer=C = US, O = Let's Encrypt, CN = R3

Planning for Cipher Suites and TLS versions that promote PFS: Cipher Suites are the key components in TLS.

Supported Server Cipher(s): Table 1 and Table 2

Table-1: Supported Server Ciphers		
TLS Version	Length	CipherSuite
TLSv1.3	128 bits	TLS_AES_128_GCM_SHA256
TLSv1.3	256 bits	TLS_AES_256_GCM_SHA384
TLSv1.3	256 bits	TLS_CHACHA20_POLY1305_SHA256
TLSv1.2	128 bits	ECDHE-ECDSA-AES128-GCM-SHA256
TLSv1.2	256 bits	ECDHE-ECDSA-AES256-GCM-SHA384
TLSv1.2	256 bits	ECDHE-ECDSA-CHACHA20-POLY1305

Table-2: Server Key Exchange Groups		
TLS Version	Length	ECDH Curve
TLSv1.3	128 bits	secp256r1 (NIST P-256)
TLSv1.3	192 bits	secp384r1 (NIST P-384)
TLSv1.3	260 bits	secp384r1 (NIST P-384)
TLSv1.3	128 bits	x25519
TLSv1.2	192 bits	secp256r1 (NIST P-256)
TLSv1.2	260 bits	secp384r1 (NIST P-384)
TLSv1.2	128 bits	secp384r1 (NIST P-384)

V. RESULTS AND DISCUSSION

After deployment proceed to do the security and transport protocol tests. Test is conducted is in the early stages in standardization of the protocol QUIC, the results might have varying values.

The Name Server lookup:

The lookup done on our domain names evaluates to the IP Addresses. This shows that the **doh.team-h.ml** & **doq.team-h.ml** are directly pointing to the origin servers, whereas the **dns.team-h.ml** is pointing to the CDN.

\$ host dns.team-h.ml

dns.team-h.ml has address 104.21.94.127

dns.team-h.ml has address 172.67.135.252

dns.team-h.ml has IPv6 address 2606:4700:3035::6815:5e7f

dns.team-h.ml has IPv6 address 2606:4700:3036::ac43:87fc

\$ host dot.team-h.ml

dot.team-h.ml has address 52.66.195.98

dot.team-h.ml has address 13.234.18.191

dot.team-h.ml has IPv6 address 2406: da1a:c8: b200::15

dot.team-h.ml has IPv6 address 2406: da1a: d19:3d02:18af: b81c: e462:79f8

\$ host doq.team-h.ml

doq.team-h.ml has address 13.234.18.191

doq.team-h.ml has address 52.66.195.98

doq.team-h.ml has IPv6 address 2406: da1a: d19:3d02:18af: b81c: e462:79f8

doq.team-h.ml has IPv6 address 2406: da1a:c8: b200::15

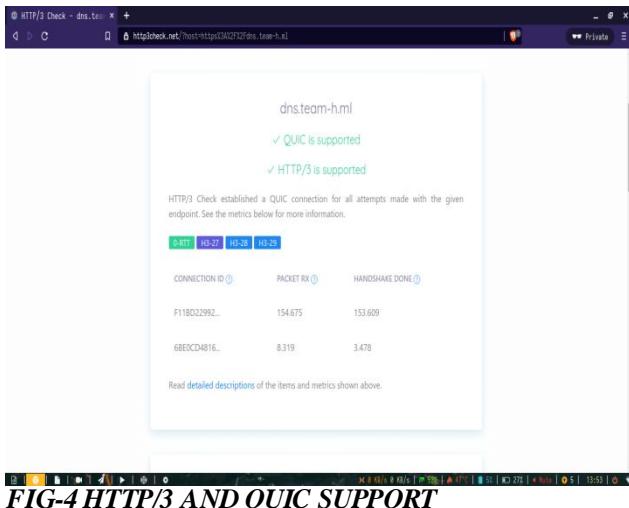
The DoH test over HTTP/2 and HTTP/3 (experimental):

The figure 4 shows the support of QUIC and HTTP/3 protocols which are tested by a site hosted by LiteSpeed. The test has been done on our servers and also on the CDN PoP. The testing server was successfully able to establish the QUIC connection and transfer application data over HTTP/3. There is a support for 0-RTT achieved using QUIC as a transport protocol. The subversions for HTTP/3 which have been proved to be supported are

H3-27 - HTTP/3 Draft version 27

H3-28 - HTTP/3 Draft version 28

H3-29 - HTTP/3 Draft version 29

**FIG-4 HTTP/3 AND QUIC SUPPORT**

The above versions have been implemented by most of the experimental servers and clients. Hence our servers support the protocol versions.

Considering the client side, the below are the results achieved and proves the support for various protocols like DoH, DoT, DoQ (experimental).

Once it is up, the DNS sample lookup should happen in such a way that it uses **10.154.65.49 (in our case)** as a DNS Resolver. Hence, on doing so,

```
; <>> DiG 9.16.15 <>> zappy.wtf @10.154.65.49
;; global options: +cmd
;; Got answer:
;; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 57791
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version:0, flags: udp: 4096
;; QUESTION SECTION:
;zappy.wtf.           IN      A

;; ANSWER SECTION:
zappy.wtf.        274     IN      A      15.206.111.111

;; Query time: 51 msec
;; SERVER: 10.154.65.49#53[10.154.65.49]
;; WHEN: Tue May 18 12:27:51 IST 2021
;; MSG SIZE rcvd: 54
```

FIG-5 DNS SAMPLE LOOKUP

Also note that the CDN at this stage is using HTTP/1.1, because it is considered optimal when compared to HTTP/2. HTTP/2 is not suitable for backend servers.

Domain Blocking section:

The below are some of the rules present in our RPZ Database. The test proves that our servers are capable of performing RPZ operations.

```
| zyrtc.4.p2l.info IN CNAME.
| zytpirwai.net IN CNAME.
| zytroxtk IN CNAME.
```

```

| zyzlk.com IN CNAME.
| zz.690tx.com IN CNAME.
| zz.cqcounter.com IN CNAME.
| zzhc.vnet.cn IN CNAME.
| zzz.clickbank.net IN CNAME.
| zzz.onion.pet IN CNAME.
| zzzrtrcm2.com IN CNAME.

```

VI CONCLUSION

We have successfully implemented one of the futuristic protocols to the Domain Name System. Successfully created a working model that makes use of the defined protocols, thus ensuring faster performance and security. The proposed system will help the users of the different network to do their basic resolution activities. The security features that come with QUIC enable secure delivery of the content. Hence, proposed model that fits in the Open Source world.

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A Study On Price Prediction Of Bitcoin Using Deep Learning

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Abstract: The development of cryptocurrencies has resulted in a fast increase in their usage. The high fluctuation of those currencies is that the motivation to analyse and predict their price within the market. Cryptocurrencies are a digital approach of money within which all transactions are held electronically. It's a soft currency that doesn't exist within the variety of form of notes physically. Here, we are emphasizing the distinction of fiat currency that is decentralized such that with no third-party intervention all virtual currency users will get the services. However, obtaining services of those cryptocurrencies impacts on international relations and trade, because of its high price volatility. There are many virtual currencies like bitcoin, ripple, ethereum, ethereum classic, doge coin, binance coin, etc. In our study, we particularly targeted on a popular cryptocurrency, i.e., bitcoin. From many types of virtual currencies, bitcoin contains a nice acceptance by totally different bodies like investors, researchers, traders, and policy-makers. To the most effective of our information, our target is to implement the efficient deep learning-based prediction models specifically long short-term memory (LSTM) and gated recurrent unit (GRU) to handle the value volatility of bitcoin and to get high accuracy. Our study involves comparison of these 2 time series deep learning techniques and verified the effectiveness in prediction the value of bitcoin.

Keywords : Crypto Curreny, Bitcoin, RNN, LSTM, GRU

1. INTRODUCTION

Virtual currencies are a kind of cryptocurrency that is a powerful technical achievement in digital marketing, nevertheless. Virtual currencies go on, and that they couldn't fully replace other or standard currencies. Within the current study, we are trying to indicate a motivating new perspective from that read of economics queries surrounding currency governance, the characteristics of money, political economy of financial intermediaries, and also the nature of currency computation.

Virtual currencies become the foremost favorable and used for business enterprise transactions everywhere the world [1, 2]. The recognition is due to its innovative characteristics like transparency, simplicity, and increasing acceptance through the world [3]. Within the current time, bitcoin is the most popular flourishing virtual currency. According to the web site <https://bitcoin.org>, viewed on April 01, 2021, the virtual currency value is about 500 billions of dollars, however it varies from time to time. Bitcoin may be a peer-to-peer cryptocurrency within which all transactions don't seem to be regulated or controlled by any third party. Third-party intervention between customers is not possible. It's extremely volatile value operating 24/7. Capitalisation of bitcoin is increased through time to time. Within the current time, over five hundred billions of dollars publicly traded. Due to its open-source nature, clear, transparent, simple, and time is saving that leads all virtual currencies within the world. Bitcoin is a worldwide and most well-liked cryptocurrency, initially introduced in 2008 and exploited as open source in 2009 by a person known as Satoshi Nakamoto, however it became extremely well-liked in 2017. Bitcoin functions as a decentralized moderate of electronic cash, with transactions well-tried and transcribed in a public distributed ledger (blockchain) without any third-party intervention. Transaction blocks contain a secure shell rule that is used to connect one another, and blocks are served as a non-editable knowledge that is recorded once the transaction is being held. Then any virtual

currency particularly bitcoin has been adopted by the people, and also the virtual currency market trend has been growing up. The popularity of bitcoin is increased within a brief amount of time. different technologies and business companies are joined with bitcoin.

As different researchers assured that once 2015 around 100,000 technology and business companies have started the bitcoin market. a number of the popular companies which are joined with bitcoin are Amazon, Microsoft, Overstock, In [1] this paper several works are done to predict time series, further as BTC value. However, any deep learning models haven't been much used however to predict the BTC price value. Knowing the deep learning models become progressive neural spec that improves prediction accuracy in varied domains as well as time series, we tend to consider applications of deep learning to predict the BTC value worth. In returning sections, we will explore previous works done on BTC price prediction, discuss deep learning models to predict the time series, and focus on 3 main articles which is able to function foundation of our work.

Primarily, the most challenge of bitcoin rate of exchange is its high rate of price fluctuation. High value volatility implies a particular live should be taken to predict the value of bitcoin accurately. Knowing the statement activity is important to inform regarding the longer term value of bitcoin and build trust further as acceptance throughout the world. Influenced by a range of things, like political system, public relations, and market policy of a country, will confirm economical role of bitcoin and international relation of nations on completely different market methods. Lastly, doesn't have an official road map: few key challenges and developments arising for bitcoin prediction are in consistent, as a result of there's no clear description of the exchange platform on that the transactions associated with buying and selling aren't regulated. the target of our current study is to forecast the bitcoin worth with improved efficiency using deep learning models and minimizing the risks for investors further as policy-makers.

2. RELATED WORKS

In [1] the author has observed that the prediction of cryptocurrencies using machine learning don't seem to be much enough, especially on deep learning models. according to the analysis of 2020, more than a thousand papers are published on this topic. Our literature survey covers work done on bitcoin (BTC) value prediction using completely different techniques, the need, and analysis of recurrent neural network (RNN) and its system design. In [4] this paper used completely different attribute choice mechanisms to get the foremost important features and applied machine learning methods like artificial neural network (ANN), support vector machine (SVM), and recurrent neural network (RNN) furthermore as k-means cluster within the bitcoin price prediction. How ever, one limitation of this study is only a lot of targeted on the investors. Policy-makers should be considered as a significant partner of the system as a result of cryptocurrency will change the dynamics of world economy. In [5] this analysis focuses on computational intelligence technique especially hybrid neuro-fuzzy controller so as to predict the exchange rate of bitcoin. This model used neuro-fuzzy approach and artificial neural networks. In [6] this paper proposed a deep direct reinforcement learning framework for financial signal illustration and trading. They combined the reinforcement learning, deep learning, and their current deep neural network to get precise prediction results. They used to validate the proposed approach using commodity future markets moreover as stock market data. In [7] this paper author has tried to predict the value of bitcoin using machine learning and investigate the trends of BTC surrounding. they have used twenty-five attributes concerning bitcoin to forecast the daily price variation. In [8] this paper they enforced machine learning algorithms to predict the exchange rate of daily value of high data availability cryptocurrencies like BTC, ripple, and digital cash. They applied RNN and GRNN to induce the prediction rate of high liquidity cryptocurrencies. In [9] this paper the author has been investigated the minimum accuracy of bitcoin value using LSTM and ARIMA model. In [10] this paper they projected the future stock price prediction using LSTM machine learning algorithmic rule. They particularly targeted on time series prediction as a result of it's a basic for share value prediction and alternative financial prediction models. And comparing with that of existing model ARIMA, LSTM algorithm provides efficient and correct results. In [11] this paper the scientist used various machine learning algorithms to predict the bitcoin value a lot of efficiently. In [12] this paper assured that bitcoin is that the new and preferred virtual currencies, whereas the security and its volatility rate are debatable. This study makes it functional for the peer-to-peer transaction of bitcoin through the network and also the blockchain technology.

3. PROPOSED METHODOLOGY

The proposed methodology considers 2 totally different deep learning-based prediction models to forecast daily price of bitcoin by identifying and evaluating relevant features by the model itself. once applying each the models for bitcoin prediction, we are able to verify that model is way a lot of correct for the future fulfillment of our target and select appropriate parameters to get a much better performance. during this work, we've got proposed deep learning mechanisms like Long -Short term memory and Gated recurrent Units that are the latest and efficient techniques for the forecasting of bitcoin price. As bitcoin is that the most popular cryptocurrency, the price volatility issue should be handled among a short period of time, Fig. 1.

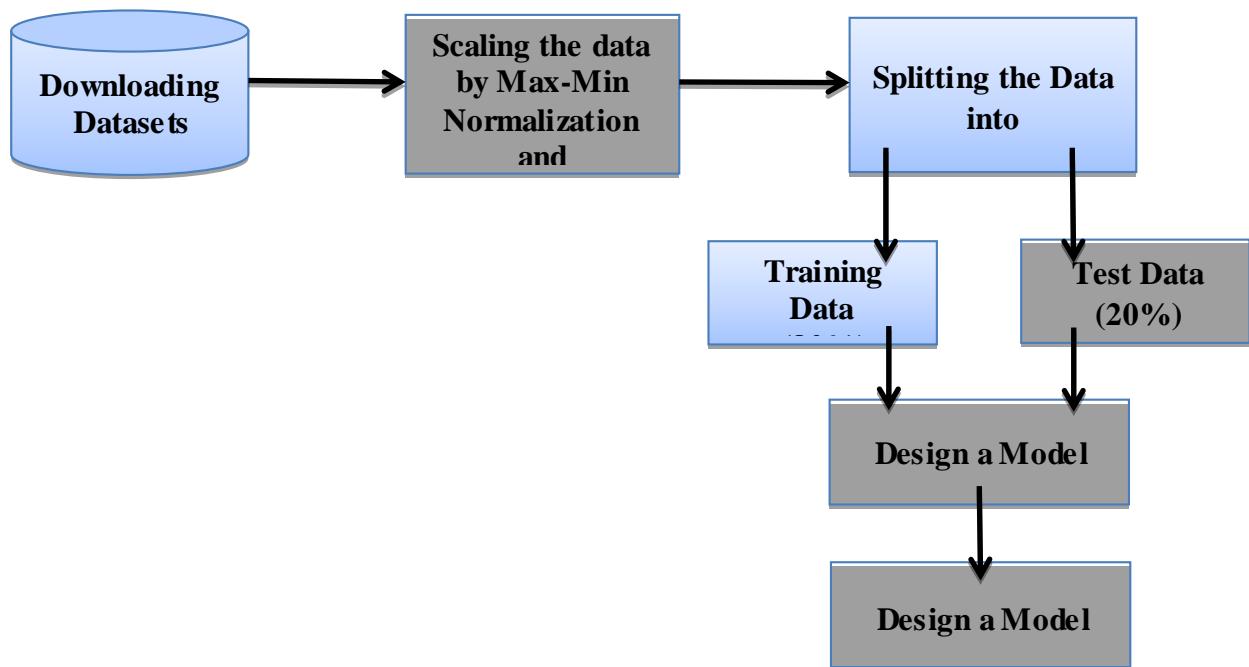


Fig. 1 Block diagram of proposed workflow

3.1 RNN (Recurrent Neural Network)

RNN may be a deep neural network characterized as a recurrent connection between the input and output of its neurons or layers and capable of learning sequences designed to capture temporal contextual data on time series data. they have recently gained popularity in deep learning due to their ability to overcome the limitation of existing neural network architecture wherever it involves learn over long sequences. 2 common RNN networks are LSTM and GRU and presented in the resultant sections.

3.1.1 LSTM (Long - Short Term Memory)

LSTMs are expressly designed to avoid the long-term dependency problem. Remembering data for long periods of time is much their default behavior, not something they struggle to learn. All recurrent neural networks have the form of a chain of continuation modules of neural network. In customary RNNs, this continuation module can have a very easy structure, like a single $\tan h$ layer.

The deep learning LSTM neural network overcome the issues with RNN related to vanishing gradients, by replacing nodes within the RNN with memory cells and gating mechanism. during this regard, it's an attractive deep learning neural architecture mostly on the account of its efficacy in memorizing long- and short-term temporal data at the same time, and it can be viewed an equivalent in LSTM design depicted in Fig. 2.

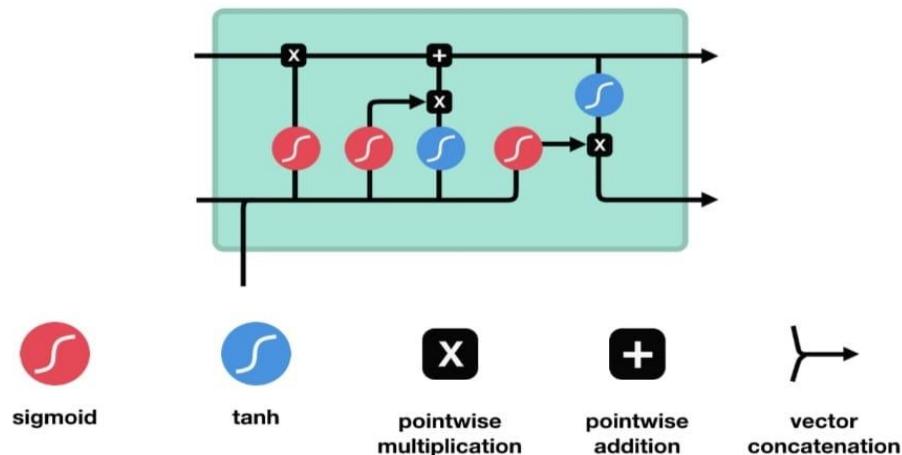


Fig. 2 LSTM Architecture

3.1.2 GRU (Gated Recurrent Units)

The GRU is the newer generation of recurrent neural networks and is pretty similar to an LSTM. GRU got rid of the cell state and used the hidden state to transfer information. It has also only two gates, a reset gate and update gate as shown in Fig. 3.

- **Reset Gate:** The reset gate is another gate that is used to decide how much past information to forget.
- **Update Gate:** The update gate acts similar to the forget and input gate of an LSTM. It decides what information to throw away and what new information to be added.

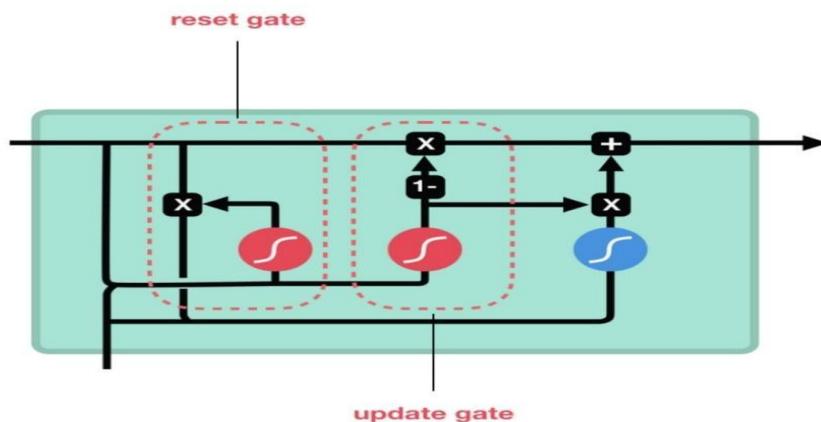


Fig. 3 GRU Architecture

4. SIMULATION RESULTS AND ANALYSIS

4.1 Data and Data Set Preparation Method

Data preparation is the process of collecting, combining, organizing, and structuring data, and then it can be considered as data visualization, analytics, and data mining with machine learning applications.

Data set preparation is a crucial step in machine learning. the data preparation impacts the accuracy of the predictions. Therefore, in this section, we should explain the details of the data sets. We will expose the methods used to prepare the data in scope of our model. The dataset used for this research consists of daily price value collected from Kaggle website <https://www.kaggle.com>.

In this dataset, there are seven attributes such as opening price, high price, low price, and closing prices and also the market cap of publicly traded outstanding shares.

Table 1 : Comparision of compilation time required both the deep learning-based models

Model	Compilation time (ms)	Epoch
LSTM	53	100
GRU	5	100

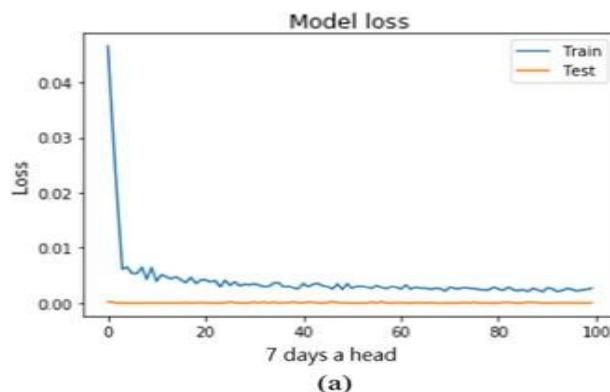
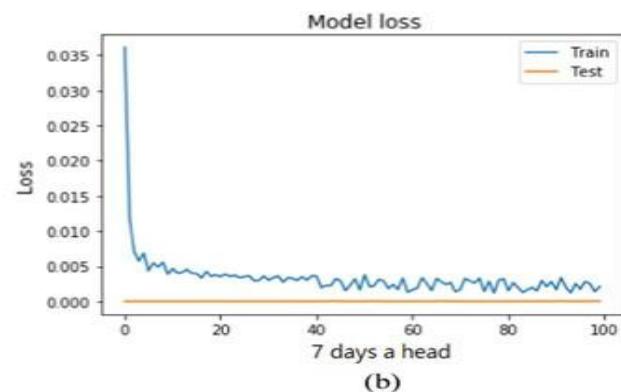


Fig. 4 (a) MSE graph obtained using LSTM model using GRU model



(b) MSE graph obtained

4.2 Performance Measures

One of the common ways to compare the time series models is to measure their performance for short- and long-term prediction. To validate the performance of these two models, we have used MAPE (Mean Absolute Percentage Error) and RMSE (Root Mean Square Error) as performance measure. These error values are obtained using LSTM and GRU and listed in Table 2.

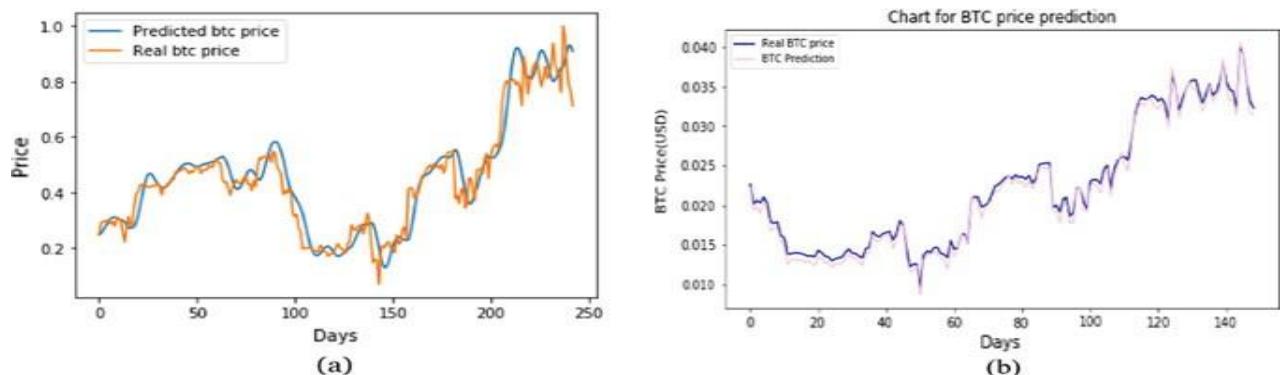


Fig. 5 Comparison of actual and predicted bitcoin price during training phase of LSTM (a) and GRU (b)

Table 2 : Comparison of RMSE and MAPE value obtained using LSTM and GRU models

Window size	Number of days ahead	LSTM		GRU	
		RMSE	MAPE	RMSE	MAPE
1	1	0.092	0.068	0.075	0.065
5	3	0.079	0.057	0.065	0.046
7	5	0.081	0.060	0.087	0.062
12	7	0.045	0.030	0.051	0.035
15	15	0.067	0.048	0.067	0.058

From this study, we found that the GRU-based forecasting model is more appropriate in order to forecast time series data of highest price volatility. As we have observed, from Table 2 the prediction accuracy of the LSTM is better at window size of 12 and days ahead of 7. However, in the rest of window sizes and days ahead, GRU model is more efficient than that of LSTM models and the comparison actual and predicted bitcoin price obtained.

4.3 Results

The proposed model of LSTM and GRU price prediction of bitcoin was trained, and also the predictions were carried out for popular cryptocurrency. The accuracy of the projected LSTM as well as GRU model is investigated by finding the root mean sq. error (RMSE) and mean absolute percentage error (MAPE) to determine that model has higher accuracy. we observed from the resultant Table one that LSTM takes more compilation time than GRU model. The MSE value obtained for seven days ahead from each the models is planned and shown in Fig. 4, and it's clearly observed that GRU is converging faster and steady than the LSTM model. From Fig. 5 a, b, it's discovered that the variation of actual value and predicted price is more in LSTM than the GRU.

5. CONCLUSION AND FUTURE WORK

Bitcoin is the most popular decentralized way of virtual currency which has a great role in the free market economy and avoids the intermediary of another third party between customers. The main objective of our study is to forecast the bitcoin price with the improved efficiency using deep learning models and minimizing the risks for the investors as well as policy-makers. We have implemented two deep learning techniques such as LSTM and GRU as prediction models. The study reveals that the GRU model is the better mechanism for

time series cryptocurrency price prediction and takes lower compilation time. LSTM and GRU models are more capable of recognizing long-term dependencies. In this study, we have only compared to basic deep learning-based models, i.e., LSTM and GRU. However, it needs to investigate further to enhance the accuracy of the deep learning-based prediction models by considering different parameters in addition to the previous one.

