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Smart Attendance by face detection using YOLO-v3

A project report submitted in partial fulfilment of the requirement

for the award of degree of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

Submitted by

KALIVARAPU VENKATSAI (19341A0570)

KELLA AKHIL ABHILASH (19341A0577)

MANDA GANESH (19341A05A4)

KONDAMUDI ANIRUDH TRIVEDI (19341A0585)

LABUDU BARIKI ABHISHEK (19341A0592)

Under the esteemed guidance of

Dr. K. Lakshmana Rao
Associate Professor
Dept of CSE
GMRIT, Rajam

GMR Institute of Technology

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Andhra Pradesh, India
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CERTIFICATE

This is to certify that the thesis entitled **Smart Attendance by face detection using YOLO-v3** submitted by **K. Venkatsai (19341A0570), K. Akhil Abhilash (19341A0577), M. Ganesh (19341A05A4), K. Anirudh Trivedi (19341A0585), L. B. Abhishek(19341A0592)** has been carried out in partial fulfilment of the requirement for the award of degree of **Bachelor of Technology** in **Computer Science and Engineering** of **GMRIT, Rajam** affiliated to **JNTUK, KAKINADA** is a record of bonafide work carried out by them under my guidance & supervision. The results embodied in this report have not been submitted to any other University or Institute for the award of any degree.

Signature of Supervisor
Dr. K. Lakshmana Rao
Associate Professor
Department of CSE
GMRIT, Rajam.

Signature of HOD
Dr. A. V. Ramana
Professor & Head
Department of CSE
GMRIT, Rajam.

The report is submitted for the viva-voce examination held on 23-5-2022

Signature of Internal Examiner

Signature of External Examiner

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Kalivarapu Venkatsai (19341A0570)

Kella Akhil Abhilash (19341A0577)

Manda Ganesh (19341A05A4)

Kondamudi Anirudh Trivedi (19341A0585)

Labudu Bariki Abhishek (19341A0592)

ABSTRACT

Attendance system is the most commonly and widely used system for the organization such as schools, colleges, companies etc. Conventional attendance system made major concern for maintenance and performing attendance manually which consumes a lot of time. The rapid growth in technology made many changes for the attendance management system like performing actions using biometrics, even by smartphones and smart devices connected to internet. However, these models were also not sufficient enough to manage. Hence, this piece of work suggested a better outcome through automated face detection using Deep Learning model such as YOLO-v3 (you only look once). This model integrated with hardware device to record of the attendance of students in a classroom covered by a camera. This model functioned to take attendance at the start of the class and at the end of the class and maintain a record of the present and absent students during a class. The framework is connected to a dynamic web page which holds and maintains the database of the attendance and even addition of new data to the system. This model reduces manual work towards taking and maintaining attendance in an organization, and improves the efficiency by reducing lapses in attendance maintenance.

Keywords: YOLO-v3, OPENCV, SQL, FACE DATA, GPU BASED CAMERA

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LIST OF SYMBOLS & ABBREVIATIONS (Alphabetic order)

CV - COMPUTER VISION

CFG - CONFIGURATION

IOU - INTERSECTION OVER UNION

DNN - DEEP NEURAL NETWORK

GUI - GRAPHICAL USER INTERFACE

NMS - NON-MAXIMAL SUPRESSION

YOLO - YOU ONLY LOOK ONCE

1. INTRODUCTION

Maintaining attendance in all schools is a crucial duty for evaluating student achievement over the course of a month and semester. Students' attendance has a significant impact on their academic success, regularity in their studies, and their likelihood of being delinquent or engaging in negative behavior. Maintaining attendance manually is in efficient approach due to below reasons: Takes a lot of lecture hours, Susceptible to proxies. However, these approaches have various drawbacks. First, it proves inefficient in terms of overhead leading to wastage of time. Second, it can potentially fail to support the genuine counting of students that may lead to attendance fraud particularly in a large class, where a certain student might just mark on the attendance sheet for other students who are not physically present in the session.

Automated attendance systems have been anticipated in recent trends in modern businesses by using different identification tactics such as biometric recognitions such as palm vein, fingerprint, and facial recognition to recognize and mark students as present. RFID, barcode, QR code, mobile devices that employ Near Field Communication (NFC), and certain systems created in a portable device like a smartphone were among the other proposed techniques for tracking attendance.

