A Synopsis on

An IOT based framework for Statistical Analysis and Screening of Covid-19

vspace1cm Submitted in partial fulfillment of the requirements
of the degree of

Bachelor of Engineering

in

Information Technology

by

Pratik Gholap (18104070)
Apoorva Gadkari (18104043)
Priyanka Walekar (19204008)

Dr. Uttam Kolekar
Prof. Sonal Jain

Department of Branch Name
A.P. Shah Institute of Technology
G.B.Road,Kasarvadavli, Thane(W), Mumbai-400615
UNIVERSITY OF MUMBAI
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CERTIFICATE

This is to certify that the project Synopsis entitled ***"An IOT based framework for Statistical Analysis and Screening of Covid-19"*** Submitted by ***"Pratik Gholap (18104070), Apoorva Gadkari (18104043),Priyanka Walekar (19204008)"*** for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Information Technology.***to the University of Mumbai,is a bonafide work carried out during academic year 2021-2022

(Prof. Sonal Jain)
Co-Guide

(Dr. Uttam Kolekar)
Guide

Prof. Kiran Deshpande
Head Department of Information Technology

Dr. Uttam D.Kolekar
Principal

External Examiner(s)

1.

2.

Place:A.P.Shah Institute of Technology, Thane
Date:

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

_____

(Signature)

_____

(Pratik Gholap 18104070)
(Apoorva Gadkari 18104043)
(Priyanka Walekar 19204008)

Date:

Abstract

One of the most Terrifying outbreaks in recent times has been the outbreak of COVID-19. The extent of this disease can be understood by the fatality rate of this disease." precaution is better than cure" is a quote that everyone has heard at least once in their lifetime and is prevalent in the case of preventing the spread of coronavirus. There must be a question in mind how we can take extra precautions from COVID-19? Simple answer is following the rules given by government and continuously monitoring the factors which indicates the symptoms. This project is basically of designing an IOT framework which will be having a temperature sensor LM35 for check body temperature, pulse sensor to detect pulse rate and a SpO2 for oxygen rate detection, a low-power wireless respiratory monitoring system with cough detection is proposed to detect various parameters that are required for the overall detection of this disease. Further, this data via an Arduino will be processed on cloud where Support Vector Machine algorithm will be performed and send the disease prediction on the application as a conclusion. The proposed system will always used when person comes outside from house as a precaution and it can be used for actual patient monitoring and thus can be used for effective analysis and detection of this disease.

Introduction

One of the deadliest and perhaps the most easily spread virus is the SARS-COV-2 or commonly known as covid-19. The first reported case was detected in late 2019 in Wuhan, China and before anyone could study such a Virus it quickly spread into the entire world-impacting all genders, ages. It can be said that it was deadlier to people who were older and to those who had a disorder of some sort but the Fear that it brought with it was felt to everyone Irrespective of their ages. Not only physically, but it also changed the way people saw a lot of things.
Masks mandate, hand sanitizers, social distancing are some of the precautions which were taken care of by people. This pandemic is showing no sign of the end and thus Data for this pandemic is generated at a fast clip but that is only one side of the Story. Its analysis is even more important to Come to a valid conclusion or to some reasonable Understanding. To make a small contribution in preventing this catastrophe, this project is about an IoT framework that can be used to measure parameters like Blood Pressure, Pulse Rate, Cough detection combine this data it will be sent to a Cloud in which the data will be sent to perform analysis. The ML model which is based on SVM Algorithm made using MATLAB will give the output and will be displayed on the GUI of the individual's phone. This will give us the prediction result on that the person can take necessary actions in time.

Support Vector Machine Algorithm
SVM is a Supervised Learning Algorithm which can be used in Classification as well as Regression problems. For this topic, the data set will be of Linear Regression type.
The Goal of the SVM is to create the best line or the decision boundary/hyperplane that segregates n-dimensional spaces into class, so that we can easily map the new data point in the correct category

Objectives

To measure Oxygen Rate, Pulse Rate and Body Temperature using Framework.
Collect the measured data and performing SVM Algorithm on Cloud to predict the diseases.
Display the predicted output on the Android Application.

Literature Review

In literature [1]we Could forecast COVID-19 via Registration Slips of Patients using ResNet-101 and Performance Analysis and Comparison of Prediction for COVID-19 using Faster R-CNN, Mask R-CNN, and ResNet-50
In literature [2] it can be inferred about the new prediction method for COVID-19 which is the ResNet-101 which has an accuracy of 82 percent with respect to time.This used tools such as COVID-19-CT-CXR: A Freely Accessible and Weakly Labeled Chest X-Ray and CT Image
In literature [3] the Collection on COVID-19 From Biomedical Literature This literature review had deep learning models and how to construct them hence how to correctly study them Fast Multi-Label Low-Rank Linearized SVM Classification Algorithm Based on Approximate Extreme Points