Features such as political system, public relations, and market policy of a country can affect and determine the price volatility of cryptocurrency. In our study, we have not considered other cryptocurrencies such as ripple, ethereum, binance coin, doge coin and others. We will enhance the model by applying on these cryptocurrencies so the model becomes a stable one. Fuzzification can also be incorporated at the input layer by considering the degree of participation of each of the features in the prediction.

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A Study On AI And Deep Multi-Layer Perceptron Based Methods To The Assistance Of Visually Impaired People

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ABSTRACT: Autonomous mobility can be a serious problem for people suffering from visual impairments and, even when walking on a well-known route, there are hazards along their path. While some are stationary and thus their position can be learned, many others are not and hence can't be detected. This study is to enhance the existing ENVISION system to ENVISION V2 by adding an obstacle classification method to ENVISION. The studied method is integrated into the ENVISION system to offer a Smartphone-based mobility aid that is capable of both detecting and providing information about the type of obstacles. The SPB method handles the high level of noise and bad resolution of images. It operates on partial visual information about obstacles. To overcome in this study related to obstacle classification, deep learning techniques are used on how to navigate safely, recognize encountered obstacles and moving independently from one location to another in unknown environments are some of the issues faced by visually impaired people. This study involves a consistent, reliable and robust Smartphone-based method to classify obstacles in unknown environments from partial visual information based on computer vision and machine learning techniques. Blindness prevents a person from gaining knowledge of the surrounding environment and makes object recognition, obstacle avoidance, and reading tasks a major challenge. To address these issues, this study focuses on a novel visual aid system for the completely blind. Because of its low cost, compact size, and ease-of-integration, Raspberry Pi 3 Model B+ has been used to demonstrate the functionality of the given prototype. The design incorporates a camera and sensors for obstacle avoidance and advanced image processing algorithms for object detection. The distance between the user and the obstacle is measured by the camera as well as ultrasonic sensors. . The system includes an integrated reading assistant, in the form of the image-to-text converter, followed by an auditory feedback. The entire setup is lightweight and portable and can be mounted onto a regular pair of eyeglasses, without any additional cost and complexity. Experiments are carried out with 60 completely blind individuals to evaluate the performance of the given device with respect to the traditional white cane.

I INTRODUCTION

Visual impairment is an umbrella term and in this may have either a totally blind person or a person with low vision. Recent statistics from the World Health Organization (WHO) shows that in 2018, 1.3 billion people live with some form of vision impairment, and 36 million of them are blind. In the difficult context of day to day life of visually impaired/blind persons, a white cane is used traditionally by the blind people to help them navigate their surroundings, although use of the white cane does not provide information for moving obstacles that are approaching from a distance. Moreover, white canes are unable to detect raised obstacles that are above the knee level. Trained guide dogs are another option that can assist the blind. However, trained dogs are expensive and not readily available. The Salma kammoun et.al suggested and validates a robust technology designed to alert users by the presence of static/dynamic obstacles few meters around them and to provide guidance/assistance in urban environments, in both outdoor and indoor spaces. The detection of obstacles is a fundamental prerequisite for a mobile robot in order to safely navigate in its environment. Static obstacles are incorporated when planning a path from the current position to a given goal. Dynamic obstacles are taken into account by the

local motion planning system in order to avoid collisions. While avoiding static obstacles such as walls, trees, and racks is quite straightforward, incorporating dynamic obstacles in motion planning is more challenging. In the first phase, the system detects static and dynamic obstacles in video streams. First, only a sub-grid of interest points is selected and tracked using the multi scale Lucas-Kanade algorithm. Then, camera/background motion is identified by recursively applying the RANSAC algorithm. In the second phase salma et.al considered the issue of obstacle classification. The image patches corresponding to the detected obstacles are now resized, while preserving the aspect ratio, and divided into 128 cells of 8 x 8 pixels. From each cell extract an interest point that is characterized using an adaptation of HoG (*Histogram of Oriented Gradients*) descriptor that captures the object structure from its surrounding regions. The Muiz Ahmed khan et.al suggested a novel visual aid system for completely blind individuals. The unique features, which define the novelty of the suggested design, include the following.

- 1) Hands free, wearable, low power, and compact design, mountable on a pair of eyeglasses, for the indoor and outdoor navigation with an integrated reading assistant.
- 2) Complex algorithm processing with a low-end configuration.
- 3) Real-time, camera-based, accurate distance measurement, which simplifies the design and lowers the cost by reducing the number of required sensors.

The suggested setup, in its current form, can detect both stationary and moving objects in real time and provide auditory feedback to the blind. In addition, the device comes with an in-built reading assistant that is capable of reading text from any document.

II. DEVICE OF THE METHODOLOGY DEVICE

Muiz Ahmed et.al suggested a visual aid for completely blind individuals, with an integrated reading assistant. The setup is mounted on a pair of eyeglasses and can provide real-time auditory feedback to the user through a headphone. Camera and sensors are used for distance measurement between the obstacle and the user. For the object detection part, multiple techniques have been adopted. For instance, Tensor Flow object detection application programming interface (API), frameworks, and libraries, such as OpenCV and Haar cascade classifier, are used for detecting faces and eyes and implement distance measurement. Tesseract, which is a free OCR engine, for various operating systems, is used to extract text from an image. In addition, eSpeak, which is a compact open-source speech synthesizer (text-to-speech), is used for auditory feedback for object type and distance between the object and the user. For obstacles within 40–45 inches of the user, the ultrasonic transducer (HC-SR04) sets off a voice alarm, while the eSpeak speech synthesizer uses audio feedback to inform the user about his or her distance from the obstacle, thereby, alerting the blind person and avoiding any potential accident. Raspberry Pi 3 Model B+ was chosen as the functional device owing to its low cost and high portability. Also, unlike many existing systems, it offers a multiprocessing capability. To detect obstacles and generate an alarm, a Tensor Flow object detection API has been used. The API was constructed using robust deep learning algorithms that require massive computing power. Raspberry Pi 3 Model B+ offers a 1.2 GHz quad-core ARM Cortex A53 processor that can output a video at a full 1080p resolution with desired details and accuracy. In addition, it has 40 general purpose input/output (GPIO) pins, which were used, in the suggested design, to configure the distance measurement by the ultrasonic sensors.

The methodology operates in four steps:

- speech recognition
- path finding
- obstacle detection
- Merging phase.

In step (1), the requested destination using (Google VoiceAPI) is recognized and passed to step (2) where a valid path to the destination is found. ENVISION implements step (2) using GPS technology (Google Maps API and Google Maps Directions API). Step (3) produces region(s) of obstacles which will be the input to obstacle

classification step (4). Finally, in the merging phase (step 5), ENVISION system generates an intelligent decision representing an appropriate voicedirective and an alert to the user when an obstacle is detected.

The obstacle classification method will be integrated as a step (4) in ENVISION system [ENVISION V2] as illustrated. The salma suggested the method that operates in two main steps which are obstacle classification and feature extraction (see Fig.4) It applies machine learning techniques for obstacle classification (Categorization / recognition) step that provides further information about the type of the detected obstacles. The detected Obstacles are marked as normal or danger based on its class. The salma kammoun et.al considers three class's person, vehicle and other. The method alerts ENVISION system when the obstacle is a person or a vehicle. In order to develop the suggested solution for automatic obstacle classification, salma et.al start by generating, in an off-line process, a classifier by exploiting deep learning techniques. Then, the generated classifier is used to classify obstacles in uncontrolled scenes. More specifically, author conduct work in two stages: Off-line learning.

III. IMPLEMENTATION AND EXPERIMENTS

Obstacle Classification

The obstacle classification step relies on two sub-steps:

- Learning and testing dataset preparation
- Classifier generation.

The classifier is used to determine the type of the detected obstacle in the images based on the visual features that were extracted from these images. The main objective of this stage is to generate a classifier that produces the most efficient obstacle classification under the aforementioned requirements (working in an unknown environment, offering maximum flexibility to the user and using the least expensive equipment). Among the existing machine learning techniques, Salma et.al adopt deep learning techniques for obstacle classification. First, build the learning set (huge number of labeled Obstacle images for each class) from the frames of videos which recorded the path in natural conditions in both indoor and outdoor environments. Second, identify the effective features for describing obstacles and build an n-dimensional table from training data. Third, select the appropriate deep learning technique to generate the classifier.

FIGURE 2: Complete workflow of the suggested system. The hardware interface collects data from the environment. The software interfaces process the collected data and generate an output response through the audio interface. Raspberry Pi 3B+ is the central processing unit of the system.

Figure 2 shows the complete workflow of the advised system with the hardware and software interfaces. Every frame of the video is being processed through a standard convolutional network to build a feature representation of the original image or the frame. This backbone network is then pretrained on Image-Net in the SSD model, as an image classifier, to learn how to extract features from an image using SSD. Then, the model manually defines a collection of aspect ratios for bounding boxes, at each grid cell location. For each bounding box, it predicts the offsets for the bounding box coordinates and dimensions. Along with this, the distance measurement is

processed using both the depth information and the ultrasonic sensor. In addition, the reading assistant works without interrupting any of the prior processes. All the three features run in the software interface with the help of the modules from the hardware interface. The suggested system integrates an intelligent reader that will allow the user to read text from any document. An open-source library, Tesseract version-4, which includes a highly accurate deep learning-based model for text recognition, is used for the reader. Tesseract has Unicode (UTF-8) support and can recognize many languages along with various output formats: plain-text, hocr (HTML), pdf, tsv, and invisible-text-only pdf. The underlying engine uses a long short-term memory (LSTM) network. LSTM is part of a recurrent neural network, which is a combination of some unfolded layers that use cell states in each time steps to predict letters from an image.

2. Classifier Generation

In order to select the appropriate deep learning technique for generating the classifier, salma et.al implement, test and evaluate six of deep learning techniques to validate the effectiveness of suggested method. These techniques are Multi-layer Perceptron (MLP), Convolutional Neural Network (CNN), Recurrent Neural Network (RNN), Self-organizing Map (SOM), Deep Belief Network (DBN) and Stacked Auto encoder (SAE). And evaluate the experimental results of the obstacle classification method based on the Accuracy Rate which is the Percentage of Correct Classification (PCC). Salma kammoun et.al can notice that the best results have been obtained with MLP and RNN techniques, while the worst results have been obtained with CNN and SOM techniques. Also, observe that the MLP and RNN techniques are able to classify the obstacles with high accuracy rate with nearly 98%. As it can be observed, a CNN returns the worst results since the number of features is 66 and it is not possible to use a large number of layers. Hence, for further experiments, salma et.al can train the images themselves rather than the features which may offer a better accuracy rate but requires a high performance GPU. Also, in the case of SOM, the accuracy rate is very low and it is not possible to change the architecture of the network map because it must contain 3 nodes corresponding to 3 classes. Although salma et.al can try different distance functions and typologies but it will not increase the accuracy rate. Therefore, MLP and RNN are the most suitable to classify obstacles into person, vehicle and other. And salma et.al selects MLP since it is most commonly used in classification tasks while RNN is suitable for speech recognition and handwriting prediction tasks.

The salma et.al provided experimental results concerned with several aspects of suggested obstacle classification method. And uses only 2D frames that are captured by a smartphone camera at a resolution of 320×240 pixels. The frames are highly challenging because they are captured with a high level of noise, bad resolution and changes in the illumination conditions. Also, different types of camera/background motions are present and the entire obstacle may not fully appear in the image since the user carries the smartphone at 45° angle and uses the landscape mode. In order to evaluate suggested method, salma et.al carried out a series of experiments based on standard metrics. The experiments 1 and 2 are conducted before integrating the method into ENVISION system and experiment 3 and experiment 4 are conducted after the integration.

IV. CONCLUSION AND FUTURE WORK

Here this study concludes to extend ENVISION system to ENVISION V2 and enhance the ENVISION by adding an obstacle classification method. The suggested method is integrated into the ENVISION system to offer a Smartphone-based mobility aid that is capable of both detecting and providing information about the type of obstacles. The advice method handles the high level of noise and bad resolution of images. It operates on partial visual information about obstacles, since the obstacle may not fully appear in the image. To overcome the challenges related to obstacle classification, salma kammoun et.al adopted deep learning techniques to generate a classifier for classifying obstacles. And conduct several experiments to find the best architecture of deep

learning technique which is suitable to the context. The suggested method was evaluated by a series of experiments with various videos against different conditions. Salma et.al obtained significant results from each experiment study, that indicate the efficiency of advice method. The suggested method has excellent categorization capability (close to 98% of classification rate) which is obtained by MLP and RNN techniques. Salma et.al selects MLP and applies it to new recorded test videos where each video includes different challenges. MLP achieves a maximum accuracy rate of 90.2%. Thus, salma et.al can conclude that MLP is the most appropriate technique for obstacle classification. The discussed method is applied and evaluated in real-time, and integrated into the ENVISION system. It achieves a maximum accuracy rate of 91.1% in real-world experiments. The reading assistant performed well under brightly illuminated settings. One major limitation of the reading assistant, as pointed out by the users, is that it was unable to read texts containing tables and pictures. A cost analysis was done with similar state-of-the-art assistive navigation devices. A detailed discussion, on the software and hardware aspects of the advised blind assistant, has been given. A total of 60 completely blind users have rated the performance of the device in well-controlled indoor settings that represent real-world situations. Although the current setup lacks advanced functions, such as wet-floor and staircases detection or the use of GPS and mobile communication module, the flexibility in the design leaves room for future improvements and enhancements. In addition, with the advanced machine learning algorithms and a more improved user interface, the system can further be developed and tested in a more complex outdoor environment. Future works will focus on increasing and improving the accuracy of the obstacle classification method on real-time by training more classes and changing or normalizing the features. In addition, in order to improve the suggested method and make the visually impaired people able to gain more information about the surrounding environment, salma et.al plan to add extra functionalities to provide the user with more information. For instance, it would be interesting to add face recognition in case the person is one of the visually impaired friends, and to determine the velocity (speed) of a dynamic obstacle. This information can make the users more in-charge of the situation and decide for themselves.

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Portable Camera Based Text Reading of Objects for Blind Persons

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ABSTRACT: This paper proposes a transportable camera-primarily based assistive text reading framework to help blind people to read textual content labels and product packaging from hand held objects of their daily use. The gadget framework includes three practical additives: First, scene seize -the use of a mini camera, the textual content which the user needs to study gets captured as an picture and has to be sent to the photo or records processing platform., second, records processing -in which textual content might be filtered from the surrounding and will be diagnosed with the aid of optical man woman popularity (OCR) software program, and sooner or later, Speech output - A filtered text can be passed into this system to get an audio output. In addition to text reputation the usage of OCR, the venture additionally includes template matching method as a separate method for spotting certain gadgets like foreign money notes. Since the undertaking should be transportable to assist the blind humans, the entire software is based on Raspberry Pi.

KEYWORDS: Portable, image processing platform, optical character recognition (OCR), template matching, Raspberry Pi.

I INTRODUCTION

There are over billions of visually challenged human beings global. A most important part of this population remains blind even in advanced international locations like United States. The national fitness interview survey carried out in 2008 stated that over eighty-five of the grownup Americans lack the potential to see. In recent times development in computer imaginative and prescient, digital cameras and portable computer systems assist to useful resource these people by using developing digicam primarily based merchandise that combine pc imaginative and prescient era with already existing merchandise consisting of optical person popularity (OCR). There are few gadgets which could provide higher get right of entry to common handheld objects an awful lot as product applications and objects revealed with text. Formulating devices that are even greater transportable and sophisticated can promote independent residing and foster monetary and social self-dependency. The maximum difficult element in assistive analysing machine for blind humans is - positioning of object of hobby inside the digital camera view. In order to awareness the object within the camera view, a camera with extensive attitude is used as an approximate answer. Often text from the encircling regions is likewise blanketed. Thus, to extract the hand-held items from the image we proposed movement-based technique to isolate the location of hobby and textual content popularity is accomplished handiest at the area of interest.

II METHODOLOGY

Image Acquisition:

The Image procurement segment gathers scenes containing objects of interest as pictures. Here, for the most part accessible and minimal expense webcam is utilized for picture securing.

Pre-processing and Gray Scale Conversion:

To make the system more robust i.e work for noisy conditions, image pre-processing methods like noise filtering are applied. For the purpose of reducing the processing time of the overall process, the input is converted into Gray Scale. Pre-processing of document images is the way of using mature image processing

techniques to improve the quality of images. Its purpose is to enhance and extract useful information of images for later processing purposes. Two pre-processing tasks, thresholding and noise removal, are performed here.

Edge detection:

Edge detection is a set of mathematical method which aims at identifying point in an image at which image brightness changes sharply or has discontinuities. Such points are typically organized into a set of curved line segments called as edges. The Canny Edge Detection Algorithm is used in edge detection.

The algorithm runs in various separate steps:

- Smoothing
- Finding gradients
- Edge tracking by hysteresis (Final edges are determined by suppressing all edges that are not connected to a very certain (strong) edge).

Thresholding:

It is a simplest method of image segmentation from a gray scale image. Thresholding can be used to create binary image. The method used in thresholding is Otsu's method. Otsu's method selects the threshold by minimizing the within-class.

Automatic Text Extraction:

Then, an automatic text extraction algorithm is implemented to detect the region containing the label text. In order to handle complex backgrounds, two novel feature maps to extracts text features based on stroke orientations and edge distributions, respectively are used. Maximally stable external region is used in automatic text extraction. MSER can be used to define image regions with their outer boundary according to the intensity of a scene street image.

Optical Character Recognition:

Text recognition is performed by off-the-shelf OCR prior to output of informative words from the localized text regions. A text region labels the minimum rectangular area for the accommodation of characters inside it, so the border of the text region contacts the edge boundary of the text character. However, OCR generates better performance if text regions are first assigned proper margin areas and binarized to segment text characters from background. We propose to use Template matching algorithm for OCR. The output of the OCR is nothing but a text file containing the product label (its name) in textual form. Audio output component is to inform the blind user of recognize text code in the form of speech or Audio.

Text Identification and Audio Output:

Subsequent to extricating the content from the foundation, the content of the item is perceived and is changed over into the sound structure. Here we will catch the picture of an item or any sort of picture which has a book on its anything but a scaled down camera mounted on scenes. After securing of picture different tasks are should have been acted to extricate text from the picture. First and foremost, pre-handling steps are acted in which separating of the picture, expulsion of camera is finished. In the wake of separating, we convert the picture into dark scale picture and thresholding activities are performed. The motivation behind these tasks is to improve and separate valuable data of pictures for later preparing purposes. Next task is to isolate the content from the foundation wherein we are going think about the double and upset twofold picture Now the content edge is isolated (i.e., characters are isolated) by utilizing division. By utilizing OCR (object character acknowledgement) characters are examined and these characters are contrasted and the information base made. Presently when these characters are perceived, these characters are at last changed over into the sound yield

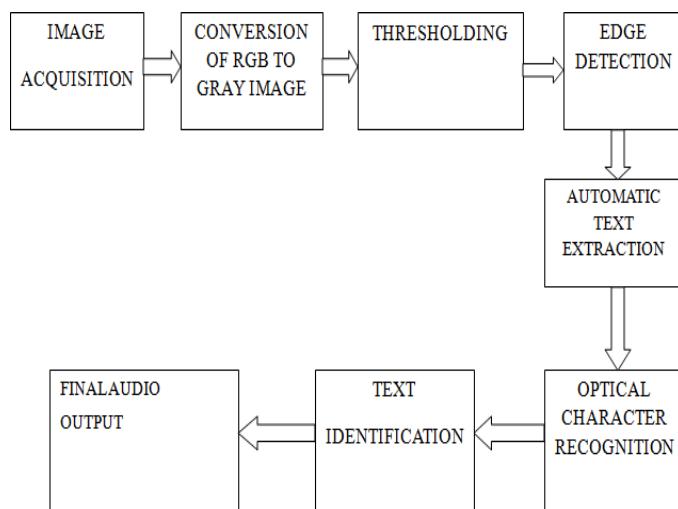


Fig: Block diagram of project using OCR

III Results using Template Matching method

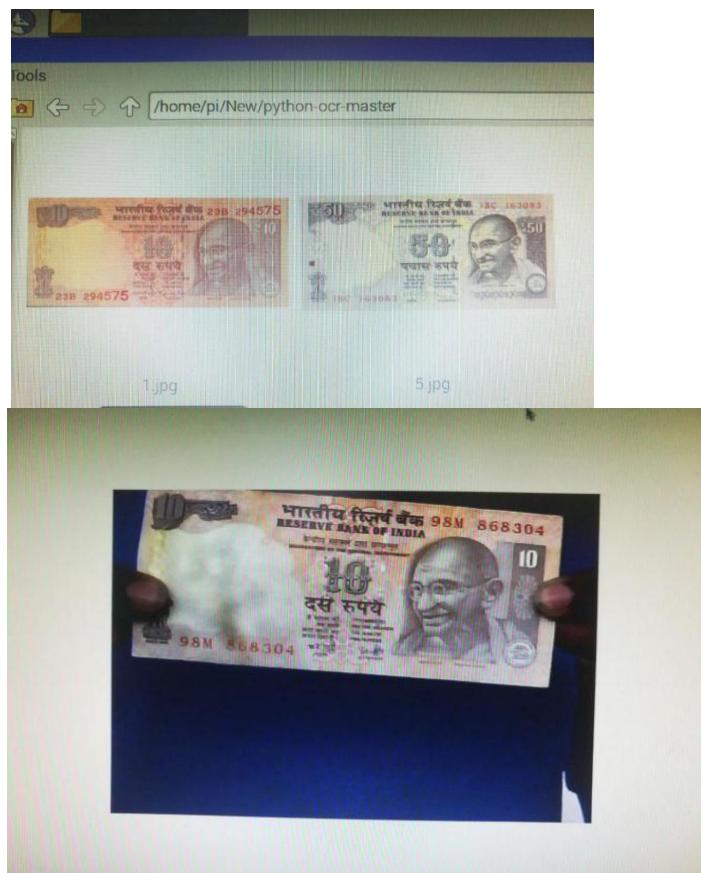
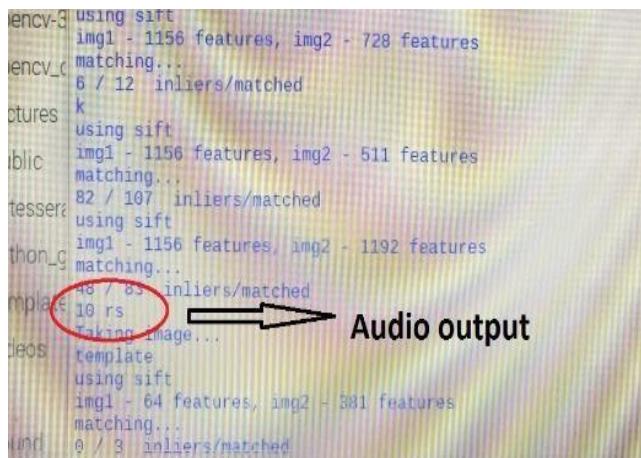


Fig: Template images in database

Here caught test picture of the item is contrasted and format pictures in the data set and toward the end we get the yield as the item name as displayed featured on the screen.



```

encv-3 using sift
img1 - 1156 features, img2 - 728 features
matching...
6 / 12 inliers/matched
k
encv-3 using sift
img1 - 1156 features, img2 - 511 features
matching...
82 / 197 inliers/matched
public
tesseract
thon-g
mpla
10 rs
Taking Image...
template
using sift
img1 - 64 features, img2 - 381 features
matching...
0 / 3 inliers/matched

```

Audio output

Fig: Output of template matching method

Henceforth the preparing of text is done and the yield is changed over into sound yield which can be heard through headphones.

IV CONCLUSION

Along these lines, this paper proposes a camera-based assistive content perusing structure to assist dazzle people with perusing text marks and item bundling from hand-held articles in their day by day lives. Results are effectively gotten for all writings having a text dimension of around 1 inch and more on non-complex foundations utilizing OCR technique. Victories are additionally gotten utilizing layout coordinating. This technique is more appropriate for money notes. Cash notes are habitually utilized by everyone including blind people and its acknowledgment precision should be 100%. In future, we will utilize more viable calculations so our framework can distinguish text which are little in size and furthermore the writings which have different complex foundations.

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A Study on Interface for Sighting and Navigating Visually Impaired

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ABSTRACT: The objective of this study is to improve the quality of life for the visually impaired people by restoring their ability to self-navigate. Generally, the visually impaired people need to count on the people who verbally describe the place and distance between the objects and this creates the difficult situation for the people and the visually impaired. For this reason, the virtual reality applications with the sensitive interfaces came into the existence. With the sensitive interfaces (voice, beeps, gestures) the creation of the virtual scenario can be performed. And also, with the voice interface with the help of cognitive maps the sight-to-sound human-machine interface (STS-HMI) helps the visually impaired for navigation which converts the visual context to binaural acoustic cues that helps in establishing the cognitive maps by the visually impaired people.

KEYWORDS: visually impaired, Human-Computer interface, Cognitive map, Virtual reality applications, Acoustic cues, Indoor Navigation.