We employ the YOLO V3 method to detect faces, which is often used to detect objects (almost 9000), but we adjusted it for face detection in this study. YOLOV3 is also used for counting, and the system tells us of the number of students in each class. Following that, face recognition is required, which is accomplished using the Azure Face API, which uses facial features to detect and confidently identify a face for identification. After that, the face database will match all students' data and output a spreadsheet for the exact time and date, with each student's attendance

recorded. At the end of each month, a report is prepared, and the system notifies every student, parent, and staff member about their attendance for the month through email. Automatic attendance monitoring can be accomplished without much human intervention.

YOLO algorithm employs convolutional neural networks (CNN) to detect objects in real-time. As the name suggests, the algorithm requires only a single forward propagation through a neural network to detect objects. This means that prediction in the entire image is done in a single algorithm run. The CNN is used to predict various class probabilities and bounding boxes simultaneously. The YOLO algorithm consists of various variants. Some of the common ones include tiny YOLO and YOLOv3. You only look once (YOLO) is a state-of-the-art, real-time object detection system. On a Pascal Titan X it processes images at 30 FPS and has a mAP of 57.9% on COCO test-dev. YOLOv3 is extremely fast and accurate. In mAP measured at .5 IOU YOLOv3 is on par with Focal Loss but about 4x faster. Moreover, you can easily tradeoff between speed and accuracy simply by changing the size of the model, no retraining required.

Prior detection systems repurpose classifiers or localizers to perform detection. They apply the model to an image at multiple locations and scales. High scoring regions of the image are considered detections. We use a totally different approach. We apply a single neural network to the full image. This network divides the image into regions and predicts bounding boxes and probabilities for each region. These bounding boxes are weighted by the predicted probabilities. Our model has several advantages over classifier-based systems. It looks at the whole image at test time so its predictions are informed by global context in the image. It also makes predictions with a single network evaluation unlike systems like R-CNN which require thousands for a single image. This makes it extremely fast, more than 1000x faster than R-CNN and 100x faster than Fast R-CNN. See our paper for more details on the full system. YOLOv3 uses a few tricks

to improve training and increase performance, including: multi-scale predictions, a better backbone classifier, and more.

YOLO algorithm is important because of the following reasons:

Speed: This algorithm improves the speed of detection because it can predict objects in real-time.

High accuracy: YOLO is a predictive technique that provides accurate results with minimal background errors.

Learning capabilities: The algorithm has excellent learning capabilities that enable it to learn the representations of objects and apply them in object detection.

Fig.1.1: Block diagram of proposed system

2. RELATED WORK

LITERATURE SURVEY

[1] Khan, S., Akram, A., & Usman, N. (2020). Real time automatic attendance system for face recognition using face API and OpenCV. Wireless Personal Communications, 113(1), 469-480.

- Traditionally, student attendance has been a big concern for universities, and professors must spend a significant amount of time and effort manually recording attendance.
- In this article, attendance will be tracked using a smart phone that practically every faculty member has.
- Back propagation neural networks, region-based convolution networks (RCNN), faster RCNN, and single shot detector are some of the most common object identification algorithms.
- The camera in the classroom will capture a photo twice, once at the beginning and once at the end, to check that pupils have attended the entire lesson.
- YOLO V3 will first count the students in a photograph, then identify recognised and unknown faces, generating separate spreadsheets, and sending an email to students, parents, and instructors at the end of the month.

[2] Alon, A. (2020). A YOLOv3 Inference Approach for Student Attendance Face Recognition System. International Journal of Emerging Trends in Engineering Research, 8(2), 384-390.

- Checking attendance in a classroom is one aspect that affects a student's final grade in a course.
- Attendance checking by name takes a long time for both students and professors, and the latter is particularly vulnerable to simple attendance fraud.
- The study used a Face Recognition-based attendance method as an alternative to the YOLOv3 strategy.
- The system recognises and marks attendance by recognising the student using face-detection and face-recognition algorithms.
- The experimental results reveal that the attendance system achieved 94 percent face recognition efficiency by employing the trained model with a training accuracy of 98.01 percent.