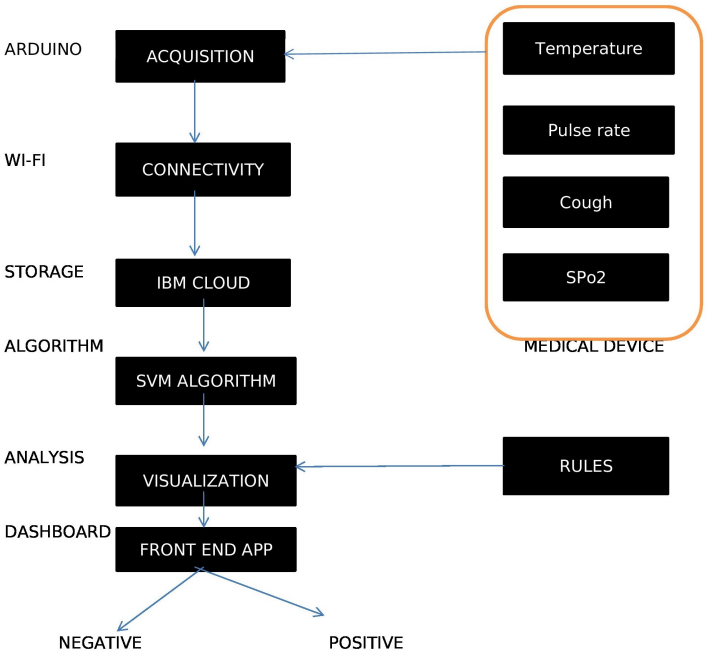
Problem Definition

Testing the results of Covid-19 takes a lot of time. There are some tests which are not that accurate and it is also possible that many of them haven't taken the vaccination.

Proposed System Architecture/Working

The sensors were chosen as follows.

Purpose	Sensor	Technology	Composition	Performance
Measuring human body temperature	MAX30205	Converts the temperature measurements to digital form using a high-resolution, sigma-delta, analog-to-digital converter (ADC)	USB-to-I2C controller along with display units	Meets clinical thermometry specification of the ASTM E1112 (0.1 ∘C)
Cough detection and variation	SW-420	Doppler radar, continuous-wave (CW) radar, vibration detection	Breakout board that includes comparator LM393	Adjustable on-board potentiometer for sensitivity threshold selection
Pulse/heart-rate	MAX30100	Uses red and infrared frequency of light to determine the percentage of haemoglobin in the blood	Two LEDs, a photo detector, enhanced optics, and low-noise analog signal processing	Programmable from 200µs to 1.6ms to optimize measurement accuracy



Design and Implementation

ARRIVAL
The first step towards this process starts with the arrival of the person at the front gate/door as the figure 1 depicts. POST-ARRIVAL This is followed by the person /visitor wearing a round-shaped —– around the neck.This has all the sensors which are required for the process to start .This ——will be not be too compact or too loose but will be of a standardized size by which any person of any size,shape ,gender will be comfortable to wear.

DATA GENERATION
After the device has been worn for certain seconds,the data with the help of
1) Temperature sensor- which will be used to detect the body temperature of the person.
2) LM35-which will be placed to detect the pulse of that individual.
3) Cough sensor-which will be used as the name suggest to detect the intensity of the cough.
Will be gathered and send to cloud for storage and further process of the data.

CLOUD
This data will be directly sent to a cloud with the help of Arduino-uno which has an in-built WI-FI which helps in the sending of the data to the cloud. The main purpose of cloud is to store the data but also for the retrieval of this data which will be used for mainly analysis.

ANALYSIS
Once the data is stored and secured in the cloud ,we will be using the SVM(Support Vector Machine) Algorithm to analysize the data and come to a conclusion.The SVM algorithm are a set of supervised learning methods used for classification, regression and outliers detection.It is widely used where there is a clear margin of separation between classes and highly effective in high dimensional classes. Another major benefit of this algorithm is the fact that it is memory efficient.

FRONT-END
After this data is analiyzed by the SVM algorithm ,this data is sent to the mobile application of the receiver or in this case the owner of the house. He/she will understand whether the person which is about to enter has any kind of symptoms in the form of abnormal pulse rate,temperature and then predict whether that person has COVID-19 or not.
Point to remember here is that it is not a conformation with this algorithm but it gives a fair idea whether the visitor has the infection or no.

Summary

In our work working with the project, we used an IOT device with the help of various sensors and WI-FI board to gather the data It was then carried out and stored in a cloud from which analysis of this data can be done using the SVM algorithm to come to the desired result. This benefits the visitor, the owner of the house and the government for tracking the carriers and thus take appropriate decisions Lastly, we also output the data on mobile devices with easy to use user interface.

References

[1] Johnson, R.M.; Vinetz, J.M. Dexamethasone in the management of covid-19. BMJ 2020.

[2] An IoT framework for Screening of Covid-19 using Real-Time Data from Wearable Sensors.

[3] CDC (Centers for Diseases Control and Prevention). About Variants of the Virus That Causes COVID-19. Available online: https://www.cdc.gov/coronavirus/2019-ncov/transmission/variant.html (accessed on 3 April 2021).

1 Publication

- Paper entitled **"An IOT based framework for Statistical Analysis and Screening of Covid-19"** will submit at **"ICCIC 2021: International Conference on Cognitive and Intelligent Computing"** by **"Pratik Gholap, Apoorva Gadkari, Priyanka Walekar".**
- Paper entitled **"An IOT based framework for Statistical Analysis and Screening of Covid-19"** will submit at **"ADSC 2022: International Conference on Advances in Data Science and Computing Technologies(ADSC-2022)"** by **"Pratik Gholap, Apoorva Gadkari, Priyanka Walekar".**