I INTRODUCTION

The visual sense provides a complex set of information about the surrounding environment. Generally, humans rely very heavily on the visual input to perform the functions like object detection, navigation and object avoidance. In the concept of the visually impaired people, this becomes difficult.[7]. This can be acquired by providing the spatial information with the cognitive maps for the blind people.[4] A cognitive map is a representative expression of an individual's cognitive map knowledge, where cognitive map knowledge is an individual's knowledge about the spatial and environmental relations of geographic space.[4] Most of the information used by the people for the cognitive mapping of spaces is gathered through visual channel. As the author (Jacobson) suggested that the supply of the appropriate spatial information through compensatory sensorial channels can be as an alternative to the (impaired) visual channel. With the visual channel the cognitive maps help the blind people for the formation of spatial knowledge. VRA use a mix of interfaces to facilitate the learning process; these interfaces can be sensitive and cognitive. Sensitive interfaces such as beep, voice or vibration make usage of the senses whereas cognitive interfaces refer to the way a person learns. Along with these, the audio-tactile maps also allow blind people to form the mental representations of space which are developed by spatial knowledge. Many Haptic-Acoustic interaction metaphors were developed by using the virtual environments. In this study, with the presence of these virtual applications an interface was developed where the avatar is moved in the virtual environments and with the cognitive maps the visually impaired people find the objects, navigation takes place. The avatar walked through the virtual environment to detect obstacles. As sensitive interfaces, the voice, beeps and gestures were used to inform about the obstacles that fall within the security zones two in the front and two on the sides. A greater effectiveness would be associated to a greater percentage of objects and structures detected with these interfaces.[1] With the extension of these cognitive maps for a good navigation and object identification the interface called sight-to-sound human-machine interface was introduced where the visual context from the scenes is converted into the binaural acoustic cues. This is based on the voice prompts or the haptic cues. As the voice interfaces plays the vital role in forming the cognitive maps. According to the study, the need of the tactile devices is more important for guiding the visually impaired people about the virtual visits. [2] With the sensitive interfaces, the verbal assistance is also

important to overcome many challenges. The Audio-Touch Interfaces (Gomez et al., 2012) contributed to improved spatial perception, allowing blind people to selectively explore environments. Using these interfaces, the sight-to-sound human-machine interface (STS-HMI) owns a camera to perform a scene analysis and generates novel binaural acoustic cues as feedback.[1] Indoor positing can be achieved through triangulation, pattern matching, direct sensing, dead-reckoning. This spatial information can be provided at two levels, which are perceptual level and conceptual level. At the perceptual level, the deficiency from the visual channel should be replaced by other senses such as acoustic or haptic. At conceptual level, consists of orientation strategies including spatial models or surface mapping.[8] These virtual cues are critical for navigation in indoor and complex environments. However, the sighted people can navigate while determining the location. Therefore, if visually impaired people can perceive visual cues from the environment, it will be much easier for them to navigate.

II RELATED WORK

A. The visually impaired people face difficulties while moving in an unfamiliar place and they need to count on the people or the rehabilitation technicians who verbally describe about the environments. So, in this study, the use of VRA with the three sensitive interfaces and a cognitive interface, with the purpose that blind people can explore an unknown place and acquire enough information about the structure of the environment and the obstacles existing inside it, and then perform tasks in the real environment equivalent to the virtual place explored.[1]

B. As the blind people acquire more spatial knowledge and rely on the cognitive maps. These cognitive helps in finding the objects and navigation with the haptic cues for the blind people. In respect to this, the sight-to-sound human-machine interface is introduced where the visual context converts them into the binaural acoustic cues. This improves the visually impaired peoples mobility with minimal effort.[2]

C. Most of the information used by people for the cognitive mapping of spaces is gathered through the visual channel. This study was based on the assumption that the acquisition of appropriate spatial information (perceptual and conceptual) through compensatory sensorial channels (e.g., haptic) within a virtual environment simulating a real target space may assist people who are blind, with the help of the multi-sensory virtual environment. For this, the multi-sensory virtual environment (MVE) is developed which helps the blind people in navigation, locating the objects and identifying the physical characteristics of the space.[3].

III METHODOLOGY

In this study, the sensitive interfaces are considered in two levels.: sensitive and cognitive. The sensitive interfaces studied were: voice, beeps and gestures; in addition, a vibration pattern was used to inform the participant that the avatar walked through the virtual environment. The cognitive interface chosen was proximity exploration. In the sensitive interfaces the RT voice application was used to generate three females voice patterns with the different playback speeds. These informs the names of the nearby objects and the structures that entered or left the frontal and lateral security zones of the avatar in the virtual space.

A. Cognitive Interface

In the cognitive interface, the user's avatar walks through the virtual room. The user receives the auditory and tactile feedback. With the help of the feedback the seated user could easily turn in all the directions to change the orientation of the avatar. The vibration indicates the user about the avatar walking. This interface uses the security zones called No-FaA and FPS zones that are activated when the avatar begins to walk through the virtual room.

B. Virtual Rooms

- Since large spaces are difficult to control and the participants require sufficient time in the environment to have adequate knowledge of the indoor space. The virtual environments are developed for the identification of the objects by the blind people
- The number of obstacles are permitted blind people to remember the names of objects, structures and their location in space after an exploration session. The position of the objects and their orientation was changed, to generate the necessary number of spaces for the test with blind people
- In each application and scenario, a colour code was assigned accordingly; the beep was black, the voice has yellow and the gesture was white. These applications were installed on smartphones with Android versions 4.4.4 and 5.0.2. was chosen to virtualize the rooms and build the VRA, due to its ability for modifying the program and change the structures and interior objects and also because it is cross-platform.

C. STS-HMI Navigation System

The STS-HMI system was designed on a smartphone platform to analyze scenes and to identify objects for navigation. Fig. 1 illustrates the necessary steps for a user to navigate. Navigation can be achieved by recognizing key objects, following the predetermined waypoints, and spotting signs. Key objects help the blind people to construct a cognitive map. Waypoints help the visually impaired to navigate by staying on a predetermined path. Signs provide essential guidance information regarding safe and reliable paths in complex spaces in scene analysis, when an unsafe situation arises, such as encountering stairs or being on course to a collision, the STS-HMI system can be designed to generate a voice prompt to warn the user to proceed cautiously. Complementing acoustic cues with voice prompts enables users to interact with the environment for efficient and safe navigation.

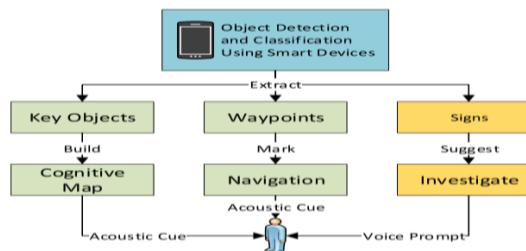
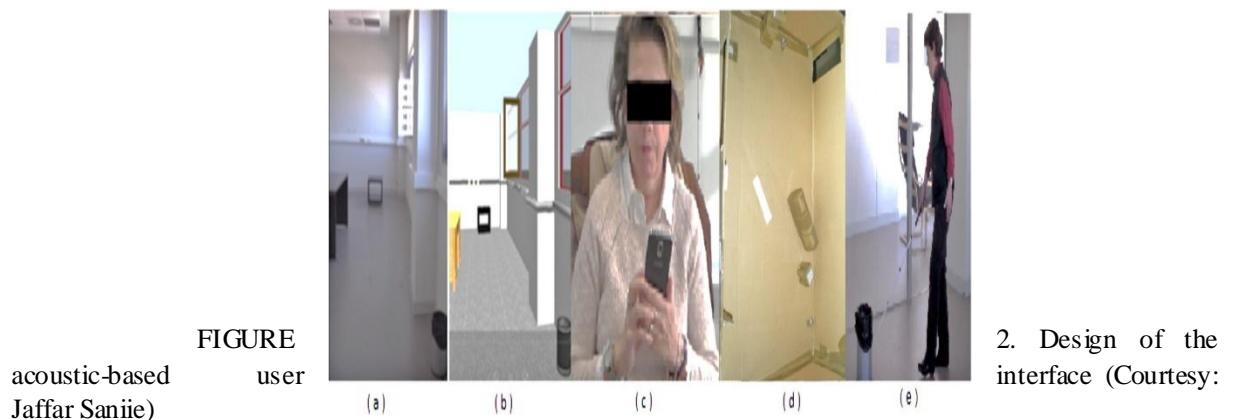


Figure 1. Block diagram for the STS-HMI navigation system (Courtesy: Jaffar Saniie)

D. Acoustic-Based Human-Machine Interface

Mobile devices such as smartphones can assist visually impaired people by capturing and analyzing a scene for object detection, identification, and localization, as shown in Fig. 2. A smartphone empowered by neural networks can detect and classify objects in a scene. The classified objects can be translated into sub band binaural acoustic cues. Through photo geometry, a machine vision system can calculate the location and the aspect of detected and classified objects. Based on an object's location and aspect, binaural acoustic cues can be generated for the blind people's perception.

The navigation systems assist the visually impaired people through voice prompts. For example, Microsoft's Seeing AI application analyzes video footage captured by a smartphone and sends verbal commands to the user for guidance. But, in practice, it is difficult for a voice prompt to keep up with changes in a scene in a continuous manner. It takes a whole sentence for a voice prompt to describe a static scene. Hence, when a person is moving, verbal cues will not be able to pass sufficient information in real time without hampering the mobility of the person. Besides, the machine-generated voice prompt interferes with the natural communication activities of the visually impaired people. Therefore, the development of the efficient binaural acoustic cues in the STS-HMI system are helpful to counter such challenges.



IV. ARCHITECTURES OF SENSITIVE INTERFACES AND STS-HMI

This study provides a solution that is based on the virtual environment and the user interfaces like sensitive and cognitive interfaces of the visually impaired people. The identification of the objects in the virtual environment is a procedural step as follows:

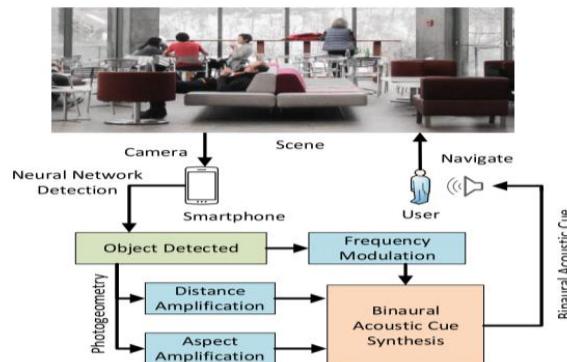


Figure. 3. Procedure: a) real scenario, b) virtual scenario-training, c) exploration, d) model, e) tasks. (Courtesy: Carlos Martin)

a) Training: The participants used a training application, which consisted of a virtual space with few obstacles, to become familiar with the interfaces that would be used during the exploration. The virtual space Fig. 3b was constructed based on Fig. 3a. The participants received the support of a team member at all time; they were given no time constraints.

b) Exploration stage: The participant explored one of the three virtual rooms (office, pub, or bedroom) using the configurations. They were asked to explore the room until they felt they could describe its structures and objects. The participant began the exploration, sliding his/her finger on the touch screen (See Fig. 3c); and ended when he notified the researcher, who was responsible for closing the exploration screen. The participants had no time restrictions in this activity. In this stage the duration of the exploration, the time of inactivity, the name of the obstacle and the route taken by the user were recorded.

c) Post-test questionnaire: Each participant was asked to indicate the number of walls, windows, doors and columns that blind people remembered from the previous exploration stage and these answers were manually recorded by a member of the research team.

d) Model: The visually impaired people select a cardboard model from three available options, only one corresponded to the empty virtual room previously explored. Twelve objects were delivered one by one to the participant, where six of them were in the room and another six did not correspond. Finally, the participant places the objects to scale within the model. A photograph of the resulting model was taken at the end (See Fig. 3d). In this stage it was recorded the: identification of the empty room, identification of objects, time dedicated to identification, location of objects and pairs of objects within the model.

e) Performing tasks: The participant was driven to the real physical space equivalent of the virtual room. At the beginning he/she was placed at the same location and position as the avatar, and then the participant was asked to complete three tasks: a relative one, an absolute one, and an orientation one. A member of the research team told to the participant toward which objects he/she must walk (Fig. 3e). The duration of the task and its success or failure was recorded.

B. Extracting Visual Cues for building cognitive maps in STS-HMI

Constructing cognitive maps is feasible using scene analysis, object detection, and identification, in this STS-HMI, the YOLO (you only look once) is used as the objection detection engine for extracting visual cues from a scene. This YOLO is a state-of-art and real-time all-purpose neural network for detecting a vast variety of objects. The COCO (Common Objects in Context) data set which was used to train the YOLO network. The COCO data set contains 80 categories of indoor environments which include homes, offices hospitals. In practice, depending on the indoor environments, only a fraction of the object categories is relevant for scene analysis.

C. Locating objects using photogeometry in STS-HMI

Typical cameras are not designed to measure the distance of an object in captured images. The projection of an object onto the image plane is determined by the intrinsic matrix of the camera and the spatial relationship between the camera and the object. This intrinsic matrix

describes the optical characteristics of the camera which includes the distortion, focal length, and resolution of the image sensor. Consequently, the intrinsic matrix needs to be measured only once for the particular camera. The projection of an object can be approximated using the pinhole model. In the pinhole model, the size of an object on the image plane is determined by the principle of similarity.

D. Acoustic based Human Machine Interface.

a) Navigation and object representation:

SLAM (simultaneous localization and mapping) is used to estimate the motion of the user and to map an indoor environment by analysing camera footage. SLAM estimates the movement of the camera by comparing the changes between two frames. Fig. 4 shows a sighted person searching for Room 6. Instead of counting the number of steps toward the intended location, this person will arrive in Room 6 right after passing the Restrooms. Therefore, to guide a visually impaired individual, a guiding system needs to detect the location of the restrooms and then convey this information to the user to construct a cognitive map. Therefore, the STS-HMI system is designed to convert visual cues into acoustic cues and to guide visually impaired users by making them perceive a cognitive map.

Human hearing perception can locate and unravel multiple sound sources. One can achieve such cognitive ability by analysing interaural time differences (ITDs) and interaural level differences (ILDs) of sounds. ITDs represent the difference between the arrival time of the same sound in both ears. ILDs represent the difference in the loudness of the sounds. By manipulating these two acoustic cues, a system can guide human perception with the location of sound source. In this study, the STS-HMI system relies on human perception for sound source localization. Moreover, through training, visually impaired individuals can develop a more sensitive sense of hearing and sound source localization.

V. CONCLUSION

In this study, the virtual visits in advance for the blind require training with a mobile to become familiar with the interfaces. These visits allowed the participants to gain spatial knowledge of an interior unknown space before visiting it and the STS-HMI is used to help visually impaired people to navigate in indoor environments; This system relies on the human-machine interface which helps in navigation and localization of the objects in respect to the real-world environments. With the virtual reality applications and with interface any environments can be easily registered by using the smart mobiles and cameras. Along with these, the indoor navigation technique is to assist visually impaired person with the help of the cognitive maps.

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Forecasting on Crime Analysis and Prediction using Machine Learning

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Abstract- Crime is one of the biggest and dominating problem in our society and its prevention is an important task. Daily there are huge numbers of crimes committed. It is required to keep track of all the crimes and maintain a database which may be used for future reference. The current problem we face are maintaining of proper dataset of crime and analyzing this data to help in predicting and solving crimes in future. Our task is to predict which category of crime is most likely to occur at what place and what time. The objective of this project is to analyze dataset which consist of numerous crimes and predicting the type of crime which may happen in future depending upon various conditions. In this project, we will be using the technique of machine learning and data science for crime prediction. In our project, we analyze crime data from the city of Vancouver. It consists of crime information like location description, type of crime, date, time, latitude, longitude. The Random Forest algorithm and various other algorithms will be tested for crime prediction and one with better accuracy will be used for training. The objective of this project is to give an idea of how machine learning and analysis of crime can be used by the law enforcement agencies to detect, predict and solve crimes at a much faster rate and thus reduces the crime rate.

Keywords: Crime prediction, Machine learning, analysis, Support Vector Machine (SVM), One nearest neighbor (1NN), Naïve Baye.

I. INTRODUCTION

Crime, in a way, influences organizations and institutions when occurred frequently in a society. Thus, it is necessary to study the factors and relations between different crimes and to find a way to accurately predict and avoid these crimes. Recently law enforcement agencies have been moving towards a more empirical, data driven approach to predictive policing. However, even with new data-driven approaches to predict crime, the fundamental job of crime analysts still remains difficult and often manual, specific patterns of crime are not very easy to find by way of automated tools, whereas larger-scale density-based trends comprised mainly of background crime levels are much easier for data-driven approaches and software to estimate. Here we will take an interdisciplinary approach between computer science and criminal justice to develop a Machine learning paradigm that can help solve crimes faster. More specifically, Crime is naturally unpredictable. It is not necessarily random; neither does it take place persistently in space or time. A Good theoretical understanding is needed to provide practical crime revention solutions that equivalent to specific places and times. Crime analysis takes past crime data to predict future crime locations and time. Crime prediction for future crime is a process that finds out crime rate change from one year to the next and projects those changes into the future.

II. RELATED WORK

Crime prediction is done on data set in which various machine learning models are used. Comparison of models like KNN, Naïve Bayes, and SVM is done this paper. It is seen that prediction varies depending upon the dataset and features that have been selected. The prediction accuracy found in is 78% for KNN, 64% for GaussianNB, 31% for SVC. Auto regressive integrated Moving average models was used to make machine learning algorithms to forecast crime trends in urban areas. One of the major problems in crimes is detecting and analyzing the pattern of crimes. Understanding datasets is also an important concept in this case. We

surely want to accurately predict so that we don't waste our resources due to false signals. Algorithms like KNN and neural networks are developed, tested and crime prediction is done. It is observed that many machine learning models are implemented on datasets of different cities having unique features, so predictions are different in all cases. Classification models have been implemented on various other application like prediction of weather, in banking and finances also in security. Most of the research in crime prediction is finding the location of crimes and doing analysis based on proposed area-specific models using geographical data. Based on the review and studying previous work, KNN classification and decision tree models is shown to be giving high accuracy so we choose to use the same to predict crimes

III. METHODOLOGY

Project Flow:

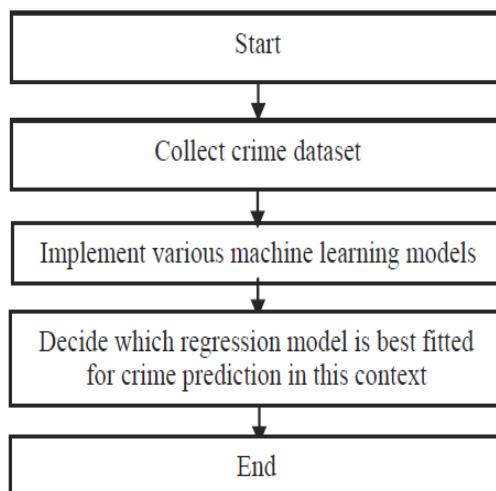


Figure1:Data flow

A data-flow diagram is a way of representing a flow of data through a process or a system .It also provides information about the outputs and inputs of each entity and the process itself .A data-flow diagram has no control flow, there are no decision rules and no loops.

EXISTING WORKS:

Crime data mining is taking onward attention to explore hidden patterns in crime data. Based on existing research, it has been observed that data mining techniques assist the procedure of crime patterns detection. To analyze the crime data, classification and machine learning algorithms are used. Employ an ensemble of data mining classification techniques to perform the crime forecasting.

A variety of classification methods such as: One Nearest Neighbor (1NN), Decision Tree , Support Vector Machine (SVM), Neural Network (Neural) with 2 layer network, and Naïve Bayesian (Bayes) were used to predict the crime "hotspot", Finally the best forecasting approach was proposed to achieve the most stable outcomes.

PROPOSED SYSTEM:

Predictive Modeling: Predictive modeling is the way of building a model that is capable of making predictions. The process includes a machine learning algorithm that learns certain properties from a training dataset in order to make those predictions. Predictive modeling can be divided further into two areas:

1. Regression

2. Pattern classification.

Regression models are based on the analysis of relationships between variables and trends in order to make predictions about continuous variables. In contrast to regression models, the task of pattern classification is to assign discrete class labels to particular data value as output of a prediction.

Pattern classification Example of a classification model is - A pattern classification task in weather forecasting could be the prediction of a sunny, rainy, or snowy day. Pattern classification tasks can be divided into two parts, Supervised and unsupervised learning. In supervised learning, the class labels in the dataset, which is used to build the classification model, are known. In a supervised learning problem, we would know which training dataset has the particular output which will be used to train so that prediction can be made for unseen data.

This process includes methods to remove any null values or infinite values which may affect the accuracy of the system. The main steps include Formatting, cleaning and sampling. Cleaning process is used for removal or fixing of some missing data there may be data that are incomplete. Sampling is the process where appropriate data are used which may reduce the running time for the algorithm. Using python, the preprocessing is done.

System Architecture

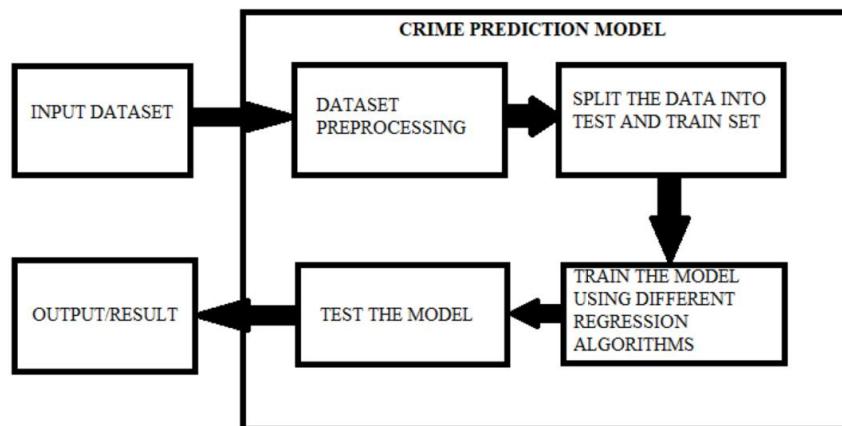


Figure2: System Architecture of Crime Prediction model

Data Preprocessing Techniques

1) Import the libraries

A library is also a collection of implementations of behavior, written in terms of a language that has a well-defined interface by which the behavior is invoked. For instance, people who want to write a higher-level program can use a library to make system calls instead of implementing those system calls over and over again.

We need to import 3 essential python libraries.

1. **Numpy** is the fundamental package for scientific computing with Python.
2. **Pandas** is for data manipulation and analysis.
3. **Matplotlib** is a Python 2D plotting library which produces publication quality figures in a variety of hard copy formats and interactive environments across platforms.

2) Import the data-set

Data is imported using the panda's library.

```
Data = pd.read_csv('Crime_Data.csv')
```

```
X = data.iloc[:, :-1].values # [:] [:,-1]
```

```
Y = data.iloc[:, 3].values
```

Here, X represents a matrix of independent variables and y represents a vector of the dependent variable.

3) Check out the missing values

There are two ways by which we can handle missing values in our dataset.

a) The first method commonly used to handle null values. Here, we either delete a particular row if it has a null value for a particular feature and a particular column if it has more than 75% of missing values. This method is advised only when there are enough samples in the data set. One has to make sure that after we have deleted the data, there is no addition of bias.

b) In the second method, we replace all the NaN values with either mean, median or most frequent value. This is an approximation which can add variance to the data set. But the loss of the data can be negated by this method which yields better results compared to removal of rows and columns. Replacing with the above three approximations are a statistical approach to handling the missing values. This method is also called as leaking the data while training.

For dealing with missing data, we will use Imputer library from **sklearn.preprocessing** package. Instead of providing mean you can also provide median or most frequent value in the strategy parameter.

```
from sklearn.preprocessing import Imputer
```

```
imputer = Imputer(missing_values='NaN', strategy = 'mean', axis = 0)
```

Next step is to train the imputer instance with the data stored in X(predictors).

```
imputer = imputer.fit(X[:, 1:3])
```

```
X[:, 1:3] = imputer.transform(X[:, 1:3])
```

4) Splitting the dataset into Training and Test set

In Machine Learning we create models to predict the outcome of certain events. To measure if the model is good enough, we can use a method called Train/Test. Train/Test is a method to measure the accuracy of your model. It is called Train/Test because you split the the data set into two sets: **a training set and a testing set** you train the model using the training set. You test the model using the testing set. Train the model means create the model. Test the model means test the accuracy of the model.

```
from sklearn.model_selection import train_test_split
```

$$y=mx+c$$

```
X_train, X_test, y_train, y_test = train_test_split(X,Y,test_size = 0.2, random_state= 0)
```

5) Feature scaling

When your data has different values, and even different measurement units, it can be difficult to compare them then we need to scale into new values that are easier to compare.

You do not have to do this manually, the Python `sklearn` module has a method called `StandardScaler()` from `sklearn.preprocessing` which returns a Scaler object with methods for transforming data sets.

Feature scaling or data normalization is a method used to normalize the range of independent variables or features of data. So when the values vary a lot in an independent variable, we use feature scaling so that all the values remain in the comparable range.

```
from sklearn.preprocessing import StandardScaler
```

```
sc_X = StandardScaler()
```

```
X_train = sc_X.fit_transform(X_train)
```

```
X_test = sc_X.transform(X_test)
```

Measuring Accuracy of Model Predictions

Three very common measures are accuracy, sensitivity, and specificity.

Consider the below confusion matrix table

		Test Indicator	
		No	Yes
Outcome	No	a True Negative	b False Positive
	Yes	c False Negative	d True Positive

Table 1: Conclusion Matrix

- 1) **Accuracy:** A perfectly accurate model would put every transaction into boxes a and d. One simple way of measuring Accuracy is simply the proportion of individuals who were correctly classified the proportions of True Positives and True Negatives.

$$\text{Accuracy} = (\text{TP} + \text{TN}) / \text{TOTAL}$$
- 2) **Sensitivity:** The proportion of observed positives that were predicted to be positive.

$$\text{Sensitivity} = d/(c+d) \text{ or } \{\text{TP}/(\text{FN}+\text{FP})\}$$
- 3) **Specificity:** The proportion of observed negatives that were predicted to be negatives.

$$\text{Specificity} = a/(a+b) \text{ or } \{\text{TN}/(\text{TN}+\text{FN})\}$$

- 4) **Explained Variance Score (EVS):** Explained variance (also called explained variation) is used to measure the discrepancy between a model and actual data. Higher percentages of explained variance indicates a stronger strength of association.

Explained Variance Score is a type of metric which helps us to calculate the ratio between the variance of error and true values.

$$\text{explained_variance}(y, \hat{y}) = 1 - (\text{var}\{y - \hat{y}\} / \text{var}\{y\})$$

Where, y = true value, \hat{y} = predicted value and Var = variance. From the formula, the possibility of the best score as well as the highest score of EVS is 1.0 and the lower value of EVS is worse.

- 5) **R Squared Score (R2Score):** The most common interpretation of r-squared is how well the regression model fits the observed data. For example, an r-squared of 60% reveals that 60% of the data fit the regression model. Generally, a higher r-squared indicates a better fit for the model.

$$R^2(y, \hat{y}) = 1 - \frac{\sum_{k=1}^N (y_k - \hat{y}_k)^2}{\sum_{k=1}^N (y_k - \bar{y})^2}$$

Where, y = true value, \hat{y} = predicted value, \bar{y} = average of all the true values, and

- 6) MAE: Mean Absolute Error (**MAE**) refers to the results of measuring the difference between two continuous variables.
 7) **Error Rate:** The best error rate is 0.0, whereas the worst is 1.0.
 $\text{Error Rate} = (\text{FP} + \text{FN}) / \text{total}$

IV.RESULT

Table 2: Results for Murder
[Total Number of Instances - 2215]

Algorithm	Correlation Coefficient	Mean Absolute Error	Root Mean Squared Error	Relative Absolute Error	Root Relative Squared Error
Linear Regression Model	0.99	3.0	6.4	26%	11%
Additive Regression Model	0.98	3.5	11.1	30%	19%
Decision Stump Model	0.83	7.6	32.3	65%	55%

2215]

Table 3: Results for Murder per 100K of Population [Total Number of Instances -

Algorithm	Correlation Coefficient	Mean Absolute Error	Root Mean Squared Error	Relative Absolute Error	Root Relative Squared Error
Linear Regression Model	0.83	3.5	5.2	56%	56%
Additive Regression Model	0.88	2.6	4.4	41%	48%
Decision Stump Model	0.67	3.9	6.8	61%	74%

The accuracy will be calculated using scikit learn function known as `score_accuracy`. We will import the metrics and then calculate the F1 score, accuracy, recall, precision of each models.