[3] Bah, S. M., & Ming, F. (2020). An improved face recognition algorithm and its application in attendance management system. Array, 5, 100014.

- Face Recognition is a computer programme that detects, tracks, identifies, and verifies human faces in images or videos acquired with a digital camera.

- Although much progress has been achieved in the field of face detection and recognition for security, identity, and attendance purposes, there are still challenges that are impeding progress toward human-level accuracy.
- Variations in human facial appearance, such as variable lighting conditions, noise in face photos, scale, attitude, and so on, are among these concerns.
- In this research paper, the local binary pattern
- LBP algorithm is used in combination with advanced image processing techniques such as contrast adjustment, bilateral filter, histogram equalization, and image blending, and face detection is LBP.
- experimental results show that the method is very accurate, reliable and robust for the face recognition system.

[4] Arsenovic, M., Sladojevic, S., Anderla, A., & Stefanovic, D. (2017, September). FaceTime—Deep learning based face recognition attendance system. In 2017 IEEE 15th International symposium on intelligent systems and informatics (SISY) (pp. 000053-000058). IEEE.

- The CNN cascade for face identification and CNN for producing face embeddings are two crucial elements in this model that were constructed utilizing today's most powerful approaches.
- It is a new approach for image augmentation for face recognition applications.

- In this paper a small collection of original face photos of people working in the real world, the overall accuracy was 95.02 percent.
- The suggested face recognition model might be used as a supporting or major component for monitoring purposes in another system, with or without some small modifications.

[5] Lukas, S., Mitra, A. R., Desanti, R. I., & Krisnadi, D. (2016, October). Student attendance system in classroom using face recognition technique. In 2016 International Conference on Information and Communication Technology Convergence (ICTC) (pp. 1032-1035). IEEE.

- This paper mainly focusses on the Authentication where it’s one of the significant issues in IT sector.
- Face recognition technology is used in the classroom by combining Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT) to extract the features of the student's face, which is then applied using Radial Basis. The facial items are classified using the RBF function.
- Where this experiment conducted by involving 16 students situated in classroom sitting it results that 121 out of 148 successful faces recognition
- This paper discusses the usage of DWT and DCT in conjunction in HFR, as well as the important findings of the project's preliminary research.

- It’s given that it can be improved for yielding a better result particularly by paying attention in feature extraction or recognition process.
- Where the success rate of the system in recognizing facial images of the students who are seated in classroom is about 82%.

[6] Wagh, P., Thakare, R., Chaudhari, J., & Patil, S. (2015, October). Attendance system based on face recognition using eigen face and PCA algorithms. In 2015 International Conference on Green Computing and Internet of Things (ICGCIoT) (pp. 303-308). IEEE.

- In this paper by using biometrics the smart automated attendance is taken.
- In some model’s proxies can’t solved but here by using viola and jones algorithm and pca this is solved
- Where here identification of students is sitting in last rows histogram equalization of image done.
- The quality of the image is enhanced and passed further for face detection for the detection there are some algo’s as Ada-Boost algorithm, neural networks, support vector machines, etc. by this paper Ada-Boost algorithm is the most effective one for sure.

- Where it stated as use of some other approach as holistic approach for this approach the appearance and as well as the entire face region is considered as input for the face detection system
- Where the features are as eyes, nose which are segmented then taken as input for face detection

[7] Patel, B., Patil, V., Pawar, O., Pawaskar, O., & Mahajan, J. R. (2022). Attendance System Using Face Recognition Library. In Applied Information Processing Systems (pp. 247-254). Springer, Singapore.

- This paper gives a system that uses TensorFlow for face identification and verification and displays students' attendance on a web-based/local GUI.
- This system is capable of generating real-time output based on video feed obtained from the classroom.
- The outcome is labelled with the name of the student as entered in the database.
- This paper primarily engenders significant advances in image processing through facial recognition library highlighting Machine Learning applications in everyday circumstances.
- This experimentation will be expanded in the Machine Learning arena in the future with the introduction of novel algorithms that can increase the system's learning rates and efficiency.