V.CONCLUSION

Predicting crimes before they happen is simple to understand, but it takes a lot more than understanding the concept to make it a reality. This paper was written to assist researchers aiming to make crime prediction a reality and implement such advanced technology in real life. Although police do include the use of new

technologies such as Sting Rays and facial recognition every few years, the implementation of such software can fundamentally change the way police work, in a much better way. This paper outlined a framework envisaging how the aspects of machine and deep learning, along with computer vision, can help create a system that is much more helpful to the police. Our proposed system has a collection of technologies that will perform everything from monitoring crime hotspots to recognizing people from their voice notes. The first difficulty faced will be to actually make this system, followed by problems such as its implementation and use, among others. However, all of these problems are solvable, and we can also benefit from a security system that monitors the entire city around-the-clock. In other words, to visualize a world where we incorporate such a system into a police force, tips or leads that much more reliable can be achieved and perhaps crime can be eradicated at a much faster rate.

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A Method For Prevention Of Shark Attacks Using Communicating Autonomous Drones

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Abstract: Shark assaults can make sea shore sightseers restless about imparting the sea to pinnacle hunters. Although the crude number of shark assaults is productive; the supreme fear brought about by sharks is certified. This article presents a novel technique named as the "drone shark safeguard framework," which uses conveying self-ruling robots to mediate and forestall shark assaults for securing swimmers and surfers. We detail the plan of the robot shark safeguard framework and the methodology for repulsing sharks through various crossing points. A shark capture attempt calculation is created to direct robots to anticipated convergence focuses for discouraging sharks. PC reproductions are led to outline our technique.

Keywords: Autonomous drones, wireless sensor network, Shark attacks, Swimmers and Surfers.

I. INTRODUCTION

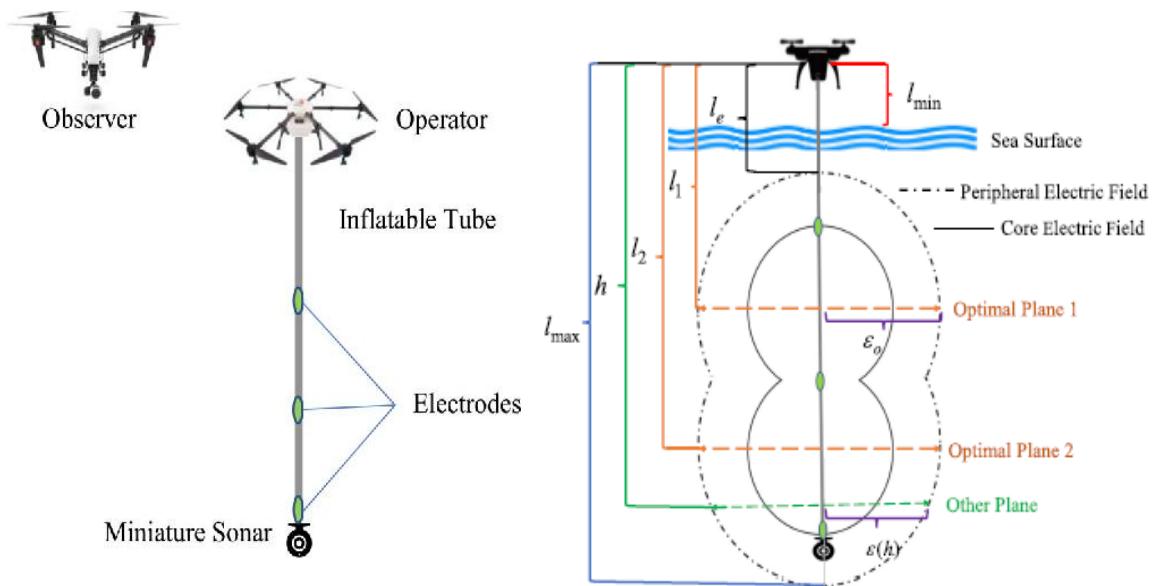
Despite its rare occurrence, shark attacks have long been a problem threatening beach visitors, such as swimmers and surfers. To reduce shark incidents, shark hazard-mitigation strategies have been adopted by the United States, South Africa, Australia, Brazil, and Reunion Island, which are regarded as shark bite "hotspots". Such strategies generally rely on culling programs aiming at reducing the local abundance of hazardous species, which have typically been implemented by deploying shark nets, long lines, and drum lines. The shark nets, long lines, or drum lines, however, result in not only the incidence of by catch, including threatened and endangered species like dolphins, sea turtles, whales, and dugongs but also the death of a huge number of sharks. Shark nets have been responsible for the death of over 33 000 sharks in the last 30 years, with 25 000 being harmless to humans. In addition, the by catches of the shark nets during the same period were 2211 turtles, 2310 dolphins, and 8448 rays. The death of these marine animals has had significant impacts on the health of the aquatic ecosystem.

II. METHODOLOGY

Design of the Drone Shark Shield:

The first type is shark-detecting drones that are equipped with cameras and fitted with an AI algorithm that can detect sharks from live video feeds with high accuracy. From now on, we call this type of drone the "observer." The observer can also identify human beings, such as swimmers and surfers. Moreover, the observers are fitted with speakers for warning swimmers and surfers when detecting any shark. A drone of the second type is attached with electric shark repellent and miniature sonar, and we call it the "operator." There are two reasons for using drones as operators, not autonomous underwater vehicles (AUVs). The first one is that drones are more manoeuvrable and faster than AUVs. The second is that during the execution of surveillance and shark deterring missions, the obstacles that drones need to avoid tend to be fewer than AUVs, which need to avoid reefs, sharks, and other marine life all the time. The observer and operator drones should have the embedded ability to avoid collisions with any obstacles, e.g., kite surfers and between each other, The entire mission. The collision avoidance ability has been embedded in many commercialized drone products, such as the DJI Inspire series. The electric shark repellent fitted on the operator is designed to be an inflatable tube with several electrodes attached to it. In this article, we consider the case with three electrodes. A miniature sonar is attached

to the tail of the inflatable tube. The sonar is to detect the positions and velocities of sharks and humans in the water. The observers and operators have the communication ability. The communication between them can be realized by 2.4-GHz radio waves, which is commonly used by different drone products.



During the surveillance, once sharks are detected by any observer, the operators will be immediately sent to repel the sharks, with the observer staying at a certain altitude to identify sharks and humans, and keep sending the information to the operators. The information will then be combined at the operators with the signals provided by the sonar to generate the real-time positions and velocities of the sharks and humans. We assume that each operator can only repel one shark at the same time, but one observer can provide the detected information to multiple operators. Fig.1 shows a schematic of a basic unit of the drone shark shield system, with one operator and one observer. Any drone in the system should have a switchable battery and can autonomously fly back to the ground drone base station to replace the battery or recharge it with automatic charging devices. The electrodes trailed by the operator generate a 3-D electric field for deterring the shark once they are immersed in the seawater, as shown in Fig. 2. The generated electric field is set to be vertically symmetrical. The dotted line depicts the peripheral electric field that the shark will turn away after the encounter, and the solid line depicts the core electric field that is strong enough so that shark will never touch.

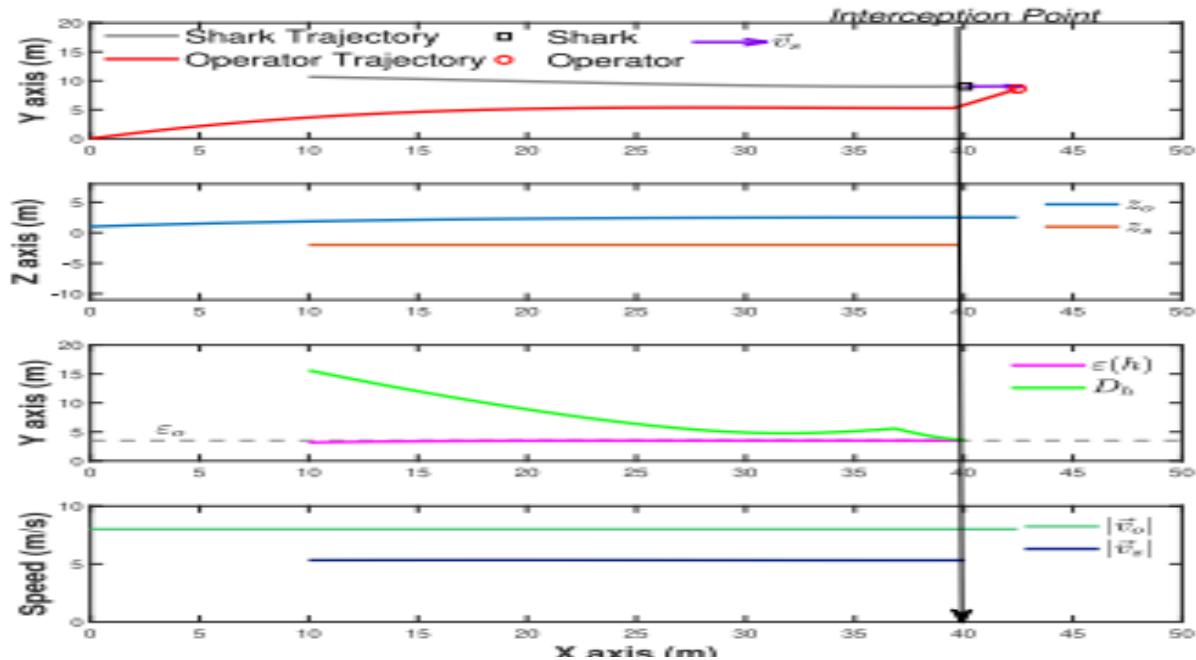
Shark Repelling Strategy:

The drone shark shield system consists of several observers and operators in a certain formation that regularly patrol the sea area near the beach. Let n be the number of operators in the current formation. Once a number of $1 \leq s \leq n$ sharks are spotted by any observer during the aerial surveillance, s operators immediately leave the surveillance formation to repel the sharks. For each operator, we allocate one shark for it. At the same time, one observer immediately leaves the surveillance formation, stays at a certain altitude to monitor the sharks, identifies humans and provides the relative information to the operators. Meanwhile, it uses the attached speakers to alarm swimmers and surfers to evacuate the water immediately. The speakers should be loud enough so that the nearby swimmers and surfers can hear the alarm immediately once a shark is spotted. If no human is detected near to the shark, it provides early warning to swimmers or surfers through the lifeguards. Moreover, the rest of the operators and observers in the formation continue the surveillance mission to spot and repel the sharks that have not been spotted. If $s > n$ sharks are spotted at the same time, the observer sends the highest alert to the lifeguards to close the beach immediately and deploy all operators to repel the n sharks that are

closer to humans in the water. A drone shark shield system with a sufficient number of operators and observers can effectively avoid this worst-case scenario.

III. SIMULATION RESULT

The performance of the proposed interception algorithm via computer simulations. All the simulations are carried out using MATLAB.



IV. CONCLUSION

Shark guard technique dependent on conveying autonomous drones for ensuring swimmers and surfers was proposed. The objective is autonomous drones to shield swimmers and surfers from shark assaults, and in the end, drive the shark to leave the sea shore region. The design of the proposed drone shark shield system and its working mechanism. We also proposed a shark repelling strategy and an interception algorithm for drones to efficiently intercept sharks. Computer simulations were conducted to demonstrate the performance of the proposed shark interception algorithm.

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Access Control Convention For Front Line Reconnaissance In Drone Helped Using Iot

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ABSTRACT: Surveillance drones, called as unmanned aerial vehicles (UAV), are airplanes that are used to gather video accounts, actually pictures, or live video of the objectives, like vehicles, individuals or explicit regions. Especially in combat zone reconnaissance, there is high chance of snooping, embeddings, altering or then again erasing the messages during interchanges among the conveyed robots and ground station server (GSS). This prompts dispatch a few likely assaults by a foe, for example, man-in-center, pantomime, drones capturing, replay assaults, and so on. Besides, secrecy and untraceability are two pivotal security properties that should be kept up with in front line observation correspondence climate. To manage a particularly significant security issue, we propose access control protocol for battlefield surveillance in drone-assisted Internet of Things (IoT) climate, called ACPBS-IoT. Through the itemized security examination utilizing formal and casual (non-numerical), and additionally the conventional security confirmation under computerized programming recreation instrument, we show the proposed ACPBS-IoT can oppose a few potential assaults required in front line reconnaissance situation. Moreover, the test bed tests for different cryptographic natives have been performed for estimating the execution time. At last, a definite relative investigation on correspondence and computational overheads, and security just as usefulness highlights uncovers that the proposed ACPBS-IoT gives predominant security and greater usefulness includes, and preferable or tantamount overheads over other existing contending access control plans.

KEYWORDS: unmanned aerial vehicles (UAV), Ground station server (GSS), Access control protocol (ACPBS-IoT).

I. INTRODUCTION

Internet of Things (IoT) is an advance technology that interacts with various smart computing devices, mechanical and digital machines or objects among the animals or people. Now-a-days, IoT is connected over billions of interconnected IoT smart devices in crucial environments, such as military (battlefield surveillance), smart transportation in supply chain, smart home for home automation, healthcare application, agricultural field, and so on. The IoT smart devices are provided with unique identifiers and have capability to exchange information over the network with minimal human-to-human or human-to-computer interaction. Since the IoT devices are attached to the Internet, they can be assigned to Internet Protocol (IP) addresses. Due to shortage of IPv4 addresses, IPv6 addresses can be assigned to them.

II. METHODOLOGY

APPROACHES AND METHODS:

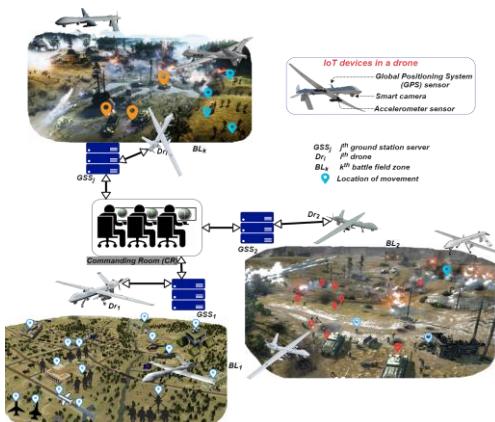


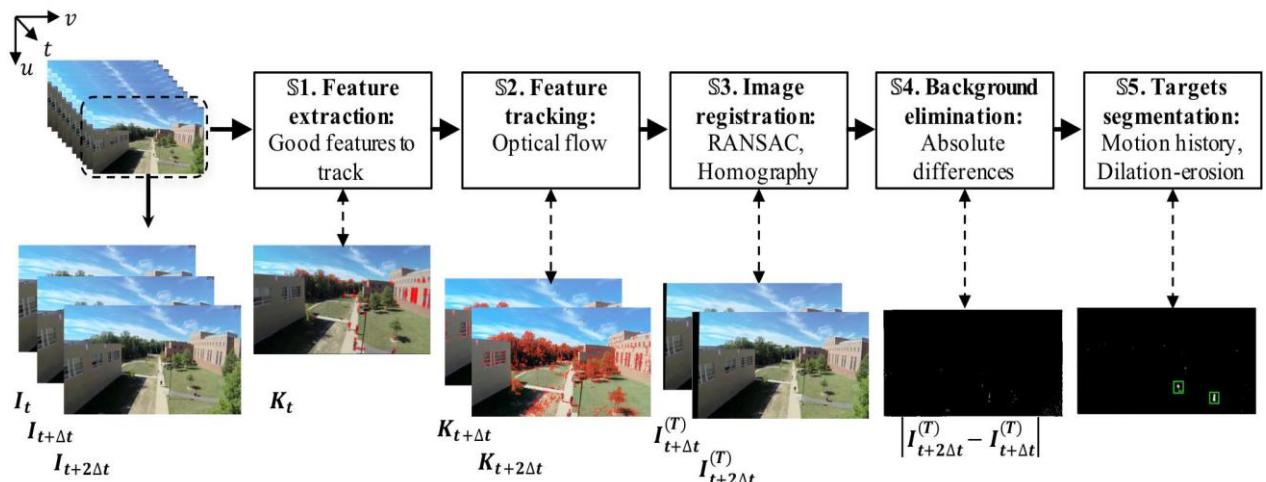
Fig. 1. Battlefield surveillance in drones-assisted IoT environment

AREA- AND FEATURE-BASED METHODS: Area-based methods (ABMs) do not explicitly perform the first step of feature detection. Instead, both detection and matching are combined into one step. A window with a predetermined size is defined to discover feature correspondences in the sensed image (within the same window) [14]. A comparison is then carried out based on direct gray-level intensity values where normalized cross correlation or the least-squares technique are among commonly used similarity measures [17]. ABMs hence assume that the discriminatory power solely lies in intensity values within each window.

FEATURE-BASED METHODS: (FBMs) on the other hand, place strong emphasis on selecting and extracting prominent, distinct and reliably detectable features in the reference and sensed images. The features should characterize information at a higher level with regards to the image's local structural information as opposed to direct intensity values.

REGION MERGING: Initially, all frames go through a segmentation process. In the desired result, a segmented region is only a part of one distinct image object. Certain segmentation approaches might yield under-segmentation, which is problematic since each object might be accidentally merged with the other objects. Resultantly, we decided to go with an oversegmentation algorithm. In this paper, SLIC superpixel [34] was chosen as it is able to produce small yet uniform regions. Although large numbers of over segmented regions are generated, at least potential image objects contain many regions. But since our approach processes many frames at a time, the large number of regions can increase computational complexity, specifically during the matching phase.

REGION MATCHING: In the literature, establishing correspondences between two groups of points is known as point pattern matching [13]. Its objective is to remove outliers in order to estimate the transformations from inliers (inliers being points having correspondences in the next frame). However, this process is complicated in nonparametric and no rigid models where images are distorted by different types of transformations [37]. In the proposed paper, we avoid estimating the transformations. Instead, a set of consecutive frames is considered at a time and their graphical representation (RAG) is exploited. Specifically, correspondence discovery is treated as multigraph matching between RAGs within a set of consecutive frames. Intuitively, processing multiple frames for matching makes more sense as visually consistent regions are expectedly better discovered over a longer frame sequence.



III CONCLUSION

We tested our method using videos captured by UAV as well as publically available datasets. The experiments on different scenarios demonstrated promising results based on the quantitative and qualitative evaluations. More specifically, the effectiveness of the proposed method is evaluated by considering results on different camera setups (in terms of altitude, speed, and view-angle) and various applications; its effectiveness is verified through comparisons with ground truth data as well as state-of-the-art methods, while reporting the achieved performance in terms of common performance metrics; and the method's efficiency is demonstrated by computational time analyses and compared with reported runtimes of existing methods. Sensitivity analysis studies have also provided for optimal setting of the key parameters in the proposed method. As a future research work, we aim at proposing a robust data association algorithm to differentiate and associate multiple detected targets over a sequence of video frames for the application of target tracking through UAVs, while considering various surveillance scenarios.

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Surveying & Analysis Of Parkinson's Disease By Applying MI Algorithms

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ABSTRACT: Parkinson's disease (PD) is one of the prime health problems in the world. It is recognized that around one million people suffer from Parkinson's disease. Thus, it is necessary to identify Parkinson's disease in an early stage so that early plan for the necessary treatment can be made, to save lives and advice few life style changes for a peaceful and healthier life at low costs. The proposed predictive analytics framework is a cluster of Decision Tree, Support Vector Machine, Naive Bayes Algorithm, Gradient Tress Boosting Algorithm, and Stochastic Gradient Descent which is used to acquire insights from patients. We obtain voice dataset from UCI Machine learning repository as input. The experimental outcome indicates that an early detection of PD will expedite clinical monitoring of elderly folk and increase the chances of their life span and improves lifestyle to lead peaceful life.

Keywords: Parkinson's disease(PD), Decision trees, Naive Bayes Algorithm, Support vector Machine(SVM), Gradient Tree Boosting Algorithm, Stochastic Gradient Descent.

LINTRODUCTION

PD is a progressive neurodegenerative disorder. It affects certain brain cells that support in controlling the movement and coordination. Dopamine is a hormone and neurotransmitter, a chemical that is generated by brain cell. It is used to transmit signals to other brain cells to control the muscle activity [1].

PD causes, degeneration of dopamine in the brain cell which leads to abnormal muscle activity. It is a common disorder observed in senile person [60years and above] which occurs in 1% of the population.

[1] There are several symptoms that cause PD. Common symptoms in PD are muscular rigidity (limbs and upper half of the body is inflexible), shivering (vibration in upper and lower limbs or jaws, speech problem), expressionless face, Bradykinesia (slow movements), lethargy (unresponsiveness and inactivity),postural instability (depression and emotional changes), involuntary movements, dementia (loss of memory which is a common disorder of Alzheimer's disease), thinking inability and sleeping disorders. P Certain phases in Parkinson's disease are:

- Primary - Due to unknown reasons

- Secondary - Dopamine deficiency
- Hereditary- Genetic origin
- Multiple system atrophy - Degeneration of parts other than mid brain.

[2] For later stages, surgery is recommended for some people. It does not cure PD, but it may help to ease symptoms. Surgery, Deep Brain Stimulation (DBS) is offered to people with advanced PD.[4] Electrodes can be embedded into specific part of the brain that sends signals to your brain and may reduce the PD symptoms.DBS is a stabilized medication which reduces involuntary movements, tremor and rigidity.

Approximately 15% of people with PD have a family history of the disorder. In a few cases, the disease may be inherited through certain gene changes. PD may occur at the age of 60. [3]Due to technological development in information technology, and healthcare areas resulted in better outcomes and low-cost

healthcare delivery that is possibly predicted from the PD patient's analysis. [3] For PD patients, life expectancy is 15 to 20 years and the survival rate is slightly lower than the people of the same age.

II. LITERATURE SURVEY

The accurate diagnosis of PD has been a challenge to date, mainly due to the close relevance of PD to other neurological diseases. These close characteristics are the reasons that cause 25% inaccurate manual diagnosis of PD. In [22], they presented a Convolutional Neural Network (CNN) based automatic diagnosis system which accurately classifies PD and healthy control (HC). Parkinson's Progression Markers Initiative (PPMI) provides publicly available benchmark T2- weighted Magnetic Resonance Imaging (MRI) for both PD and HC. The mid-brainslices of 500, T2- weighted MRI are selected and aligned using image registration technique.

[23] A general purpose model of Parkinson's disease prognosis based on Markov process is described in this paper. The paper presents the mathematical tool that can be used to generate accurate assessments of Parkinson's disease stage and the DBS effects in time, and can be applicable in medical screening for patients with Parkinson's disease. The Markov chains were used to observe the effect in time of this procedure. Being a minimally invasive procedure, but quite expensive for the patient is helpful to know which area of the brain to be stimulated electrically to relieve symptoms of Parkinson's disease. Using Markov chain is an efficient method to find the features vector for an individual patient at a given time and to predict and identify a stage in Parkinson's disease.

[24] Provides approaches to quantify the motor symptoms of Parkinson's disease with wearable devices, and the quantification was developed with four paradigm maneuvers. The quantification parameters included tremor frequency, amplitude of hands movement, and speed of foot-tapping and turning duration. The approach provided quantitative measures for the tremor, bradykinesia and gait symptoms, which could be useful for optimization of drug or deep brain stimulation treatments.

[23] A study of the frontal and temporal EEG of Parkinson's disease patients using MATLAB platform. Lyapunov exponent and inverse Lyapunov exponent for both PD and healthy subjects were calculated within a given time frame. It was found that for PD subjects, the Lyapunov exponent for the temporal part of the brain is less than that of the frontal while the inverse Lyapunov exponent is reverse order of the brain.

Many researchers have conducted several studies using voice recordings to produce an accurate PD diagnosis system. One unique promising way to use the speech disorder as a helping factor to predict PD is by using machine learning techniques [26] they used NNge classification algorithms to analyze voice recordings for PD classification. NNge classification is known to be an efficient algorithm for analyzing voice signals but has not been explored in details in this area. Then, an experiment using NNge classification algorithm to classify people into healthy people and PD patients was performed. The parameters of the NNge algorithm were optimized. Moreover, SMOTE algorithm was used to balance the data. Finally, NNge and ensemble algorithms specifically, AdaBoostM1 was implemented on the balanced data. The final implementation of NNge using AdaBoost ensemble classifier had an accuracy of 96.30%.

The literature shows that a sizable number of researchers have used data mining to classify people correctly as either PD patients or healthy people based on a set of voice recording values. In 2011, feature selection was performed on the Oxford Parkinson's Disease Detection (OPD) dataset from Data Mining Repository of the University of California, Irvine (UCI) and the accuracies of several classifiers were compared [27].

As the PD progresses slowly in most people. Therefore, it is difficult to be identified in the earlier stage. It resides for many years with only minor symptoms. The symptoms differ in various stages of the disease, but they mainly involve tremors, rigidity, bradykinesia, flatfacial expression, and speech disorder. Since speech disorder is one of main PD symptom, recording voice signals and analyzing it automatically is the easiest and most reasonable way to identify the disease in its initial stages [28].

An attempt was been made to `distinguish PD group from the healthy control group based on voice recordings with selected features and different classification techniques such as linear classifiers, nonlinear classifiers and Probabilistic classifiers. They used recursive feature elimination algorithm (RFE) for selection of important features [29].

III. EXISTING APPROACH

In this section, we review some existing machine learning techniques for diagnoses of Parkinson Disease. Olanrewaju et al. in the article [30], proposed machine learning based technique for diagnosis of PD and developed Multilayer Feed Forward Neural Network (MLFNN). They used a data set, available in Oxford Parkinson disease datasets. The dataset consists of voice measurements of 31 people with 23 patients. They used 8 attributes which are based on frequency (tremor). They used a total of 8 input and 10 hidden nodes. For classification, they used the k-mean algorithm. The simulation result showed that they achieved a sensitivity of 83.3%, specificity of 63.6% and accuracy up to 80%. However, this method is not validated on real data.

Das et al has done a comparison based on different classification method on speech signals for effective diagnosis of PD. He used four classification methods such as neural networks, regression, for effective diagnosis of PD. He used four different classification methods such as Neural networks, Regression, DM neural, and Decision tree and found that neural network is the best among the four classifierwith accuracy of 92.9%.