[8] Huang, S., & Luo, H. (2020, July). Attendance System Based on Dynamic Face Recognition. In 2020 International Conference on Communications, Information System and Computer Engineering (CISCE) (pp. 368-371). IEEE.

- Nowadays, attendance system is of great significance in enterprises, schools, governments and other places where personnel management is needed.
- This paper designs a dynamic face recognition attendance system with living detection based on MTCNN, FaceNet and ERT neural network.
- A video-based attendance system is designed by using the method of real-time face recognition.
- The face detection part of the system is based on MTCNN (multitask convolutional Neural Network) algorithm, and the face recognition part is based on FaceNet algorithm.
- The algorithm implementation is based on TensorFlow framework, and face liveness detection is based on ERT (Ensemble of Regression Tree) algorithm, which can judge whether the user blinks.

[9] Gupta, N., Sharma, P., Deep, V., & Shukla, V. K. (2020, June). Automated attendance system using OpenCV. In 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO) (pp. 1226-1230). IEEE.

- Student Attendance mainframe structure is defined to manage the student's class attending files using the concept of face detection and recognition through open computer vision.
- This idea is completely based on general purpose language named as python through which use the concept of open computer vision.
- For face detection system hear cascade is used and for face recognition LBPH model is used.
- Then the training of individual student happened and finally the system generates the spreadsheet which provides the no. of students present in classroom with an image or video capturing live.
- The other improvement made is to connect the project to a server and link it with the parent email id thereafter it can give the monthly attendance report of the student to their parents via email for the student’s progress.

[10] Darapaneni, N., Evoori, A. K., Vemuri, V. B., Arichandrapandian, T., Karthikeyan, G., Paduri, A. R., ... & Madhavan, J. (2020, November). Automatic Face Detection and Recognition for Attendance Maintenance. In 2020 IEEE 15th International Conference on Industrial and Information Systems (ICIIS) (pp. 236-241). IEEE.

- This paper focuses on building a deep learning based efficient attendance capturing system.
- This paper created a system architectural solution using YOLO, Multi task Cascaded Convolutional Network (MTCNN), FaceNet embeddings by applying multiple augmentations, picture quality check and denoise methods to get a better attendance.
- To get better performance, accuracy and to avoid spoofing, this automated technique can be used at multiple intervals during a typical class hour.
- In training, some of the faces were not detected in the YOLO model. For these undetected faces MTCNN model was used.it gave better accuracy but performance was reduced by a little when compared to YOLO with the de-noise model.
- Limitation is camera is fixed at a particular location and classroom covered by the camera lens is alone consider for attendance.no outdoor session was considered.

[11] Yang, H., & Han, X. (2020). Face recognition attendance system based on real-time video processing. IEEE Access, 8, 159143-159150.

- In recent years, the face recognition application system has developed rapidly as a computer security technology in the world, especially today, when terrorist activities are rampant, this technology has received more and more attention.
- This paper mainly focuses on to design a face recognition attendance system based on real-time video processing.

- The truancy rate of the face recognition attendance system with real-time video processing and the interface settings of the face recognition attendance system using real-time video processing.
- Experimental data shows that the accuracy rate of the video face recognition system is up to 82%. Compared with the traditional check-in method, the face recognition attendance system can be reduced by about 60%.
- In this paper the methodology is Real-Time video face Image Recognition and Basic face Recognition algorithm by using video image Recognition system, Support Vector Machine (SVM), Neural Network method and many more steps were used for experimental setup.

[12] Kapania, S., Saini, D., Goyal, S., Thakur, N., Jain, R., & Nagrath, P. (2020, January). Multi object tracking with UAVs using deep SORT and YOLOv3 RetinaNet detection framework. In Proceedings of the 1st ACM Workshop on Autonomous and Intelligent Mobile Systems (pp. 1-6).

- Over the years, object tracking and detection has emerged as one of the most important aspects of UAV applications such as surveillance, reconnaissance, etc.
- This paper presents a tracking-by detection approach for real-time Multiple Object Tracking (MOT) of footage from a drone-mounted camera.