Prashanth et al. in the article [31], worked on nonmotor features for PD diagnosis. The non-motor features consist ofRapid Eye Movement (REM), sleep behavior disorder, and olfactory loss. In this study, they used nonmotor features in combination with cerebrospinal fluid measurement and dopaminergic imaging markers features. The dataset was obtained from (PPMI) database. This dataset consists of 183 normal and 401 patients of Parkinson disease. They used Naïve Bayes, SVM, Boosted Tree and Random Forest for classification. The simulation result showed 96.4% accuracy rate of SVM. It was found that the combination of different non-motor features yielded better results. However, data contained imbalanced class distribution.

Al-fatlawi et al. in the article [32], proposed Deep Belief Network (DBN) for diagnosis of PD. In this work, a data set PDD was obtained from the UCI data repository that contains 195 voice recordings of 31 people and 16 attributes. The proposed DBN yielded 94% accuracy. However, this work didn't calculate harming probability.

IV. PROPOSED APPROACH

In this proposed system, we follow a similar approach, however we try to use different machine leaming algorithms that can help in improving the performance of model and also play a vital role in making in early prediction of PD which in tum will help us to initiate neuro protective therapies at the right time.

The clinical Parkinson dataset consists of 195 instances and 22 attributes with one class without any missing values. The data set is collected from speech sounds produced during standard speech tests records using a microphone and there recorded speech signals are analyzed using part software [10] to eliminate noise and characterize unique properties in signals. The classifier models are trained with 66 percent of the sample and tested them over the rest of it. Sufficient care has been taken such that the testing is not done over the same instances. Also the data set is standardized such that the overall standard deviation & mean is equal to 1 and 0 respectively using relation given by $P(j) = (k-n)/SD$ where $P(j)$ is the standardized data, k is the data to be standardized, n is the mean of the population and SD is the standard deviation. Data cleaning methods are applied for dimension reduction horizontally as well as vertically. The appropriate features are selected for the models and also the outliers from the dataset are removed based on the quantile information obtained statistically beyond 10 % and 90%.

The flow chart of the proposed methodologies is shown in the figure 1. The original data collected from the dataset composed of voice measurements from 31 people out of which 23 were diagnosed with PD. We have used Random Forest-Recursive Feature Elimination (RF-RFE) algorithm on the original feature sets. Feature reduction removes multicollinearity resulting in improvement of the model in use. Feature reduction is used to decrease the number of dimensions, making the data less sparse. We have used nonlinear classifier with decision tree for classification of groups are as follows Bagging classification and Regression tree, Random Forest and Boosted C5.0 and probabilistic classifier as Naïve Bayes method, and linear classifier as SVM Support vector machine is used for voiceprint analysis of Parkinson's disease patients.

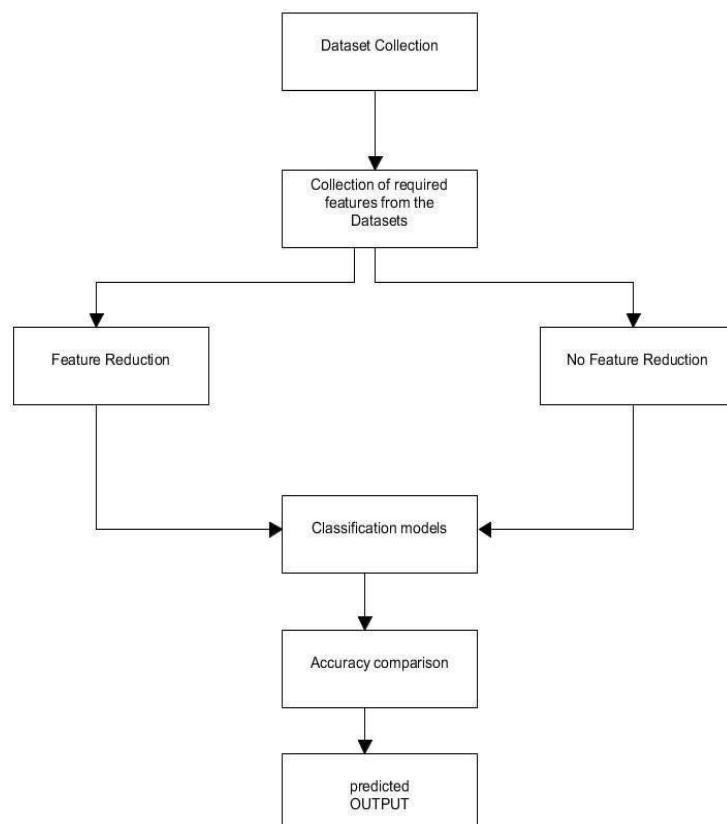


Fig 1: Flow chart of proposed method

For time series acquired from subjects specified, we applied the linear and nonlinear dynamics analysis, using specific parameters for the tremor symptom diagnosis. To characterize the tremor signal we used the following parameters:
frequency, amplitude, type of tremor, spectral character.

V. CONCLUSION

In this paper we have implemented different algorithms such as Decision Tree, Support Vector Machine, Naïve Bayes Algorithm, Gradient Tress Boosting Algorithm, and Stochastic Gradient Descent to classify the

PD. We found SVM has performed well in terms of accuracy, sensitivity, and specificity. It was presented how to use different algorithms to generate accurate assessments of Parkinson's disease at various levels. Using SVM one can attain accuracy up to 87.74% and it's been an efficient method to find the features vector for an individual patient at a given time and to predict and identify a stage in Parkinson's disease. It can be concluded that these neurophysiological measurements are most helpful for early diagnosis of PD.

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Covid-19 ChatBot

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ABSTRACT: Covid-19 pandemic was unexpected and has changed everyone's life, we lost many people and it was a global emergency. There were many myths in the society about covid-19 pandemic, initially we had no idea about the pandemic behaviour, there were lot of misconceptions and rumours spreading around the people. This paper attempts to provide an AI chatbot using rasa NLU to answer queries related to covid-19 pandemic and display covid-19 state wise covid reports from the government covid-19 API in India. The main objective of this proposed chatbot was to break the myths about covid-19. The Bag of Words (BOW) and Conditional Random Field (CRF) Algorithms understand the user's questions efficiently by recognising the intent behind the question, and for that recognised intent respond with legitimate answers

KEYWORDS: Myths about Covid-19 pandemic; Chatbot using Rasa NLU; State wise Covid reports; Covid-19 API from government of India; Bag of Words (BOW); Conditional Random Field (CRF);

I. INTRODUCTION

Over past few years, messaging applications have become more popular than social networking sites. People are using messaging applications these days such as Facebook Messenger, Skype, Viber, Telegram, Slack etc. This is making other businesses available on messaging platforms leads to proactive interaction with users about their products. To interact on such messaging platforms with many users, the businesses can write a computer program that can converse like a human which is called a chatbot. The Covid-19 Chatbot provides all the basic information required to the user about covid-19 pandemic, virus, vaccination, safety measures required, active positive, negative cases state wise all over India. This Chatbot was deployed in telegram app as a channel, the covid-19 chatbot was developed using Rasa frame work, spacy library and coded in python language. RasaNLU internally uses Bag-of-Word (BoW) algorithm to find intent and Conditional Random Field (CRF) to find entities. Where entities refers to states of India and intent refers to purpose behind the user query.

II. RELATED WORK

In [1] the author says how effectively we can develop and configure chatbots according to our requirement, there the author demonstrates the design of chatbot, the algorithms for natural language processing. One such designs are considered in covid-19 chatbot. In [2] the proposed chatbot assists in answering questions provided by the users. They have employed an ensemble learning method as random forest in the presence of extracted features from the prepared dataset. The validation system offers an average F-measure 0.870 score on various K-values under random forest for the proposed chatbot. Finally, They have deployed the proposed system in a form of telegram bot. These methodologies have been followed to deploy the covid-19 chatbot as telegram bot. [3] This paper provides a critical review of chatbots and the current strategies and limitations are exhaustively explored and talked discussed, Such strategies and limitations are considered to make chatbot effective in conversations. [4] In this system, the similarity between tokens of the query and the responses from the corpus is taken as the heuristic. The text response generated based on this heuristic value, then the preferred output is then converted speech making it more interactive. The tokenisation concept was integrated to covid-19 chatbot by observing this paper. [5] A counselling application is developed in the form of a chatbot to assist the individuals. It implements various Emotion recognition to check the emotions of the user based on the history of responses. The response is generated using the Recurrent Neural Network (RNN). Each response is encoded based on the previous responses.

III. PROPOSED ALGORITHM

Bag of Words

Step 1 : We will first preprocess the data, in order to:

- Convert text to lower case.
- Remove all non-word characters.
- Remove all punctuations.

Step 2 : Obtaining most frequent words in our text.

- We will apply the following steps to generate our model.
- We declare a dictionary to hold our bag of words.
- Next we tokenize each sentence to words.
- Now for each word in sentence, we check if the word exists in our dictionary.
- If it does, then we increment its count by 1. If it doesn't, we add it to our dictionary and set its count as 1

Step 3 : Building the Bag of Words model

- In this step we construct a vector, which would tell us whether a word in each sentence is a frequent word or not.
- If a word in a sentence is a frequent word, we set it as 1, else we set it as 0.

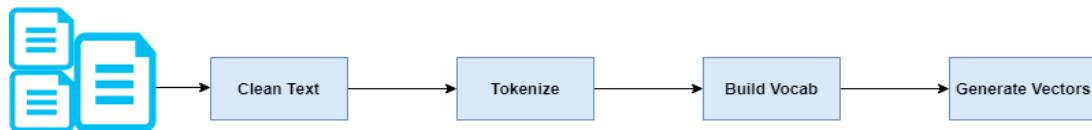


Fig. 2.1.1 High level flow of Bag OF Words

Conditional Random Field

Conditional Random Fields is a class of discriminative models best suited to prediction tasks where contextual information or state of the neighbors affects the current prediction.

- Label domain : Assume that random variables in set Y have a domain : $\{m \in \mathbb{N} \mid 1 \leq m \leq M\}$ i.e. first M natural numbers.
- Evidence structure and domain : Assume that random variables in set X are real valued vectors of size F i.e. $X_i \in X, X_i \in \mathbb{R}^s$.
- Let the length of CRF chain be L i.e. L labels and L evidence variables.
- Let $\beta_j(Y_i, Y_{i+1}) = W^T c$ if $Y_i = c$, $Y_{i+1} = c'$ and $j = i+1, 0$ otherwise.
- Let $\beta_j(Y_i, X_i) = W^T c \cdot X_i$, if $Y_i = c$ and 0 otherwise, where \cdot represents the dot product i.e. $W^T c \in \mathbb{R}^s$.
- Notice that the total number of parameters is $M \times M + M \times S$ i.e. there is one parameter for each label transition ($M \times M$ possible label transitions) and S parameters for every label (M possible labels) that will be multiplied to the observation variable (a vector of size S) at that label.
- Let $D = \{(x_n, y_n)\}$ for $n=1$ to N , be the training data consisting of N examples.

Description of the Proposed Algorithm:

Aim of the proposed algorithm is, Rasa NLU internally uses Bag-of-Word (BOW) algorithm to find intent and Conditional Random Field (CRF) to find entities. These algorithms help in finding intent and entities using Rasa.

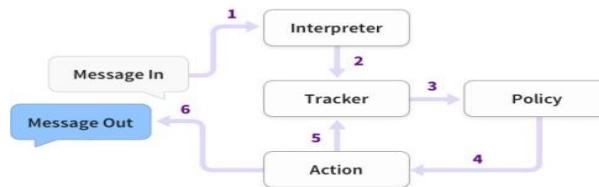


Fig. 2.2.1 Basic steps of Rasa app internally works to reply a message

The proposed algorithm consists of seven main steps.

Step 1: Create a directory called covid_bot and create a directory named data inside it.

```
$mkdir covid_bot
$cd covid_bot
$mkdir data
```

Step 2: View Your NLU Training Data

```
{
  "text": "hi",
  "intent": "greet",
  "entities": []
}
```

Step 3: Define Your Model Configuration.

- story: happy_path
- intent: greet
- action: utter_greet
- intent: mood_great
- action: utter_happy

Step 4: Write Your First Stories.

- Story: corona_tracker path
 - steps:
 - intent: corona_state
 - action: action_corona_tracker
- Story: hello_world path
 - steps:
 - intent: hello_world
 - action: action_hello_world

Step 5: Define a Domain.

```
entities:- state
utter_iamabot:
- text: I am a bot, powered by Rasa.
actions:
- action_hello_world
- action_corona_tracker
```

Step6: Train a Model

1. Rasa Core combines them randomly to create more complex user paths.
2. It then builds a probabilistic model out of that. This model is used to predict the next action Rasa should take.

Step 7: Text to Your covid-19 chatbot.

Human : Hi, this is nishanth

Chatbot : Hey, How are you

Human : Cases in KARNATAKA?

Chatbot : Active: 44846 Confirmed: 285364 Recovered: 2773407 On : 05/07/2021

IV. PSEUDO CODE

Step 1: Identify User Input and Process the query.

Step 2: Identify the Intent and Entity.

Step 3: for identified intent trigger related action.

Step 4: if intent is covid report

 Call ActionCoronaTracker;

Step 5: ActionCoronaTracker()

```
get request from covid-19 API
for data in response["statewise"]:
if (entity == data["state"] )
```

```
    message = "Activate: " +data["active"] +" Confirmed: " +data["confirmed"] +
    "Recovered: " +data["recovered"] +" on "+data["lastupdatedtime"]
```

Step 6: respond with message.

Step 7: keep track of conversation.

Step 8: if (query ==null)

 END

Else

 Go to step 1

V. SIMULATION RESULTS

The simulation studies involve various query inputs and noticing how chatbot replies to various kinds of questions related to covid-19. And also examined the basic conversation flow of the chatbot when the queries are irrelevant to covid-19. The project was developed using rasa, a machine learning framework for chatbot development, spacy library for language processing, ngrok tool for connecting local server to internet and coded in pycharm. As observed the chatbot identifies the intent and entities behind the query if the entity is one of such a state in India it calls the action action_coronatracker, where the Api is called, On receiving successful response the chatbot responds a message containing the covid report of the state with number of active cases, deaths on a that specific date. There are few keywords set where the chatbot stops responding Fig. 5.1 The chatbot also runs on web version (GUI mode) as shown in Fig. 5.1. We conclude that the response was efficient enough to user query.



Fig.5.1 Covid-19 Chatbot on Telegram

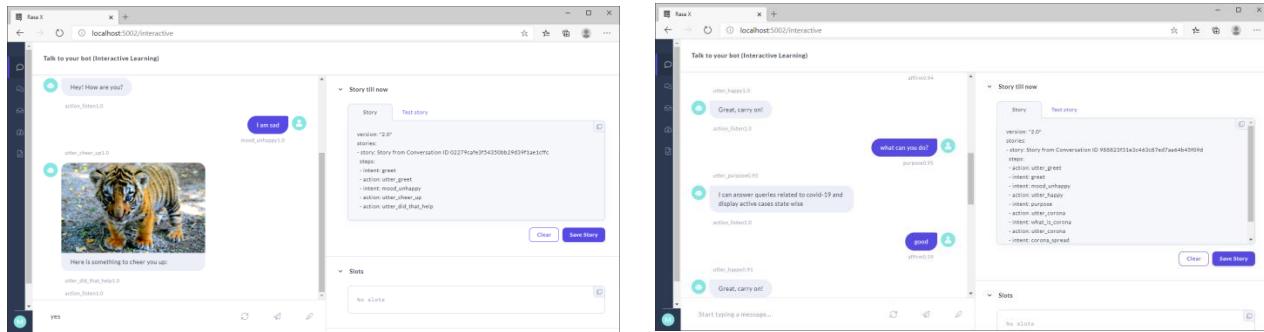


Fig. 5.2 Covid-19 Chatbot on GUI mode

VI. CONCLUSION AND FUTURE WORK

The project developed is an interactive covid-19 chatbot developed using Rasa framework which is machine learning framework to develop chatbots. The training data to develop this chatbot was devised from the data available on the World Health Organization (WHO) website. The Covid-19 API from the government of India which is available to public was integrated to get the real-time state wise case details. The chatbot even answers the users questions not only in the form of text but also in form of jpg images. For the future enhancement we are planning to deploy the chatbot in any of the cloud platform like Google Cloud/Heroku so that it will be online and voice chat functionality.

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Covid 19 Face Mask Detection And Alert System Using Machine Learning Techniques

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ABSTRACT: WHO announced the novel coronavirus pneumonia epidemic caused by SARS-CoV-2 as a public health emergency of international concern on 30 January, and an epidemic on 11 March 2020⁷. Wuhan city located in China reported 27 cases of pneumonia of unknown cause. The Chinese Centre for Disease Prevention and Control (CCDPC) collected swabs from throat of all the above patients and confirmed that a replacement organism called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was the causative agent. Subsequently, the disease was named Coronavirus communicable disease 2019 or COVID-19 by the planet Health Organization (WHO) on 11 February 2020. On 31 December 2019, Chinese government officially reported to the WHO that the primary confirmed case was diagnosed on 8 December 2019. The majority of the patients that had a cough, pharyngitis, cold, fever, and other system symptoms, recovered spontaneously, but a number of them landed into serious complications such as severe pneumonia, bronchitis, septic shock, organ failure, and acute respiratory distress syndrome (ARDS). In this proposed system we Build a COVID-19 Face Mask Detection System that can detect a person in real-time if he/she is wearing a mask using CCTV camera with quite a good accuracy. After that, he/she is denied access to places where authorities have strictly asked to wear the mask. After denying access to the person, authorities will get an alert email in real-time where the person's photo are going to be attached. May be screen panels might be installed at the entrances where an individual when denied can see a pop-up Waming Message where he/she would be advised to wear a mask before getting access.

KEYWORDS: Facial Mask Detection, COVID-19, Deep Leaming, Convolution Neural Network, Face Recognition.

I. INTRODUCTION

In the public mind, the origin story of coronavirus seems well fixed in late 2019 someone at the now world-famous Huanan seafood market in Wuhan was infected with an epidemic from an animal. The rest is a component of an awful history still within the making, with Covid-19 spreading from that first cluster in the capital of China's Hubei province to a pandemic that has killed the people so far. But there's uncertainty about several aspects of the Covid-19 origin story that scientists are trying hard to unravel, including which species passed it to a person. They're trying hard because knowing how a pandemic starts may be a key to stopping the subsequent one. At the time of writing this paper, almost 12.3 million infected cases out of which 11.5 million have been recovered where 163 thousand are death in India. A face mask detection is a technique to find out whether someone is wearing a mask or not. It is similar to detect any object from a scene. Many systems have been introduced for object detection. Deep learning techniques are highly used in medical applications. A COVID-19 Face Mask and Face Shield Detection System that can detect a person in real-time if he/she is wearing a mask or face shield using CCTV camera with quite a good accuracy. After that, he/she is denied access to places where authorities have strictly asked to wear the face mask. After denying access to the person, authorities will get an alert email in real-time where the person's photo will be attached. May be screen panels could be installed at the entrances where a person when denied can see a pop-up Waming Message where he/she would be advised to wear a mask before getting access. This application can be used at Airports, Hotels, Public Buildings like Driving Licence Offices, and other major places where we expect large public

gatherings. We have used Python, OpenCV, Keras with Tensorflow as a backend for building Convolution Neural Network model.

II. RELATED WORK

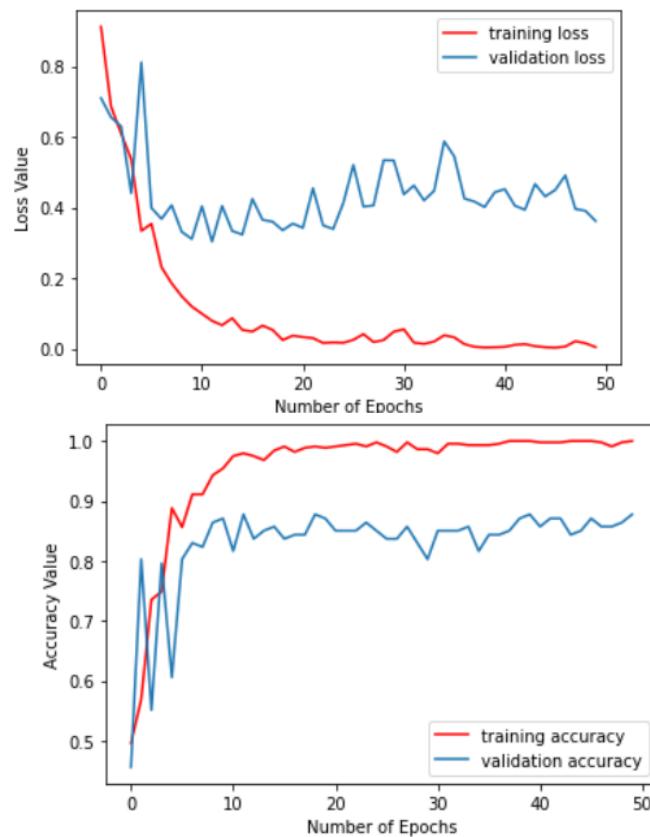
In the meantime, many systems have been developed for COVID-19 in smart city networks. BlueDot and HealthMap services have been introduced. It is the first method used to mark the cluster of unusual pneumonia in Wuhan which finally detected the disease has pandemic. It also predicted that the virus would spread from Wuhan to Bangkok, Tapei, Singapore. Tokyo and Hong Kong HealthMap service, based on San Francisco, spread the patients with cough which is the initial sign of COVID-19 using Artificial Intelligence and big data. A study was made on using facemask that indicated that masks that are adequately fit, effectively interrupt the spread of droplets expelled when coughing or sneezing. Allam and Jones proposed a framework on smart city networks focusing on how data sharing should be performed during the outbreak of COVID-19. Data regarding the safety issues of the economy and national security is collected from various points of the city using sensors, trackers and from laboratories.

III. PROPOSED METHODOLOGY

Methodology is a contextual framework for research, a coherent and logical scheme based on views, beliefs, and values, that guides the choices researchers [or other users] make. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge such that the methodologies employed from differing disciplines vary depending on their historical development.

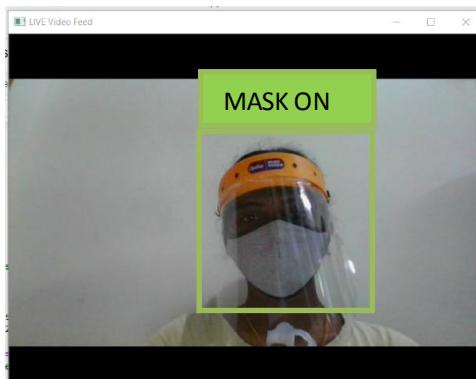
Detection of Face Mask

- Configure Working directory and mount Google Drive to make use of Google Colab.
- Data pre-processing to convert images to grayscale and separate out labels and images.
- Build a Convolutional Neural Network using sequential API Keras.
- Train the Face mask detection classifier on image data using Keras and Tensorflow as backend.
- Evaluate the model to see the loss and accuracy in graphical form.
- Save the face detection classifier model.
- Download the model on local system and load it in program.
- Use the live webcam video stream to detect the face.
- Extract the region of interest of face.
- Engage trained face mask detection model to the face identified and determine if person is wearing mask or not.
- Throw a warning message in terms of pop up window to highlight that access denied if person has not worn the face mask or face shield.
- Trigger an email to concerned person alerting them the person is not wearing face mask or face shield.

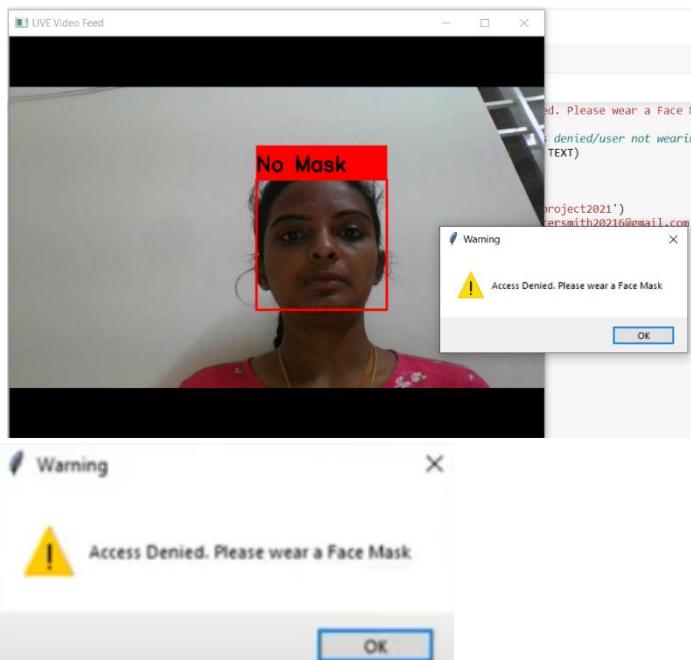


IV. RESULTS AND DISCUSSION

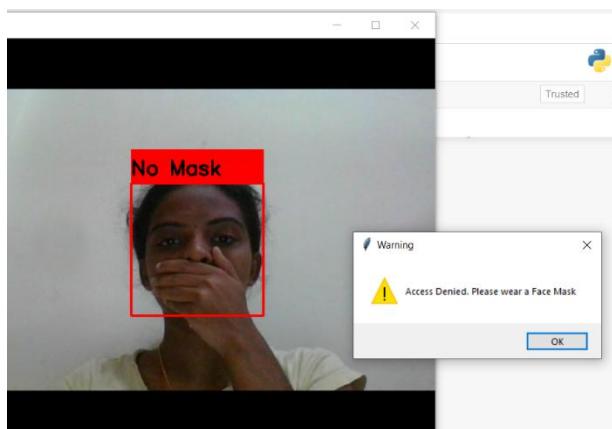
- If people under CCTV surveillance are wearing mask there will be no warning message.



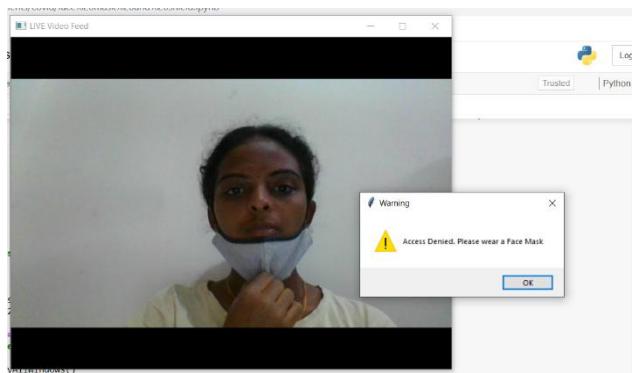
- When people are under CCTV surveillance if they are caught without the face mask there will be an alert message that will pop up.



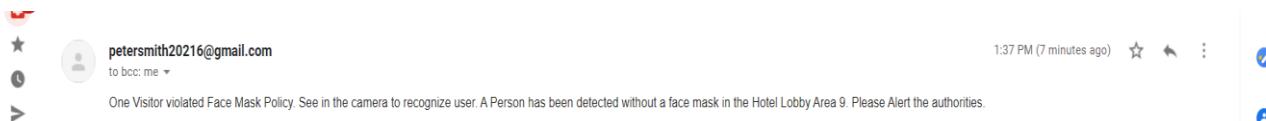
- There will be an alert message that pop up when people cover their face with hands indicating them to wear face mask or face shield.



- If people do not wear face mask properly it is also alerted and a popup appears that the access to enter the place is denied.



- Later there will be an alert mail sent to the authorities indicating them to be alert and inform the person to wear the mask or their entrance to the public place will be denied.



- So by getting this alert email the authorities can easily find the people without mask and deny them by getting into their premises.
- By this alert mail people will be warned to wear masks compulsorily and by this the spread of corona virus can be reduced. This can be used at public places like malls, government offices and so on.

VI. LIMITATIONS AND FUTURE WORK

This system faces some limitations in classifying faces person without a face mask is traveling on any vehicle, the system cannot recognize that person correctly. For a very populated area, distinguishing the face of each person is very difficult. For this case, identifying people without face mask would be very difficult for our proposed system. In order to get the best result out of this system, the city must have a large number of CCTV cameras to monitor the whole city as well as dedicated manpower to enforce proper laws on the violators. Since the information about the violator is sent via SMS, and cameras height should be less than 10feet so that it able to detect faces easily. Some of the currently under development features are listed below in brief:

- Coughing and Sneezing Detection: Machine learning based approach can be proved handy here to detect & limit the disease spread by enhancing our proposed solution with body gesture analysis to understand if a person is coughing and sneezing in public places while breaching facial mask and social distancing guidelines and based on outcome enforcement agencies can be alerted.
- Contactless Attendance Workers entering the factory premises at the entrance are required to mark their attendance using a fingerprint biometric scanner. The use of such systems poses a high risk in a post COVID world as the scanner surface becomes a potential medium for spread of the virus.
- Temperature Screening: Elevated body temperature is another key symptom of COVID-19 infection, now a days thermal screening is done using handheld contactless IR thermometers where health worker need to come in close contact with the person need to be screened which makes the health workers vulnerable to get infected and also its practically impossible to capture temperature for each and every person in public places, the proposed use-case can be equipped with thermal cameras based screening to analyze body temperature of the peoples in public places that can add another helping hand to enforcement agencies to tackle the pandemic effectively.

VII CONCLUSION

The coronavirus COVID-19 pandemic is causing a global health crisis. So we have novel face mask detector which can possibly contribute to public healthcare. In this paper, we proposed a modified SSD method to detect whether shoppers are wearing masks in the supermarket. In order to detect whether shoppers are wearing masks, we created the COVID-19-Mask dataset, which can provide data for future studies. Human faces might be covered by other objects such as facial mask. This makes the face recognition process a very challenging task. Consequently, current face recognition methods will easily fail to make an efficient recognition. We conducted a wide range of experiments and provided a comprehensive analysis of the performance of our model on the task of face mask detection. We proposed a Convolution neural network using Keras and tensor flow which provides the best accuracy and stops the spread of corona virus.

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Automatic Music Transcription Using Conventional Neural Networks

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Abstract— The problem of automatic music transcription (AMT) is considered by many researchers as the holy grail of the field, because of the notorious complexity and difficulty of the problem. Meanwhile, the current decade has seen an unprecedented surge of deep learning where neural network methods have achieved tremendous success in many machine learning tasks including AMT. The success of deep learning is largely enabled by the ever-increasing amount of available data and the innovation of GPU hardware, allowing a deep learning model to enjoy the increased capacity to process such scale of data. While having more data and higher capacity translates better performance in general, there still remains the question of how to design an AMT model that can effectively incorporate the inductive bias for the task and best utilize the increased capacity. This thesis hypothesizes that an effective way to address this question is through the use of generative neural networks. Starting with a simplified setup of monophonic transcription, we learn the effectiveness of convolutional representation and the roles of dataset choices in data-driven models for music analysis. In the subsequent chapters, we examine the applications of deep generative models in music analysis and synthesis tasks, by introducing a WaveNet-based music synthesis model that learns a multi-dimensional timbre representation and a music language model applied in an adversarial manner to improve a piano transcription model. Finally, we combine the analysis and synthesis methods to develop a multi-instrument polyphonic music transcription system. From these observations, we conclude that deep generative models can be used to improve AMT in many ways, and they will be a crucial component for further advancing AMT.

I INTRODUCTION

The capability of transcribing music audio into music notation is a fascinating example of human intelligence. It involves perception (analyzing complex auditory scenes), cognition (recognizing musical objects), knowledge representation (forming musical structures) and inference (testing alternative hypotheses). Automatic Music Transcription (AMT), i.e., the design of computational algorithms to convert acoustic music signals into some form of music notation, is a challenging task in signal processing and artificial intelligence. It comprises several subtasks, including (multi-)pitch estimation, onset and offset detection, instrument recognition, beat and rhythm tracking, interpretation of expressive timing and dynamics, and score typesetting. Given the number of subtasks it comprises and its wide application range, it is considered a fundamental problem in the fields of music signal processing and music information retrieval (MIR) [1], [2]. Due to the very nature of music signals, which often contain several sound sources (e.g., musical instruments, voice) that produce one or more concurrent sound events (e.g., notes, percussive sounds) that are meant to be highly correlated over both time and frequency, AMT is still considered a challenging and open problem in the literature, particularly for music containing multiple simultaneous notes and multiple instruments [2].

The typical data representations used in an AMT system are illustrated in Fig. 1. Usually an AMT system takes an audio waveform as input (Fig. 1a), computes a time-frequency representation and outputs a representation of pitches over time (also called a piano-roll representation, or a typeset music score). In this paper, we provide a high-level overview of Automatic Music Transcription, emphasizing the intellectual merits and broader impacts

of this topic, and linking AMT to other problems found in the wider field of digital signal processing. We give an overview of approaches to AMT, detailing the methodology used in the two main families of methods, based respectively on deep learning and non-negative matrix factorization. Finally we provide an extensive discussion of open challenges for AMT. Regarding the scope of the paper, we emphasize approaches for transcribing polyphonic music produced by pitched instruments and voice. Outside the scope of the paper are methods for transcribing non-pitched sounds such as drums.

II. LITERATURE SURVEY

A successful AMT system would enable a broad range of interactions between people and music, including music education (e.g., through systems for automatic instrument tutoring), music creation (e.g., dictating improvised musical ideas and automatic music accompaniment), music production (e.g., music content visualization and intelligent content-based editing), music search (e.g., indexing and recommendation of music by melody, bass, rhythm or chord progression), and musicology (e.g., analyzing jazz improvisations and other nonnotated music). As such, AMT is an enabling technology with clear potential for both economic and societal impact. AMT is closely related to other music signal processing tasks [3] such as audio source separation, which also involves estimation and inference of source signals from mixture observations. It is also useful for many high-level tasks in MIR [4] such as structural segmentation, cover-song detection and assessment of music similarity, since these tasks are much easier to address once the musical notes are known. Thus, AMT provides the main link between the fields of music signal processing and symbolic music processing (i.e., processing of music notation and music language modeling). The integration of the two aforementioned fields through AMT. Given the potential impact of AMT, the problem has also attracted commercial interest in addition to academic research. While it is outside the scope of the paper to provide a comprehensive list of commercial AMT software, It is worth noting that AMT papers in the literature have refrained from making explicit comparisons with commercially available music transcription fundamental frequency ratio of its three notes C:E:G is 4:5:6, and the percentage of harmonic positions that are overlapped by the other notes are 46.7%, 33.3% and 60% for C, E and G, respectively. The timing of musical voices is governed by the regular metrical structure of the music. In particular, musicians pay close attention to the synchronization of onsets and offsets between different voices, which violates the common assumption of statistical independence between sources which otherwise facilitates separation.

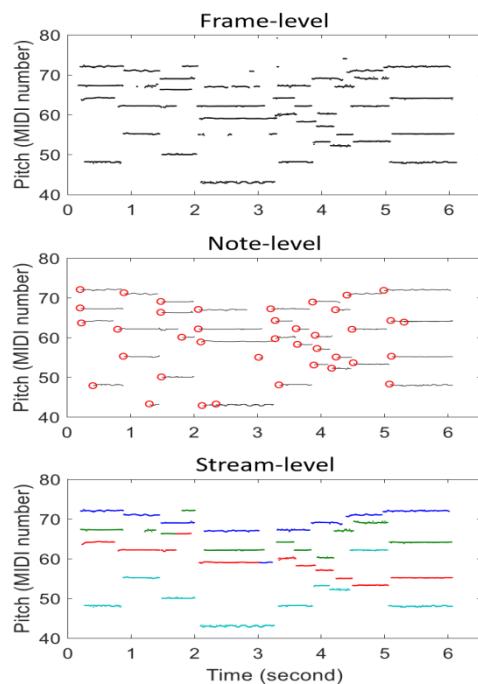
The annotation of ground-truth transcriptions for polyphonic music is very time consuming and requires high expertise. The lack of such annotations has limited the use of powerful supervised learning techniques to specific AMT sub-problems such as piano transcription, where the annotation can be automated due to certain piano models that can automatically capture performance data. An approach to circumvent this problem was proposed in [7], however, it requires professional music performers and thorough score pre- and postprocessing. We note that sheet music does not generally provide good ground-truth annotations for AMT; it is not time-aligned to the audio signal, nor does it usually provide an accurate representation of a performance. Even when accurate transcriptions exist, it is not trivial to identify corresponding pairs of audio files and musical scores, because of the multitude of versions of any given musical work that are available from music distributors. At best, musical scores can be viewed as weak labels. The above key challenges are often not fully addressed in current AMT systems, leading to common issues in the AMT outputs, such as octave errors, semitone errors, missed notes (in particular in the presence of dense chords), extra notes (often manifested as harmonic errors in the presence of unseen timbres), merged or fragmented notes, incorrect onsets/offsets, or mis-assigned streams [1], [2]. The remainder of the paper will focus on ways to address the above challenges, as well as discussion of additional open problems for the creation of robust AMT systems.

In the past four decades, many approaches have been developed for AMT for polyphonic music. While the end goal of AMT is to convert an acoustic music recording to some form of music notation, most approaches were designed to achieve a certain intermediate goal. Depending on the level of abstraction and the structures that need to be modeled for achieving such goals, AMT approaches can be generally organized into four categories: frame-level, note-level, streamlevel and notation-level. Note-level transcription, or note tracking, is one level higher than MPE, in terms of the richness of structures of the estimates. It not only estimates the pitches in each time frame, but also connects pitch estimates over time into notes. In the AMT literature, a musical note is often characterized by three elements: pitch, onset time, and offset time [1]. As note offsets can be ambiguous, they are sometimes neglected in the evaluation of note tracking approaches, and as such, some note tracking

approaches only estimate pitch and onset times of notes. Fig. 2(middle) shows an example of a note-level transcription, where each note is shown as a red circle (onset) followed by a black line (pitch contour). Many note tracking approaches form notes by post-processing MPE outputs (i.e., pitch estimates in individual frames). Techniques that have been used in this context include median filtering [12], Hidden Markov Models (HMMs) [20], and neural networks [5]. This post-processing is often performed for each MIDI pitch independently without considering the interactions among simultaneous notes. This often leads to spurious or missing notes that share harmonics with correctly estimated notes. Some approaches have been proposed to consider note interactions through a spectral likelihood model [9] or a music language model [5], [18] (see Section IV-A). Another subset of approaches estimate notes directly from the audio signal instead of building upon MPE outputs. Some approaches first detect onsets and then estimate pitches within each inter-onset interval [21], while others estimate pitch, onset and sometimes offset in the same framework [22], [23], [24].

We Stream-level transcription, also called Multi-Pitch Streaming (MPS), targets grouping estimated pitches or notes into streams, where each stream typically corresponds to one instrument or musical voice, and is closely related to instrument source separation. Fig. 2(bottom) shows an example of a stream-level transcription, where pitch streams of different instruments have different colors. Compared to note-level transcription, the pitch contour of each stream is much longer than a single note and contains multiple discontinuities that are caused by silence, non-pitched sounds and abrupt frequency changes. Therefore, techniques that are often used in note-level transcription are generally not sufficient to group pitches into a long and discontinuous contour. One important cue for MPS that is not explored in MPE and note tracking is timbre: notes of the same stream (source) generally show similar timbral characteristics compared to those in different streams. Therefore, stream-level transcription is also called timbre tracking or instrument tracking in the literature. Existing works at this level are few, with [16], [10], [25] as examples.

From frame-level to note-level to stream-level, the transcription task becomes more complex as more musical structures and cues need to be modeled. However, the transcription outputs at these three levels are all parametric transcriptions, which are parametric descriptions of the audio content. The MIDI piano roll shown in Fig. 1(c) is a good example of such a transcription. It is indeed an abstraction of music audio, however, it has not yet reached the level of abstraction of music notation: time is still measured in the unit of seconds instead of beats; pitch is measured in MIDI numbers instead of spelled note names that are compatible with the key . complete music notation transcription, especially for polyphonic music. Several software packages, including Finale, GarageBand and provide the functionality of converting a MIDI file into music notation, however, the results are often not satisfying and it is not clear what musical structures have been estimated and integrated during the transcription process. Cogliati et al. [29] proposed a method to convert a MIDI performance into music notation, with a systematic comparison of the transcription performance with the above-mentioned software. In terms of audio-tonotation transcription, a proof-of-concept work using end-to-end neural networks was proposed by Carvalho and Smaragdis [30] to directly map music audio into music notation without explicitly modeling musical structures.



III. METHODOLOGY

The many approaches have been developed for AMT for polyphonic music. While the end goal of AMT is to convert an acoustic music recording to some form of music notation, most approaches were designed to achieve a certain intermediate goal. Depending on the level of abstraction and the structures that need to be modeled for achieving such goals, AMT approaches can be generally organized into four categories: frame-level, note-level, stream-level and notation-level. Is the estimation of the number and pitch of notes that are simultaneously present in each time frame (on the order of 10 ms). This is usually performed in each frame independently, although contextual information is sometimes considered. Given the popularity of NMF and neural network based methods for automatic music transcription, it is interesting to discuss their differences. In particular, neglecting the nonnegativity constraints, NMF is a linear, generative model. Given that NMF-based methods are increasingly replaced by NN-based ones, the question arises in which way linearity could be a limitation for an AMT model. To look into this, assume we are given an NMF dictionary with two spectral templates for each musical pitch. To represent an observed spectrum of a single pitch C4, we can linearly combine the two templates associated with C4. The set (or manifold) of valid spectra for C4 notes, however, is complex and thus in most cases our linear interpolation will not correspond to a real-world recording of a C4. We could increase the number of templates such that their interpolation could potentially get closer to a real C4 – however, the number of invalid spectra we can represent increases much more quickly compared to the number of valid spectra. Deep networks have shown considerable potential in recent years to (implicitly) represent such complex manifolds in a robust and comparatively efficient way [33]. An additional benefit over generative models such as NMF is that neural networks can be trained in an end-to-end fashion, i.e., note detections can be a direct output of a network without the need for additional postprocessing of model parameters (such as NMF activations).

- K-Nearest Neighbor (K-NN): KNN is a classification-monitored learning algorithm. Predict the class label as a new entry and use the same for your entries in the training set. KNN's performance is not good enough
- Random Forest (RF): The random forest classifier generates a set of decision trees from a randomly selected subset of the training set. Then you add up the votes from different decision trees to determine the final class of the test object. Random Forest creates multiple decision trees and merges them for a more accurate and stable prediction. The random forest has almost the same hyperparameters as a decision tree or a packaging classifier. With the Random Forest, you can also process regression problems using the regressor of the algorithm.

IV. DESIGN AND IMPLEMENTATION

Design is the strategy which is utilized to do the framework investigation. We find that frequency magnitudes relative to the f0 are enough to produce frame instrument classifications with an accuracy of 54% using an ‘out-of-the-box’ random forest with 500 trees. That increases to 79% when given information about absolute frequency. If we augment our training data, by shifting it up and down 1 and 2 frames, we can increase that accuracy to 85%. CNN3, outlined in section 4.5, attains a classification accuracy of 90% on the same data. Whilst the random forest uses approximately 6,000,000 parameters, whilst CNN3 uses fewer than 76,000. With two orders of magnitude fewer parameters, this results in a significantly less complex model upon which to build for future work. To compare as best we can with studies from the literature (issues discussed in Section). This script is for creating and loading a JSON structure that will hold parameters that are to be held constant for preprocessing data for, training, and testing each model.

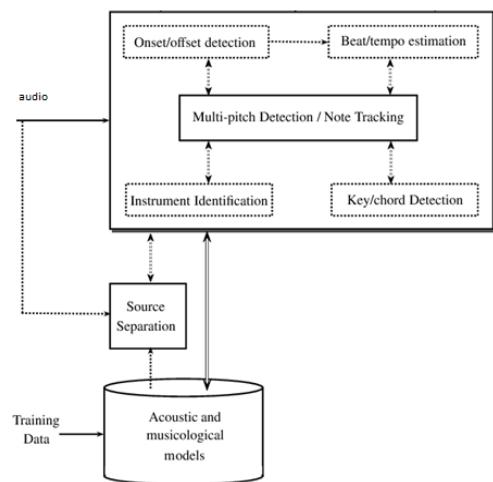


Fig 1: System Architecture

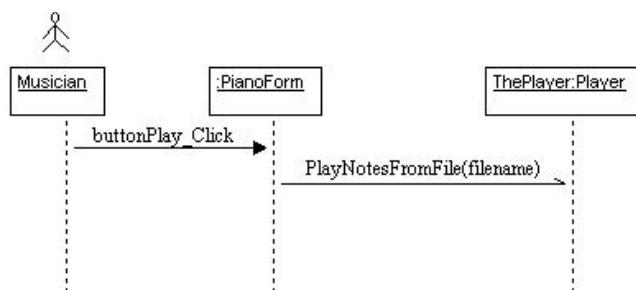


Fig 2: Sequence Diagram

Western notation conceptualizes music as sequences of unchanging pitches being maintained for regular durations, and has little scope for representing expressive use of microtonality and microtiming, nor for detailed recording of timbre and dynamics. Research on automatic transcription has followed this narrow view, describing notes in terms of discrete pitches plus onset and offset times. For example, no suitable notation exists for performed singing, the most universal form of musicmaking. Likewise for other instruments without fixed pitch or with other expressive techniques, better representations are required. These richer representations can then be reduced to Western score notation, if required, by modeling musical knowledge and stylistic conventions. Evaluation Metrics Most AMT approaches are evaluated using the set of metrics proposed for the

MIREX Multiple-F0 Estimation and Note Tracking public evaluation tasks1. Three types of metrics are included: frame-based, note-based and stream-based, mirroring the frame-level, note-level, and stream-level transcription categories presented. While the above sets of metrics all have their merits, it could be argued that they do not correspond with human perception of music transcription accuracy, where e.g., an extra note might be considered as a more severe error than a missed note, or where out-of-key note errors might be penalized more compared with in-key ones. Therefore, the creation of perceptually relevant evaluation metrics for AMT, as well as the creation of evaluation metrics for notation-level transcription, remain open problems.

V. CONCLUSION

Detection Automatic music transcription has remained an active area of research in the fields of music signal processing and music information retrieval for several decades. With several potential benefits in other areas and fields extending beyond the remit of music. To be addressed in order to fully address this problem: these include key challenges as described in Section I-C on modeling music signals and on the availability of data, challenges with respect to the limitations of state-of-the-art methodologies. We believe that addressing these challenges will lead towards the creation of a “complete” music transcription system and towards unlocking the full potential of music. Automatic music transcription has remained an active area of research in the fields of music signal processing and music information retrieval for several decades, with several potential benefits in other areas and fields extending beyond the remit of music.

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Arduino Based Home Automation Using Android Application

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ABSTRACT: We are living in 21st century where automation of any form i.e. home or industrial plays an important role in human life. When it comes to industrial automation, the concept is applied to large machines or robots which help in increasing the efficiency in terms of production, energy and time. Home automation on the other hand involves automating the household environment. This is possible because of the smartphones and internet that we are widely using. Home automation can be again divided in to just controlling the appliances using a smartphone from a remote location and another type filled with sensors and actuators which controls the lighting, temperature, door locks, electronic gadgets, electrical appliances etc. using a “Smart” system. Technology is a neverending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This project presents the design and implementation of a low cost but yet flexible and secure cell phone-based home automation system. The design is based on a standalone Arduino BT board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Password protection is being used to only allow authorized users from accessing the appliances at home.

I. INTRODUCTION

Today's homes require sophistication control in its different gadgets which are basically electronic appliances. This has revolutionized the area of home automation with respect to an increased level of affordability and simplicity through the integration of home appliances with smart phone and tablet connectivity. Smart phones are already feature-perfect and can be made to communicate to any other devices in an ad hoc network with a connectivity options like Bluetooth.

With the advent of mobile phones, Mobile applications development has seen a major outbreak. Utilizing the opportunity of automating tasks for a smart home, mobile phone commonly found in normal household can be joined in a temporary network inside a home with the electronic equipment. Android, by Google Inc. provides the platform for the development of the mobile applications for the Android devices. Home automation system is a mobile application developed using Android targeting its vast market which will be beneficial for the masses. Automation of the surrounding environment of a modern human being allows increasing his work efficiency and comfort. There has been a significant development in the area of an individual's routine tasks and those can be automated.

In the present times, we can find most of the people clinging to their mobile phones and smart devices throughout the day. Hence with the help of his companion – a mobile phone, some daily household tasks can be accomplished by personifying the use of the mobile phone. Analysing the current smart phone market, novice mobile users are opting for Android based phones. It has become a second name for a mobile phone in layman terms. Home Automation System (HAS) has been designed for mobile phones having Android platform to automate an 8-bit Bluetooth interfaced microcontroller which controls a number of home appliances like lights, fans, bulbs and many more using on/off relay. This project presents the automated approach of controlling the devices in a household that could ease the tasks of using the traditional method of the switch. The most famous and efficient technology for short range wireless communication- Bluetooth is used here to automate the system. The HAS system for Android users is a step towards the ease of the tasks by controlling one to twenty four different appliances in any home environment.

II. PROBLEM STATEMENT

While people are pursuing ever-growing high quality of their lives today. This leads to more and more facilities and home appliances poured into their buildings. How to control and manage these versatile facilities and appliances in a house? • Usually conventional wall switches are located in different corners of a house and, thus

necessitate the need of manual operations like pressing to turn the loads on or off. It becomes very difficult for the elderly or physically handicapped people to operate them. How to help them?

The Existing system consists of homes equipped with electrical appliances with their control switches at different positions on the walls. The existing system causes old aged people and physically challenged people to use a lot of physical work to reach out to those switches. Also, the higher variants of the home automation systems can cost more as compared to the Bluetooth enabled Home Automation System. The existing system does not allow physically challenged and old people to control the electrical appliances in their homes. Also, it causes a lot of energy wastage, if they are not capable to switch it OFF when it is not needed and consumes a lot of precious time in such small household chores. The existing system may be suitable for the younger generations as they have physical strength, but not for physically challenged or old people.

III. PROPOSED PLAN

According to the proposed plan the final outcome of this project leads to the development of a home automation. Through this project, an automation system has been created so that we can easily control home appliances like as light, fan, tube light, AC, bulb, etc. One of the objectives of this project is also to get us a smart automation and low-cost project. The system is easy and secured for access from unknown user or intruder. The approach discussed in the project is novel and has achieved the target to control home appliances using the Bluetooth technology to connect system parts, satisfying user needs and requirements. Bluetooth technology capable solution has proved to be controlled remotely, provide home security and is cost effective as compared to the previously existing systems. Hence, we can conclude that the required goals and objectives of home automation system have been achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

IV. SYSTEM DESIGN

This venture centres around the robotization of machines with the assistance of an android application. In this day and age, enhancement is the primary thought process. Any framework created goes for streamlining the human endeavours to a negligible and our framework goes for doing likewise. The architecture of this device as shown in figure.

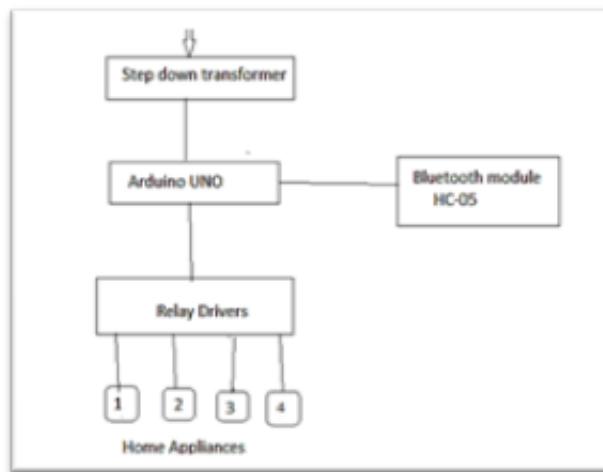


Fig 4.1 Architecture of Home Automation

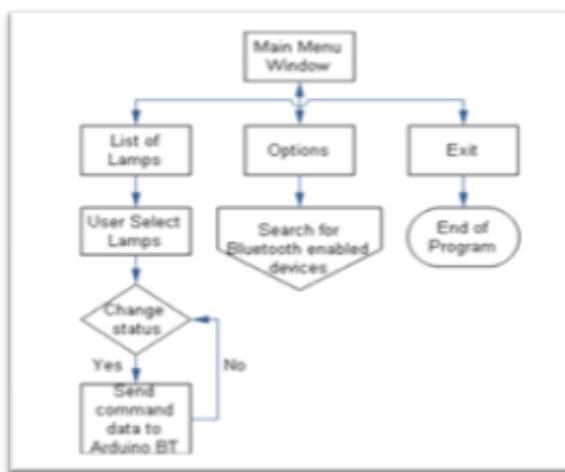


Fig 4.2 Program Flowchart for Main Menu Window of the GUI

The user will communicate to Android application through the Arduino Uno via Bluetooth module. This model is very resilient and gaugeable, maximum efficiency, safety and securely added smart home appliances with least amount of human effort. The Bluetooth signal having most efficient energy to connect any signal without loss of information with least harmonics. Home automation system main part consists of Arduino with microcontroller. The people must have mobile application with proper connection. It should be used as multi appliances works as together. The Arduino board is configured for each home appliances using coding in microcontroller. By the help of Microcontroller, we can control the electromagnetic relay which works as a switch to receive a signal from the Arduino through Bluetooth module HC-05. When the signal transmits from transmitter as datasheet to relay then the relay works as switch and control many appliances of smart home(multitas king).