- Work uses a combination of YOLOv3 and RetinaNet for generating detections in each frame. RetinaNet detects objects from a significant height more accurately, as YOLO performs sub-optimally in cases where objects are of smaller size and are in clusters.
- This paper Evaluates the performance on VisDrone 2018 dataset.
- To evaluate the implementation against other trackers, it used the py-motmetrics library which supports CLEAR-MOT metrics and ID metrics.
- Py-motmetrics tracks all the relevant per-frame events such as correspondences, misses, false alarms and switches.

[13] Sharanya, T., Sucharith, P., Kasturi, U., & Mahesh, T. (2020). Online Attendance using Facial Recognition. Int. J. Eng. Res, 9(06), 202-207.

- In the modern world, education system is advancing day-by-day due to the introduction of concept of “smart classroom”.
- In this method the camera is fixed within the classroom and it'll capture the image, the faces are detected and then it's recognized with the database and finally the attendance is marked.
- The source code was developed using Python for backend and server side frameworks, and Tkinter GUI for the front-end user interface.
- Here this paper uses convolutional neural network (cnn) here there were two more crucial components are face detection and face recognition. using the OpenCV, TensorFlow and Keras libraries to perform facial recognition and liveness detection.

- As a conclusion, this system replaces the manual system with an automated system which is fast, efficient, cost and time saving as it replaces the stationary material such as bulky registers and the paper work.

[14] Arbain, N., Nordin, N. F., Isa, N. M., & Saaidin, S. (2014, December). LAS: Web-based laboratory attendance system by integrating RFID-ARDUINO technology. In 2014 2nd International Conference on Electrical, Electronics and System Engineering (ICEESE) (pp. 89-94). IEEE.

- This paper described on the web-based Laboratory Attendance System (LAS) that utilize RFID and Arduino technology.
- LAS implementation consists of hardware and software system.
- The hardware system is implemented using RFID devices with Arduino UNO microcontroller board that can detect the unique ID in the student card and then print the information of the student on LCD panel of the system devices.
- This paper is aimed to overcome this problem by using RFID-ARDUINO approach in web-based laboratories attendance system. The system will assist the lab instructor to record and manage the student attendance automatically.
- Besides that, XAMPP application is choose because it is free and open-source server package that include Apache, PHP, and MySQL database.

[15] Menon, S., Geroge, A., Aswathy, N., & James, J. (2021, May). Custom Face Recognition Using YOLO. V3. In 2021 3rd International Conference on Signal Processing and Communication (ICPSC) (pp. 454-458). IEEE.

- Face recognition technique is adopted in many applications such as surveillance systems, medical field, security, robot navigation, etc.
- The importance of facial recognition comes to more importance at the time of a pandemic situation, for attendance marking people monitoring, in health care, social distancing etc.
- Many facial recognition algorithms are available today. But the performance of these algorithms lacks many factors and which lead to poor performance in real-time applications.
- The most commonly used algorithms for face recognition are R-CNN, Fast R-CNN, etc.
- YOLO.V3 algorithm can be used for facial recognition which produces faster output.

Sl. no	Technique (i.e. author names with reference number)	Year	Description	Limitations	Advantages	Performance Metrics	Gaps
1	**Real time automatic attendance system for face recognition using face API and OpenCV**. (Sikandar Khan, Adeel Akram, Nighat Usman.)	2020	The work tried to eradicate all challenges and attendance will be marked using camera in a classroom. Counting of students is done and faces are recognized in image to mark attendance automatically	Cannot detect mixed faces and small faces in camera.	YOLO algorithm detects all faces within an image by marking with a rectangle or square. Up to 600 roll Numbers can be allotted to a specific group of class which is quite enough.	Accuracy,: 100% for 10 test cases	Thus concluded from above discussion is that the given system is cost effective, secure, reliable, fast, better and efficient module is developed to replace unreliable and manual system.
2	**A YOLOv3 Inference**	2020	The system, based on face-detection	Training the models often	The experimental	Accuracy: 98.01%	The system requested that