V. OUTCOMES

The system as the name indicates, ‘Home automation’ makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies. The system consists of mainly three components is a BLUETOOTH module, Arduino microcontroller and relay circuits. WIFI is used as the communication channel between android phone and the Arduino microcontroller. We hide the complexity of the notions involved in the home automation system by including them into a simple, but comprehensive set of related concepts. This simplification is needed to fit as much of the functionality on the limited space offered by a mobile device’s display. This paper proposes a low cost, secure, ubiquitously accessible, auto-configurable, remotely controlled solution. The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the WiFi technology to connects system parts, satisfying user needs and requirements. WiFi technology capable solution has proved to be controlled remotely, provide home security and is costeffective as compared to the previously existing systems. Hence we can conclude that the required goals and objectives of home automation system have been achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

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Multipurpose Iwalk Stick For Visually Impaired

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ABSTRACT- Visually impaired people find great difficulty in moving around freely without a human guide, especially in a new terrain. To overcome these problems, an iwalk is specially designed for visually disabled individuals to improve and ease navigation. The iWalk uses ultrasonic and misture sensor to detect obstacles and water ahead. Once they are detected an alert message will be displayed on LCD display and pre-recorded output will be provided via the application created in the android phone. The RFID readers detects the RFID tags placed at pre-defined places and pre-defined buses, once they are detected an alert message will be displayed on LCD display and pre-recorded output will be provided via the application created in the android phone. In case of an emergency, an emergency button is provided. When the emergency button is pressed by blind person, an alert message is displayed on the LCD display, pre-recorded output will be provided via the application created in the android phone and by taking longitude, latitude values of the blind person location of the blind along with the emergency message is sent to the caretaker number which is registered in the application created in the android phone. The wireless connection has been set up using Bluetooth to the stick. The wireless connectivity can be achieved with the help of Bluetooth device to the android application.

Keywords- Ultrasonic sensor, RFID, Renesas microcontroller, Emergency button, Android, Bluetooth module

I INTRODUCTION

People with low vision or complete blindness face difficulty in navigating surroundings they are not familiar with and usually require someone to help them navigate. They often bump into the obstacles present in their way thus hindering their free movement. The conventional white sticks that are used by the blind do not help them to avoid the obstacles efficiently. Only those obstacles that are hit by the stick are identified and can be avoided. However, the obstacles in the surroundings are at different heights and distances, and sometimes cannot be identified by the white canes used. In order to navigate independently and confidently in unfamiliar environments it is required that the blind people are well aware about the obstacles in their path from a distance. This can be achieved by implanting sensors in the traditional white cane, which can then be used to detect the obstacles. There are many technologies that can be used to detect the obstacles in the path from a distance. Smart assistive device indicates an intelligent device that will help the blind in his easy mobility and to carry out his work like any other person.

Visually impaired persons have difficulty to interact and feel their environment. They have little contact with surrounding. Physical movement is a challenge for visually impaired persons, because it can become tricky to distinguish where he is, and how to get where he wants to go from one place to another. To navigate unknown places, he will bring a sighted family member or his friend for support. Over half of the legally blind people in the world are unemployed. Because limited on the types of jobs they can do. They have a less percentage of employment. They are relying on their families for mobility and financial support.

Their mobility opposes them from interacting with people and social activities. In the past different systems are designed with limitations without a solid understanding of the nonvisual

perception. Some of the systems are only for indoor navigations, and has no hurdle detection and determining location feature in outdoor environment. There is no one system available to navigate indoor, outdoor and also determine location and position to easily facilitate the visually impaired persons. The available systems are very costly; some of the systems are very heavy cause physical fatigue and required training to use. In the present scenario if we consider the handicap people face lots of simple problems in their daily life. So with respect to that we have designed this project which consists of different stages which are listed below: To provide information about the destination of the bus through voice announcement using RFID technology.

II. PROBLEM STATEMENT

Visually impaired people are the one who struggle whenever they need help for basic necessities due to partial or complete blindness. Inconvenience while travelling to far off places and not aware of bus arrival, and waste of time finding or depending on others to reach the destination.

III. SOLUTION TO THE PROBLEM

To overcome the above problem the multipurpose iWalk (Intelligent Walk) is designed which detects the obstacles like pebbles, pits, rocks etc., detect the water in the path to avoid slipping or drenching, to trace the location of the blind person and send data to their relatives to avoid any misfortunes from befalling them, bus navigation using RFID.

IV. OBJECTIVE

The primary objective of the proposed Multipurpose iWalk stick for visually impaired are:

1. To detect the obstacles like pebbles, pits, rocks along with pre-recorded voice output via android app.
2. To detect the water in the path to avoid slipping or drenching with pre-recorded voice output via the android app.
3. To send the location of the blind person to the caretaker in case of emergency, when emergency switch is pressed.
4. To provide pre-defined bus and place notification along with pre-recorded voice output via the android app.

V. HARDWARE REQUIREMENTS

1. Ultrasonic sensor: An ultrasonic sensor is a device that can measure the distance to an object by using sound waves. The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object ranging from 2cm to 400 cm or 1 to 13 feet. It measures distance by sending out a sound wave at a specific frequency and waiting for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bounce back, it is possible to calculate the distance between the ultrasonic sensor and the object. We are using this sensor in our stick to detect the obstacles like pits, pebbles, and cars etc. Fig. 1 and Fig. 2 shows the ultrasonic sensor used and its working respectively.



Figure 1: Ultrasonic Sensor



Figure 2: Ultrasonic Sensor Working

2. Moisture Sensor: The Moisture sensor is used measure the water content (moisture) as shown in the below figure 3. When water is detected, the module output is at high level, else the output is at low level. This sensor reminds the user about the presence of water or moisture. The operating voltage and current of Moisture Sensor is 5V and <20mA and working temperature is 10°C ~ 30°C.

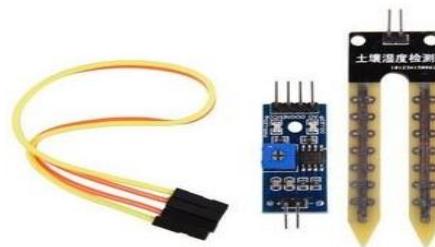


Figure 3: Moisture Sensor

3. RFID Tags and Reader: Radio-frequency identification (RFID) technique uses electromagnetic fields for automatic identification and tracking of tags attached to various objects. The information in tags is electronically stored. RFID tag shown in the figure 4 consists of an integrated circuit and an antenna. The tag is also composed of a protective material that holds the pieces together and shields them from various environmental conditions. RFID tags are of two types, active tags, which contain an internal power source, and passive tags, which obtain power from the signal of an external reader. Passive tags are more commonly used than active tags for retail purposes, because of their lower price and smaller size. A passive tag consists of a microchip surrounded by a printed antenna and some form of encapsulation, plastic laminates with adhesive that can be attached to a product or a small glass vial for implantation.

The tag reader powers and communicates with passive tags. The tag's antenna conducts the process of energy capture and ID transfer. A tag's chip typically holds data to identify an individual product, the product model and manufacturer.

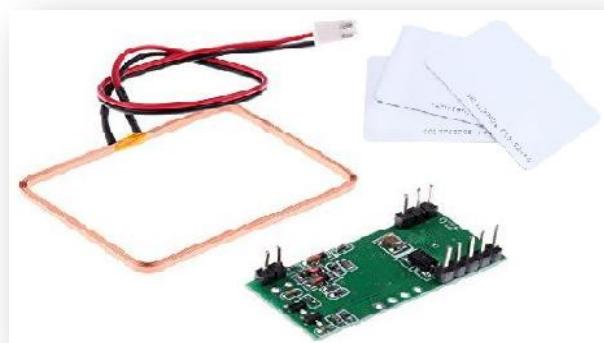


Figure 4: RFID Tag and Reader

4. Liquid Crystal Display (LCD): A liquid-crystal display (LCD) shown in the figure 5 is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.



Figure 5: Liquid Crystal Display

5. Renesas RL78 Microcontroller: In this project, we are using Renesas RL78 family R5F100LE microcontroller. It acts as a brain for our stick. The RL78 family is a 16-bit and 8-bit CPU core for embedded microcontrollers of Renesas electronics. The basis of RL78 family is an accumulator-based register-bank CISC architecture with 3-stage instruction pipelining. It has 20-bit 1M Byte address space. The RL78 is designed specifically for ultra-low-power applications. Execution speed of Renesas is 41MIPS (Million Instruction Per Second) with operating clock frequency of 38MHz. The RL78 is designed specifically for ultra-low-power applications. RL78 offers widest operating voltage in its class from 1.6V to 5.5V. Totally it has 11 ports with 58 input/output pins.



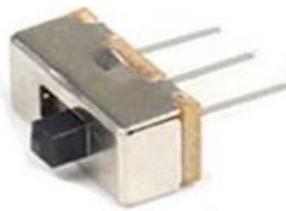


Figure 8: Slide Switch

8. DC Motor: DC motor is a rotating electrical device as shown in the figure 9. The operating voltage of DC motor is 12V. An inductor (coil) inside the DC motor produces a magnetic field that creates rotary motion as DC voltage is applied to its terminal.



Figure 9: DC Motor

9. Relay Board: A relay is an electromechanical switch which is activated by an electric current as shown in the figure 10. The operating voltage is 12V DC. A single relay board arrangement contains driver circuit, power supply circuit and isolation circuit. The driver circuit contains transistor for switching operations and transistor is used for switching the relay.



Figure 10: Relay Board

10. 12V Battery: These batteries are sealed Lead Acid batteries which is maintenance free as shown in the figure 11. Zero loss in the power output over the battery life with voltage of 12V.



Figure 11: 12V Battery

VI. SOFTWARE REQUIREMENTS

1. CubeSuite+ Compiler: The Cubesuite+ is an Integrated Development Environment (IDE) for the microcontrollers as shown in the figure 12. The CubeSuite+ is a software program which was developed by Renesas Electronics. CubeSuite+ offers a highly user-friendly development environment featuring significantly shorter build times and the graphical debug functions. The generated program code is in the C language. The CubeSuite+ is also compatible with Renesas hardware tools, such as on-chip debugging emulator E1 (sold separately), facilitating advanced debugging.

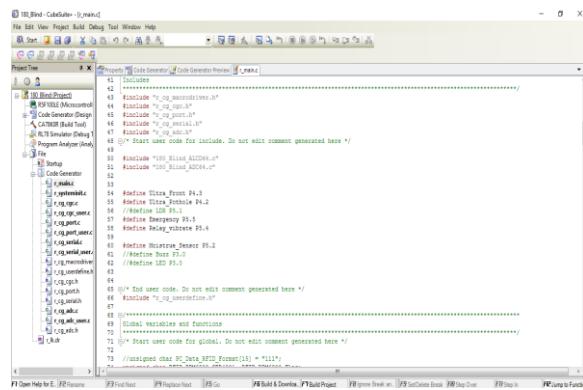


Figure 12: CubeSuite+ Software

2. Renesas Flash Programmer: The Renesas Flash Programmer provides usable and functional support for programming the on-chip flash memory of Renesas microcontrollers in each phase of development and mass production as shown in the figure 13. It provides usability and functionality optimized specifically for flash programming.

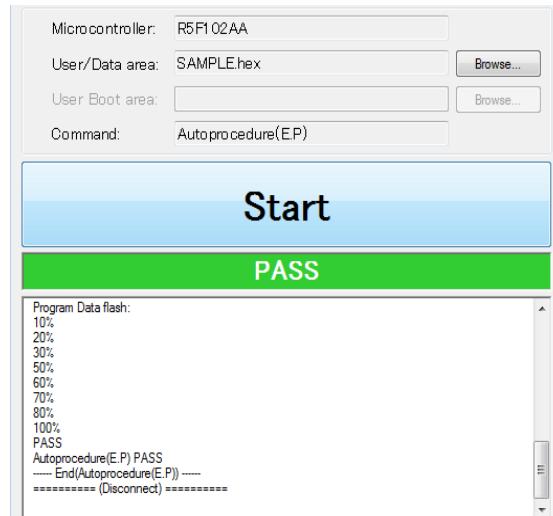


Figure 13: Renesas Flash Programmer

Software required to setup android for eclipse IDE are:

- a. Java Development Kit (JDK): A Java Development Kit (JDK) is a program development environment for writing Java applets and applications. It consists of a runtime environment that "sits on top" of the operating system layer as well as the tools and programming those developers need to compile, debug, and run applets and applications written in the Java language.

- b. Eclipse: Eclipse provides a common user interface (UI) model for working with tools. It is designed to run on multiple operating systems while providing robust integration with each underlying Operating System. Plugins can be programmed to the Eclipse portable APIs and run unchanged on any of the supported operating systems.
- c. Android Software development kit (Android SDK): The Android software development kit (SDK) includes everything you need to start developing, testing, and debugging Android applications.
- d. ADT Plugin: Android Development Tools (ADT) is a plugin for the Eclipse IDE that is designed to give you a powerful, integrated environment in which to build Android applications shown in the figure 14. ADT extends the capabilities of Eclipse to let you quickly set up new Android projects, create an application UI, add packages based on the Android Framework API. Debug your applications using the Android SDK tools, and even export signed (or unsigned) .apk files in order to distribute your application.

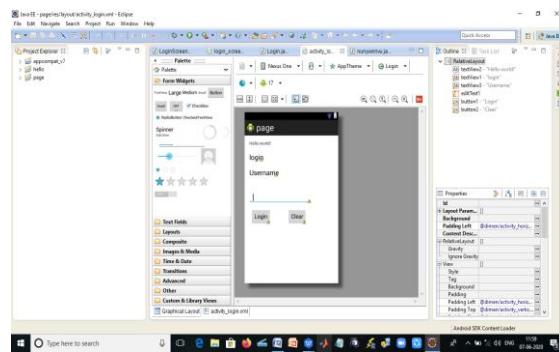


Figure 14: Application Development

VII. BLOCK DIAGRAM

The block diagram of multipurpose iWalk stick is shown in the figure 15. It shows all the important components embedded in the iWalk stick. Ultrasonic sensor will detect the nearby obstacles (or pot holes) that can cause an accident of blind person and will send the information in the digital form, the microcontroller will analyze this data and will notify the blind person by the pre-recorded voice output via the application created in the android phone. Similarly, Water sensor will detect the presence of water and will send the information in the digital form, the microcontroller will analyze this data and will notify the blind person by the pre-recorded voice output via the application created in the android phone. RFID readers detect the RFID tags placed at predefined places and predefined buses. Blind person will get a pre-recorded voice output via the application created in the android phone, when RFID readers detects the RFID tags placed at predefined places and predefined buses. In case of an emergency, an emergency switch is provided. When the switch is pressed by the blind person, an emergency message and the location of the blind person is sent to the caretaker number which is registered in the application created in the android phone. The wireless connection has been setup using bluetooth to the stick. The wireless connectivity can be achieved with the help of Bluetooth device to the android application.

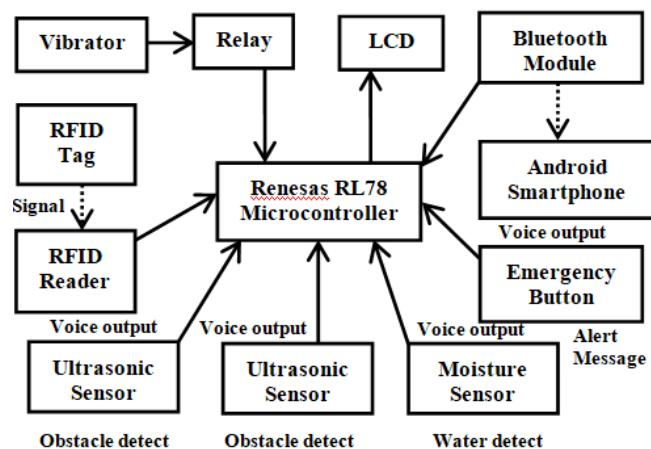


Figure 15: Block Diagram of Multipurpose iWalk Stick

VIII FLOWCHART

The working of Multipurpose iWalk Stick is shown in the figure 16 in the form of flowchart.

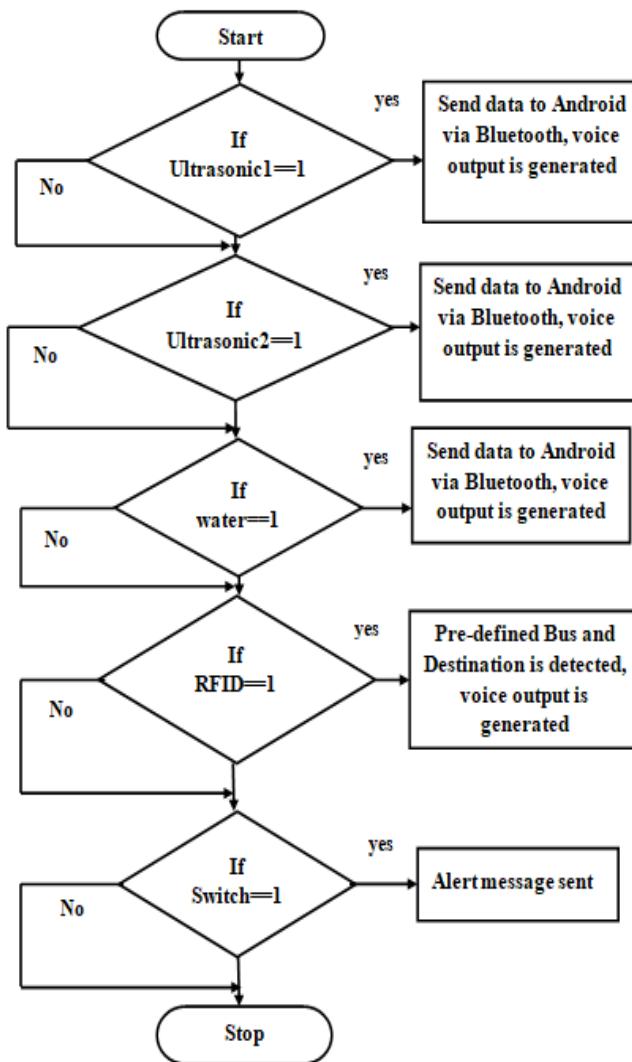


Figure 16: Flowchart of the Multipurpose iWalk Stick

IX. RESULTS AND DISCUSSIONS:

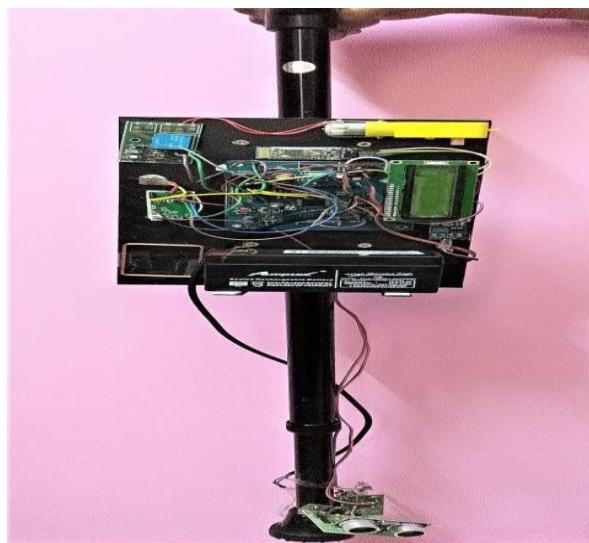


Figure 17: Development of Multipurpose iWalk Stick

The above figure 17 shows the development of 'Multipurpose iWalk Stick for Visually Impaired', where Ultrasonic sensor, Moisture sensor, Bluetooth module, Relay, DC motor, LCD display, Switch and RFID reader, are all interfaced together with Renesas Microcontroller which are embedded in the Multipurpose iWalk stick.

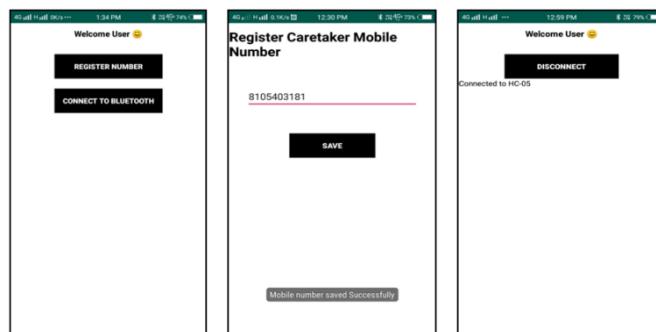


Figure 18: Connecting Bluetooth and care taker mobile no. Registration

Initially user has to login successfully with the given username and password in the login screen. The caretaker mobile number has to be registered in order to send the location and alert message and finally connect to the Bluetooth as shown in the figure 18.



Figure 19: Front obstacle detected and voice output via android app

The Ultrasonic sens or detects the obstacles, the message is displayed on the LCD screen and the alert message is displayed along with the pre-recorded voice output via the application created in the android smart phone as shown in the figure 19.

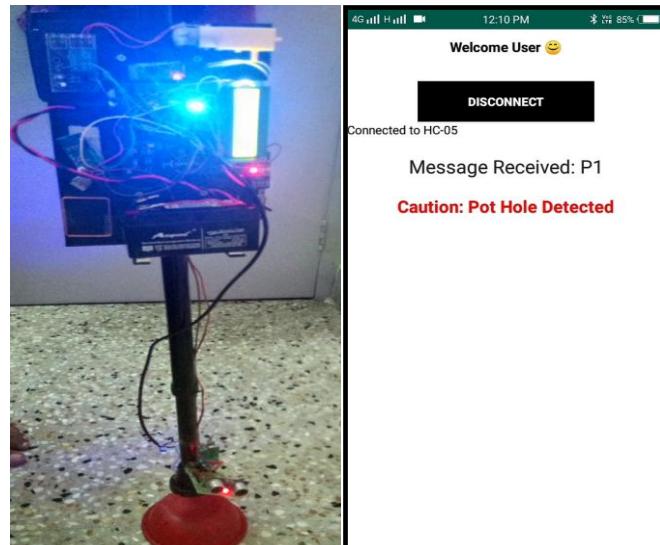




Figure 20: Pothole detected and voice output via android app

The Ultrasonic sensor detects the pothole, the message is displayed on the LCD screen and the alert message is displayed along with the pre-recorded voice output via the application created in the android based smart phone as shown in the above figure 20.



Figure 21: Water detected and voice output via android app

The Moisture sensor detects the water ahead, the message is displayed on the LCD screen and the alert message is displayed along with the pre-recorded voice output via the application created in the android based smart phone as shown in the figure 21.



Figure 22: Predefined bus detected and voice output via android app

The RFID reader detects the tag placed in pre-defined buses, message is displayed on the LCD screen and alert message is displayed along with the pre-recorded voice output via the application created in the android based smart phone as shown in the figure 22.

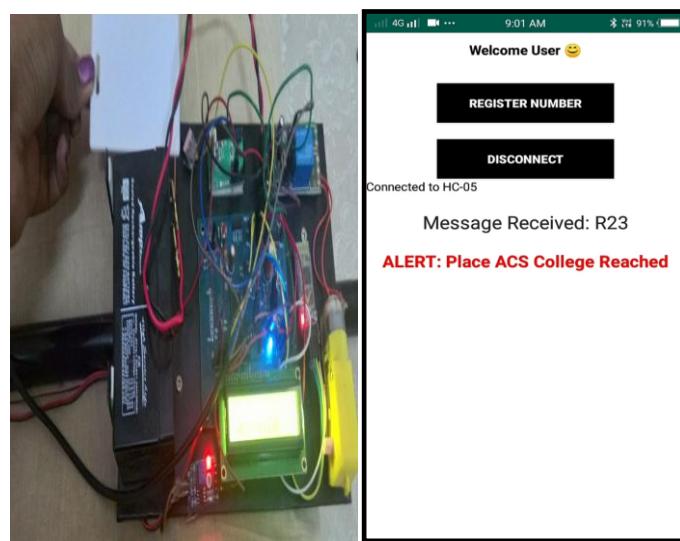




Figure 23: Pre-defined destination, Emergency situation detected and voice output via android app

The RFID reader detects the tag placed at pre-defined destinations and when emergency button is pressed, message is displayed on LCD screen and alert message is displayed along with the pre-recorded voice output via the application created in android based smart phone as shown in the above figure 23.

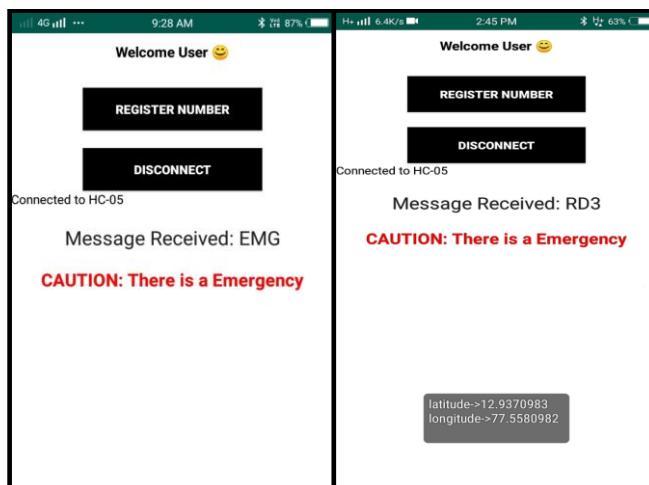


Figure 24: Emergency situation detected and voice output via android app

When the emergency button is pressed by the blind person, a vibration and alert message along with the pre-recorded voice output is provided via the application created in the android based smart phone. It also takes the longitude and latitude values of the blind person location is shown in the figure 24.

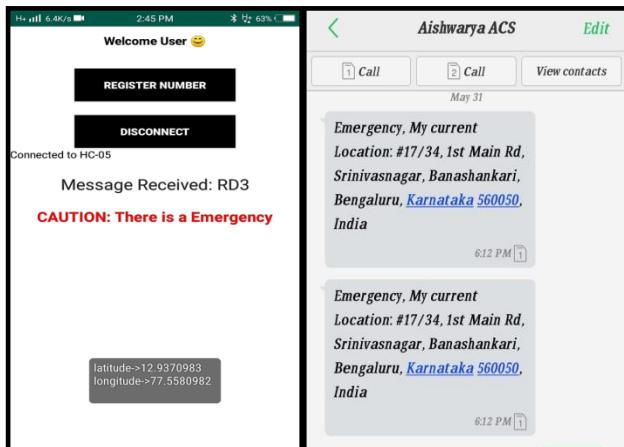


Figure 25: Location of Blind with emergency message sent to caretaker

When Emergency button is pressed, the alert message is sent to the caretaker along with location by taking the latitude and longitude values of the blind person location via the GSM/GPS modem that is present in the android based smart phone and SMS is sent successfully to the caretaker with the location of the blind person as shown in the above figure 25.