	Approach for Student Attendance Face Recognition System (Alvin Sarraga Alon Cherry D. Casuat , Mon Arjay F)		and face-recognition algorithms, automatically recognizes, and marks attendance by recognizing the student with RFID.	takes too much time.	testing shows that the study achieved a 94% face recognition performance by using the trained model with a 98.01% training accuracy.		each listed student capture his / her face-image before a web camera. The facial recognition model then recognized the inferential image automatically.
3	**An Improved Face Recognition Algorithm and its Application in Attendance Management** System (Serign Modou Bah, Fang-Ming)	20 20	The paper gives an Android based course attendance system using face recognition. The system asked every registered student to capture his/her face image and QR code displayed at the	Bluetooth device connection distance between user mobile and raspberry pi system in class room.	The experimental result shows that attendance system achieved performance of 97.29% by employing LDA and only needed	Face recognitio n rate: 90.49% Accuracy: Haar – 92%, LBP – 91%	This paper gives Android based course attendance system using face recognition. To ensure the student attend in the course.

			front of classroom using his/her smartphone and provide attendance by face detection.		0.000096 s for face recognition process in the server.		
4	**FaceTime – Deep Learning Based Face Recognition Attendance System**.(Marko Arsenovic, Srdjan Sladojevic, Andras Anderla, Darko Stefanovic)	2017	It is a new approach for image augmentation for face recognition applications. The suggested face recognition model might be used as a supporting or major component for monitoring purposes in another system, with or without some small modifications.	Better classifiers are there but it uses SVM	In this paper a small collection of original face photos of people working in the real world, the overall accuracy was 95.02 percent.	The overall accuracy was 95.02 percent.	The suggested face recognition model might be used as a supporting or major component for monitoring purposes in another system, with or without some small modifications.

5	**Student Attendance System in Classroom Using Face Recognition Technique**. (Samuel Lukas , Aditya Rama Mitra , Ririn Ikana Desanti , Dion Krisnadi)	2016	Face recognition technology is used in the classroom by combining Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT) to extract the features of the student's face, which is then applied using Radial Basis.	This experiment conducted by involving 16 students situated in classroom sitting it results that 121 out of 148 successful faces recognition	The success rate of the system in recognizing facial images of the students who are seated in classroom is about 82%.	It gives overall accuracy 90%	It's given that it can be improved for yielding a better result particularly by paying attention in feature extraction or recognition process.
6	**Attendance System based on Face Recognition using Eigen face and PCA Algorithms.**	2015	In this paper by using biometrics the smart automated attendance is taken.		It can identifiy the people who are sitting in last row too.where histogram equalization of	It gives a good performance compared too other kinds.	The features are as eyes,nose which are segmented then taken as input for face

	(Priyanka Wagh, Roshani Thakare, Jagruti Chaudhari, Shweta Patil)				image done		detection.
7	**Attendance System Using Face Recognition Library** (Bhavna Patel, Vedika Patil, Onkar Pawar, Omkar Pawaskar, and J. R. Mahajan)	2022	This system is capable of generating real-time output based on video feed obtained from the classroom	A database management system is not designed to maintain attendance logs, which can be accessed when needed.	The features and landmarks have been detected successfully to provide positive output.	Accuracy: 96.2%	Attendance tracking during classroom sessions can be effectively executed through this system.
8	**Attendance System Based on Dynamic Face Recognition** (Shizhen Huang, Haonan Lao)	2020	This paper designs a dynamic face recognition attendance system with living detection based	The recognition rate is not that much accurate.	good real time performance	The results show that both the false accept rate and the	The attendance system can be used in schools,companies,enterprises and other scenarios that

			on MTCNN, FaceNet and ERT neural networks.			false rejection rate of face recognition are within 2%.	require multiple people to attend at the same time
9	**Automated attendance system using OpenCV** (Naman Gupta,Purushottam Sharma,Vikas Deep,Vinod Kumar Shukla)	2020	This paper created the design and used a variety of techniques like face exposure and understanding system to automatically detect the students in a class and mark their attendance by capturing his/her frames.	conflict issues were present	connect the project to a server and link it with the parent email id there after give the monthly attendance report of the student to their parents via email for the student's progress.	The concept of LBPH used in attendance system to recognize the face of classroom with 96% accuracy rate.	It tends to be assumed that the strong, secure, quick and a productive stable class participation used to execute frameworks hascreated supplanted the normal and erratic framework.
10	**Automatic Face**	20	This paper	Camera fixed	camera capture	svc for	To get better