X. CONCLUSION

The main objective of this project is to assist blind or visually impaired people to safely move among obstacles and other hurdles faced by them in their daily life. Using this system blind can travel independently. Using Ultrasonic sensor, RFID technology, Moisture sensor, Bluetooth technology and Android application the first four objectives of the project has been achieved. The iWalk is simple, cheap, easy to handle electronics guidance device, which is proposed to provide constructive assistance and support for blind and visually impaired persons. It is a user-friendly device and can serve the purpose of potential beneficiaries.

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Quality Inspection In Manufacturing PCB With RCNN And LSTM

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Abstract—Virtually every electronic product manufactured today is powered by one or more printed circuit boards (PCBs). In the past few years, designers have pushed the limits of these thin sheets of conducting material, engineering them to fit a series of integrated circuits and critical connections with smaller sizing requirements. To keep up with these rapid advancements, PCB assembly (PCBA) providers must conduct quality assurance testing capable of thoroughly examining assemblies and detecting defects in nearly microscopic packages. In high volume production runs, even an occasional deformity will undermine manufacturers' fundamental goal of achieving higher yields with lower defect rates and reduced costs. Manufacturers must also validate each assembly with their own inspections in order to provide original equipment manufacturers (OEMs) with the highest quality part for their end user product. The quality inspection can also be done by digital image processing. While performing this method there will a lot of false errors such as short circuits, pose detection, capacitor detection in the output mainly due to image subtraction process. These errors can be minimized by using the proposed project. The proposed project presents "Quality inspection of PCB using RCNN and LSTM" which helps to identify the defects in PCB by using visual inspection on the monitor to find a specific object. This includes inventory management, sorting, quality management, machining, and packaging. Localization and automatic object counting allow improving inventory accuracy. It ensures that the desired accuracy is obtained by arranging too many training examples.

Keywords—quality inspection, Neural Networks, RCNN, LSTM.

I INTRODUCTION

A printed circuit board (PCB) mechanically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of non-conductive substrate. Components are generally soldered onto the PCB to both electrically connect and mechanically fasten them to it, as shown in Fig.1.1.

Printed circuit boards are used in all but the simplest electronic products. They are also used in some electrical products, such as passive switch boxes.

Alternatives to PCBs include wire wrap and point-to-point construction, both once popular but now rarely used. PCBs require additional design effort to lay out the circuit, but manufacturing and assembly can be automated. Specialized CAD software is available to do much of the work of layout. Mass-producing circuits with PCBs are cheaper and faster than with other wiring methods, as components are mounted and wired in one operation. Large numbers of PCBs can be fabricated at the same time, and the layout only must be done once. PCBs can also be made manually in small quantities, with reduced benefits.

The rise in popularity of multilayer PCBs with more than two, and especially with more than four, copper planes was concurrent with the adoption of surface mount technology. However, multilayer PCBs make repair, analysis, and field modification of circuits much more difficult and usually impractical.

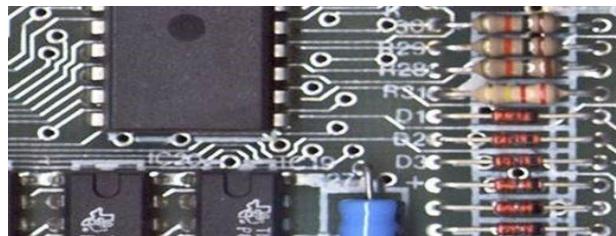


Figure 1.1: PCB board

Printed Circuit Boards Classification

A PCB is a thin board made of fiberglass, composite epoxy, or other laminate material. Conductive pathways are etched or "printed" onto board, connecting different components on the PCB, such as transistors, resistors, and integrated circuits. PCBs can be classified into rigid PCBs and flex PCB and the former can be classified into three types.

- a) Single sided PCB
- b) Double sided PCB
- c) Multilayer PCB

Quality of PCBs

According to quality class PCBs can be classified into three quality classes.

- a) CLASS 1
- b) CLASS 2
- c) CLASS 3

Class 3 features the highest requirements. Difference on PCB quality class leads to differences in terms of complexity and test and inspection method. Up to now, rigid double-sided PCBs and multilayer PCBs account for the relatively large applications in electronics products and flex PCBs are sometimes applied in some circumstances. Therefore, quality inspection be discussed focusing on rigid double sided and multilayer PCBs. After PCB fabrication, inspection must be carried out in order to determine whether the quality is compatible with design requirement. It can be put that quality inspection is the important insurance of product quality and smooth implementation of subsequent procedures.

The rest of this paper is arranged as follows: Section II introduces the Neural Networks and the components of the proposed model in detail.

II. RELATED WORK

There has been and are numerous research works in the field of visual inspection and image classification using machine learning techniques. Every year new type of deep neural networks are developed, and the networks have become deeper and deeper.

Training such deep neural networks require very heavy computation, and most of them utilize GPUs for acceleration, but often takes several days to train and are expensive. We have built a model that runs on CPU

Image classification techniques for defect detection in industrial products are mostly kept secret today, partly because defective images contain very sensitive information about the products and the confidential manufacturing processes and technologies.

III. THE INTRODUCTION OF RCNN & LSTM

In this section, the Neural Networks will be introduced followed by the introduction of RCNN and LSTM which are the two main components of this model. Neural Networks is a network or circuit of neurons, or in a modern sense, an artificial neural network, composed of artificial neurons or nodes. An artificial neural network consists of artificial neurons or processing elements and is organized in three interconnected layers: input, hidden that may include more than one layer, and output. The input layer contains input neurons that send information to the hidden layer. The hidden layer sends data to the output layer. Every neuron has weighted

inputs ([synapses](#)), an [activation function](#) (defines the output given an input), and one output. Synapses are the adjustable parameters that convert a neural network to a parameterized system.

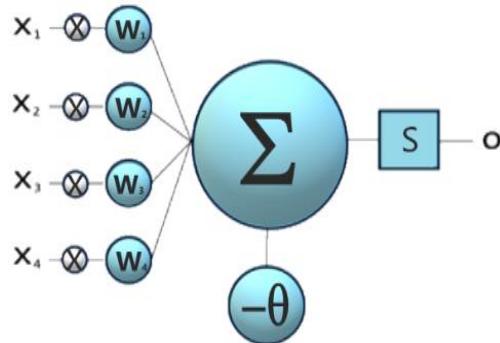


Figure 1.2: Artificial neuron with four inputs

The weighted sum of the inputs produces the activation signal that is passed to the activation function to obtain one output from the neuron. The commonly used activation functions are linear, step, sigmoid, tanh, and rectified linear unit (ReLU) functions.

Training is the weights' optimizing process in which the error of predictions is minimized and the network reaches a specified level of accuracy. The method mostly used to determine the error contribution of each neuron is called [backpropagation](#) that calculates the gradient of the loss function.

It is possible to make the system more flexible and more powerful by using additional hidden layers. Artificial neural networks with multiple hidden layers between the input and output layers are called [deep neural networks \(DNNs\)](#), and they can model complex nonlinear relationships.

Recursive Convolutional Neural Network

A convolutional neural network is a class of deep neural network, most applied to analyzing visual imagery. They are also known as shift invariant or space invariant artificial neural networks, based on their shade-weights architecture and translation invariance characteristics. They have application in image and video recognition, recommender systems, image classification, medical image analysis and natural language processing. CNNs are regularized version of multilayer perceptrons. Multilayer perceptrons usually, mean fully connected to all neurons in the next layer, the fully connectedness of this networks makes them prone to over fitting data.

A recurrent neural network (RNN) is a class of artificial neural networks where connections between nodes form a directed graph along a temporal sequence. This allows it to exhibit temporal dynamic behavior. Derived from [feedforward neural networks](#), RNNs can use their internal state (memory) to process variable length sequences of inputs. This makes them applicable to tasks such as unsegmented, connected [handwriting recognition](#)^[2] or [speech recognition](#).

The Recurrent-Convolutional Neural Networks is the combination of two of the most prominent neural networks. The R-CNN (recurrent-convolutional neural network) involves CNN (convolutional neural network) followed by the RNN (Recurrent neural networks) as shown in Fig.1.3.

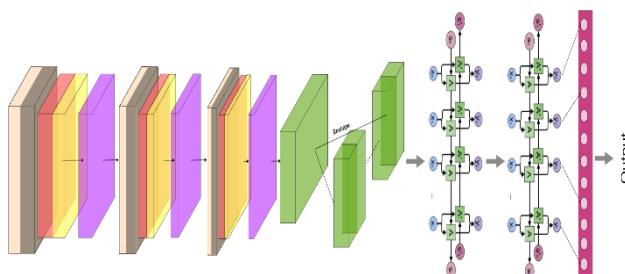


Figure 1.3: Recursive Convolutional Neural Network

The network starts with the traditional 2D convolutional neural network followed by batch normalization, ELU activation, max-pooling and dropout with a dropout rate of 50%. Three such convolution layers are placed in a sequential manner with their corresponding activations. The convolutional layers are followed by the permute and the reshape layer which is very necessary for RCNN as the shape of the feature vector differs from CNN to

RNN. The convolutional layers are developed on 3-dimensional feature vectors, whereas the recurrent neural networks are developed on 2-dimensional feature vectors.

Long Short-Term Memory

LSTM is an artificial recurrent neural network architecture used in the field of deep learning. Unlike standard feed forward neural networks, LSTM has feedback connections as shown in figure 1.5. Using the mechanism of gating to the input of the layer to remember the previous inputs where half of the input goes through the memory cell and the other through the working memory. So it can learn features from previous inputs while generating outputs, which is very important in the text processing since a single token from the series of text is related to others and has a significant effect on its neighbors. It can take many input vectors and produce many output vectors taking into account the weights of the inputs and also the hidden vectors that represent the context of previous inputs. It can not only process single data points (such as images), but also entire sequences of data (such as speech or video). For example, LSTM is applicable to tasks such as un-segmented, connected handwriting recognition, speech recognition and anomaly detection in network traffic or IDSs (Intrusion Detection Systems).

Fig.1.5 shows the gates of the LSTM memory cell, where the forget gate decides which information to keep or to discard from the previous hidden state by transferring it with the current input to a sigmoid function and based on the value it decides how much to ignore and how much to keep. While the input gate acts as the update to the cell state using the current information. Lastly, the output gate is responsible for deciding what the next state should be.

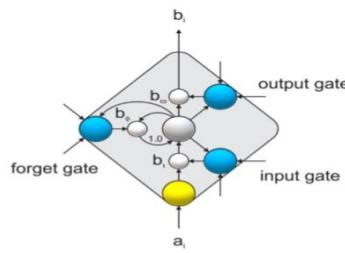


Figure 1.5: Long Short-Term Memory

In the past decade, LSTM models have been recognized as powerful models which show learning capability from sequence data. The strength of LSTM lies in its ability to capture long range dependencies and learn effectively from varying length sequences. Several studies have reported that LSTMs performed well to solve the following problems

- Frame-wise phoneme classification
- Sound classification
- Scene image classification
- Video classification
- Image generation
- Medical diagnostics.

LSTM models also have been explored to recognize fraudulent card transaction.

IV. METHODOLOGY



Fig 1.6 The block diagram of the process

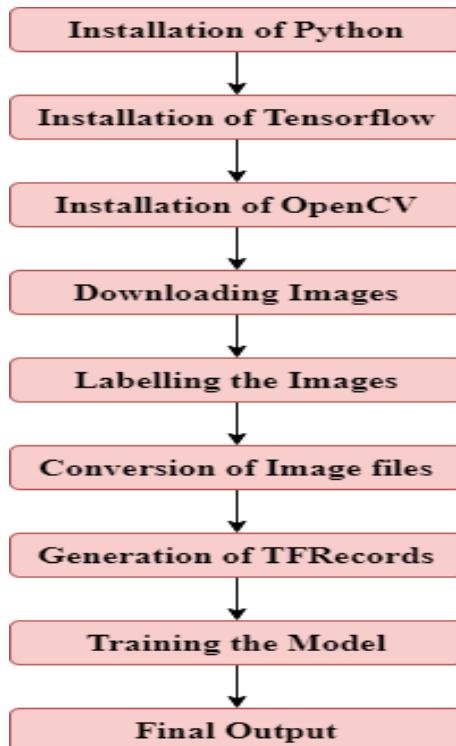


Fig 1.7: The flowchart for creating the CNN

Installation of Python:

Python is dynamically typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly, procedural), object-oriented, and functional programming. Python is often described as a "batteries included" language due to its comprehensive standard library.



Fig 1.8: Python Logo

Python was conceived in the late 1980s as a successor to the ABC language. Python 2.0, released in 2000, introduced features like list comprehensions and a garbage collection system with reference counting. Python 3.0, released in 2008, was a major revision of the language that is not completely backward-compatible, and much Python 2 code does not run unmodified on Python 3. The Python 2 language was officially discontinued in 2020 (first planned for 2015), and "Python 2.7.18 is the last Python 2.7 release and therefore the last Python 2 release." No more security patches or other improvements will be released for it. With Python 2's end-of-life, only Python 3.5.x and later are supported.

Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

Installation of Tensorflow:

Next step is the installation of Tensorflow with pip (Python Installation Package). TensorFlow is an end-to-end open source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries, and community resources that lets researchers push the state-of-the-art in ML, and gives developers the ability to easily build and deploy ML-powered applications.

TensorFlow provides a collection of workflows with intuitive, high-level APIs for both beginners and experts to

create machine learning models in numerous languages. Developers have the option to deploy models on a number of platforms such as on servers, in the cloud, on mobile and edge devices, in browsers, and on many other JavaScript platforms. This enables developers to go from model building and training to deployment much more easily.

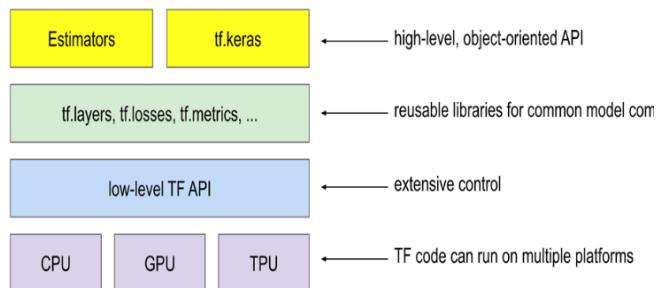


Figure 1.9: TensorFlow toolkit hierarchy.

TensorFlow APIs are arranged hierarchically, with the high-level APIs built on the low-level APIs. Machine learning researchers use the low-level APIs to create and explore new machine learning algorithms. In this class, you will use a high-level API named `tf.keras` to define and train machine learning models and to make predictions. `tf.keras` is the TensorFlow variant of the open-source Keras API. Earlier versions of Machine Learning Crash Course focused on a high-level TensorFlow API named `Estimators`, which this class no longer explores.

Open CV code:

Once machine learning platform is installed, a computer vision software library needs to be installed. Open CV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. Open CV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

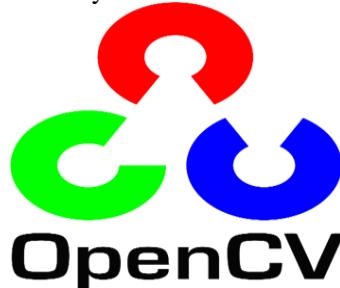


Fig 1.10: Open CV Logo

Downloading images:

Since no in-built or external cameras are used in this project, the images for the purpose of training the model were downloaded from the cloud. Google Colaboratory or “Colab” for short is a free cloud service which supports free GPU. It enables users to develop deep learning applications using popular libraries such as Keras, TensorFlow, PyTorch, and Open CV. Colab allows users to use and share Jupyter notebooks with others without having to download, install, or run anything. The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more. Colab notebooks are stored in Google Drive, or can be loaded from GitHub.



Fig 1:11: Google colab Logo

Labelling the images:

Data labelling is an essential step in a supervised machine learning task. Garbage In Garbage Out is a phrase commonly used in the machine learning community, which means that the quality of the training data determines the quality of the model. The same is true for annotations used for data labelling. Data labelling is a task that requires a lot of manual work.

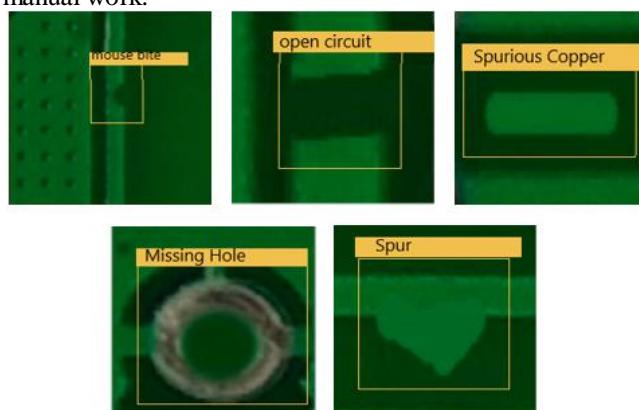


Fig 1.12: Labelling the images

Conversion of the image:

In this step, the image file after being labelled is converted from xml to csv file. XML is an acronym standing for Extensible Markup Language. XML is extremely useful for keeping track of small to medium amounts of data without requiring a SQL-based backbone.

- i. CSV files can be opened or edited by text editors like notepad.
- ii. In data-warehouse, CSV follows a fairly flat, simple schema.
- iii. Any programming language to parse CSV data is trivial, generating it is extremely easy.
- iv. CSV is safe and can clearly differentiate between the numeric values and text. CSV does not manipulate data and stores it as-is.
- v. In CSV, you write column headers only once where as in Excel, you have to have a start tag and end tag for each column in each row.
- vi. Importing CSV files can be much faster, and it also consumes less memory.
- vii. It's easy to programmatically manipulate CSV since, after all, they are simple text files.



Fig 1.13: CSV Logo

Generation of TF record:

For each image file of csv format, a tf record is generated such that it stores the data in the form of a binary string. A major advantage of TF Records is that it is possible to store sequence data — for instance, a time series or word encodings — in a way that allows for very efficient and (from a coding perspective) convenient import of this type of data. This is especially true if the data is being streamed over a network.



Fig 1.14: TF Record Logo

Training the model:

The process of training an ML model involves providing an ML algorithm (that is, the learning algorithm) with training data to learn from. The term ML model refers to the model artifact that is created by the training process.

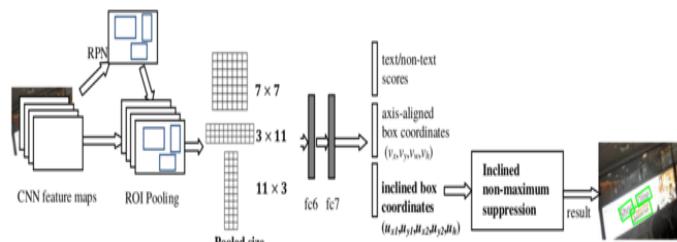


Fig 1.15: R2CNN

The training data must contain the correct answer, which is known as a target or target attribute. The training data set in Machine Learning is the actual dataset used to train the model for performing various actions. This is the actual data the ongoing development process models learn with various API and algorithm to train the machine to work automatically. There are three types of data sets – Training, Development and Test that are used at various stage of development. Training dataset is the largest of three of them, while test data functions as seal of approval and you don't need to use till the end of the development. Test data is the data typically used to provide an unbiased evaluation of the final that are completed and fit on the training dataset. Actually, such data is used for testing the model whether it is responding or working appropriately or not.

The learning algorithm finds patterns in the training data that map the input data attributes to the target (the answer that you want to predict), and it outputs an ML model that captures these patterns.

Usually, machine learning models require a lot of data in order for them to perform well. Usually, when training a machine learning model, one needs to collect a large, representative sample of data from a training set. Data from the training set can be as varied as a corpus of text, a collection of images, and data collected from individual users of a service. Overfitting is something to watch out for when training a machine learning model. Cross-validation is a powerful preventative measure against overfitting. The idea is to use the initial training data to generate multiple mini train-test splits. Then use these splits to tune the model. In standard k-fold cross-validation, the data is partitioned into k subsets, called folds. Then the algorithm on k-1 folds is trained iteratively while using the remaining fold as the test set (called the “holdout fold”).

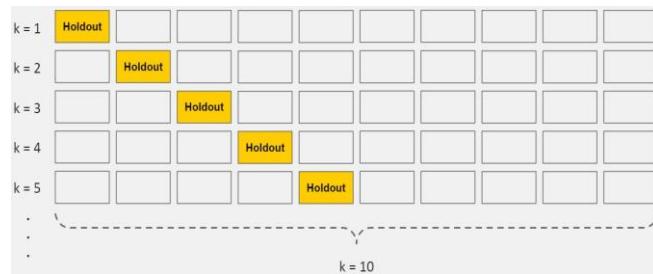


Fig 1.16: K-Fold Cross-Validation

Cross-validation allows you to tune hyper-parameters with only your original training set. This allows you to keep your test set as a truly unseen dataset for selecting your final model.

Output

The output obtained is an image of a PCB board manufactured with a defects detected if any present in a board.

V. EXPERIMENTAL RESULTS

Installation of Python

This is the result obtained after the installation of Python.

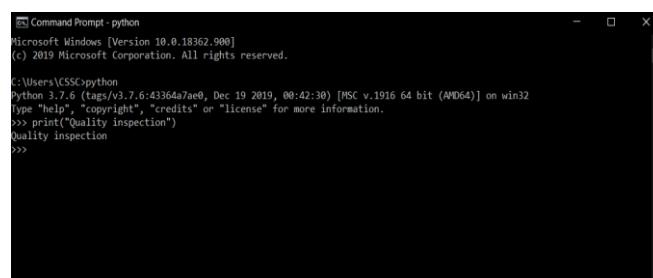


Fig 1.17 Installation of Tensorflow

Installation of Tensorflow

This is the result obtained after the installation of Tensorflow. We need to enter the command 'pip install tensorflow' to install Tensorflow for CPU.

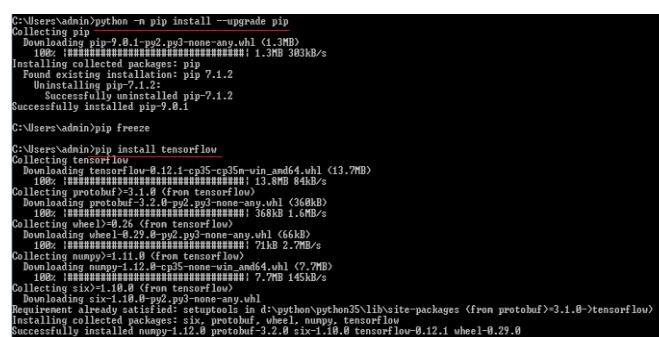


Fig 1.18 Installation of Tensorflow

Installation of OpenCV

This is the result obtained after the installation of OpenCV. We need to enter the command 'pip install opencv-python' to install OpenCV to make use of the camera used to capture the images of the PCB.

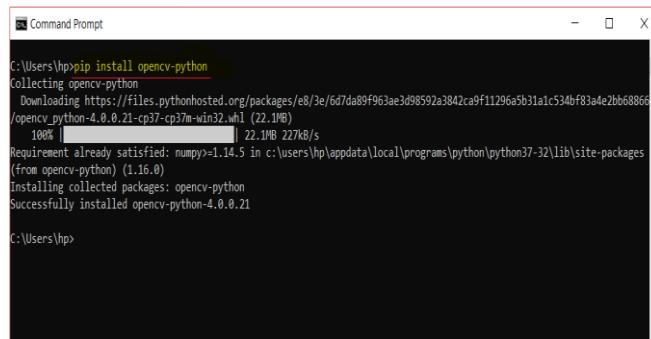


Fig 1.19 Installation of OpenCV

Labelling the Images

The downloaded images are downloaded according to the defect it contains. With the help of bounding boxes with the help of ‘labelImg’ command.



Fig 1.20 Labelling the Images

XML to CSV conversion

After labeling the input images which are in xml format are converted to csv format which stores the data in form of plain text which enables easy organization of large amounts of data.



Fig 1.21 XML to CSV conversion

Generation of the TF records

After the conversion process, for each image there is an TF record that is generated for storing the sequence of binary records of an image. TF record is the format optimized for use with Tensorflow.

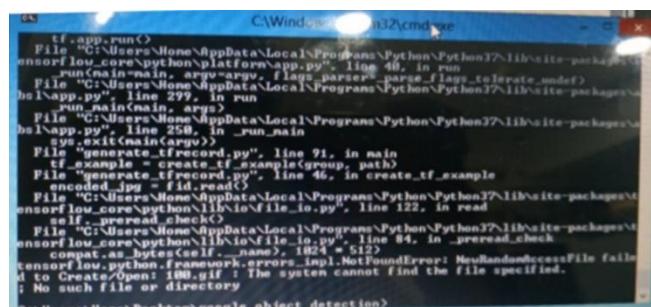


Fig 1.22 Generation of TF record

Training Process

After the generation of the TF records the images are sent for the training process in which the computer trains itself for the set of input images. In this process the calculation of the losses and efficiency is done.



Fig 1.23 Training Process

Final Output

After the training process is completed, the computer can detect any errors present in the manufactured PCB. If the errors are present then the image contains the rectangular boxes around the errors.

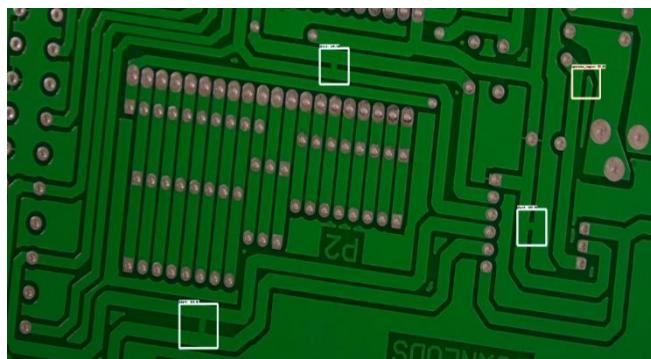


Fig 1.24 Output of the PCB with defects

VI. CONCLUSION

In this paper, we have developed the "Quality inspection of PCB using RCNN and LSTM" which helps to identify the defects in PCB by using visual inspection on the monitor to find a specific object. This work can be used in many PCB manufacturing industries so that they can increase the quality of the manufactured PCB. It ensures that the desired accuracy is obtained by arranging too many training examples.

The proposed model shows the defects in the PCB with an image as the output. This model minimizes False errors and the efficiency is improved by 5%. The main advantage is that it automatically detects the important features without any human supervision once trained.

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