	Detection and Recognition for Attendance Maintenance (Narayana Darapaneni,Aruna Kumari Evoori,vijaya babu Venuri)	20	focuses on buliding a deep learning based efficient attendance capturing system.	ata particular location and the classroom covered by camera lens is alone considered for attendance.	at multiple intervals during a typical class hour.	face recognition gave 98% accuracy	performance, accuracy and to avoid spoofing, this automated technique can be used at multiple intervals during a typical class hour .
11	**Face Recognition Attendance System Based on Real-Time Video Processing**.(Hao Yang, Xiaofeng Han)	2020	This paper mainly focuses on to design a face recognition attendance system based on real-time video processing using Real-Time Video face image recognition and	The smart machine is turned on may bring some experimental errors, indicating that the human-machine interactive testing	Experimental data shows that the accuracy rate of the video face recognition system is up to 82%. Compared with the traditional	Accuracy: 88%	The system has made tremendous innovations, greatly improving the attendance rate and the reliability of face recognition

			Basic face recognition algorithm.	instrument needs to be pre-powered on for two to four hours before the accuracy of the testing data can be guaranteed.	check-in method, the face recognition attendance system can be reduced by about 60%.		technology. It is worthy of further exploration and realization by the scientists.
12	**Multi Object Tracking with UAVs using Deep SORT and YOLOv3 RetinaNet Detection Framework**. (Shivani Kapania, Dharmender Saini, Sachin Goyal, Narina	20 20	This paper presents a tracking-by detection approach for real-time Multiple Object Tracking (MOT) of footage from a drone-mounted camera.	FM is the number of times that the trajectories are disconnected, that is, from tracked to not tracked.	RetinaNet detects objects from a significant height more accurately, asYOLO performs sub-optimally in cases where objects are of smaller size and are in	Accuracy: 80% Faster computation	Thus future work may investigate the trade-off between performance and speed in online tracking by training the tracker in offline mode for the initial optimization of

	Thakur, Rachna Jain, Preeti Nagrath)				clusters.		its parameters.
13	**Online Attendance using Facial Recognition**. (T.Sharanya,P. Sucharith, Ujwal Kasturi, Trisheeka Mahesh)	2020	This paper is going to describe the attendance without human interference. In this method the camera is fixed within the classroom and it'll capture the image, the faces are detected and then it's recognized with the database and finally the attendance is marked.	That the use of ordinary generic cameras for video replay attacks in a nonintrusive technique may leads to some cost-effective face anti-spoofing systems.	It provides a method in pre-processing stage to reduce the illumination effect and enhance the image contrast.	Fast, efficient, cost and time saving	The efficiency could be improved by integrating high speed computers with a good RAM
14	**LAS: Web-based Laboratory**	2014	This paper described on the web-based	The website only can send the data to	It can encourage the community to	Reduce cost, Save Energy	It can encourage the community.

	Attendance System by integrating RFID-ARDUINO Technology. (Norakmar Arbain, Noor Firdaus Nordin, Naimah Mat Isa, Shuria Saaidin)		Laboratory Attendance System (LAS) that utilize RFID and Arduino technology. LAS implementation consists of hardware and software system.	devices but cannot read data in devices.	use widely the information and communicatio n technology (ICT) in daily human activities.	and Time	This RFID-Arduino approach can be further research and implements in the area of wireless transmitter and receivers of system integration.
15	**Custom Face Recognition Using YOLO.V3** (Suman Menon M, Anju Geroge, Aswathy N, Jaimy James)	20 21	In this paper, face recognition using both R-CNN and YOLO.V3 algorithm is implemented. Paper has taken speed as a constraining factor in face recognition and	It has low Mean Average Precision (MAP) value while compared to the CNN algorithms.	YOLO.V3 is having a high processing speed and it is in a millisecond of range, training of YOLO.V3 takes around five to six-hour time for a	Accuracy: 63%	Concluding that the YOLO.V3 algorithm can provide output with 30 ms and is highly recommended for real-time Application.

			we have implemented it using the YOLO.V3 algorithm which is a single shot algorithm that has a high Processing speed compared with other algorithms.		moderate dataset depend upon the amount of dataset.		

Table 2.1: Comparison Table

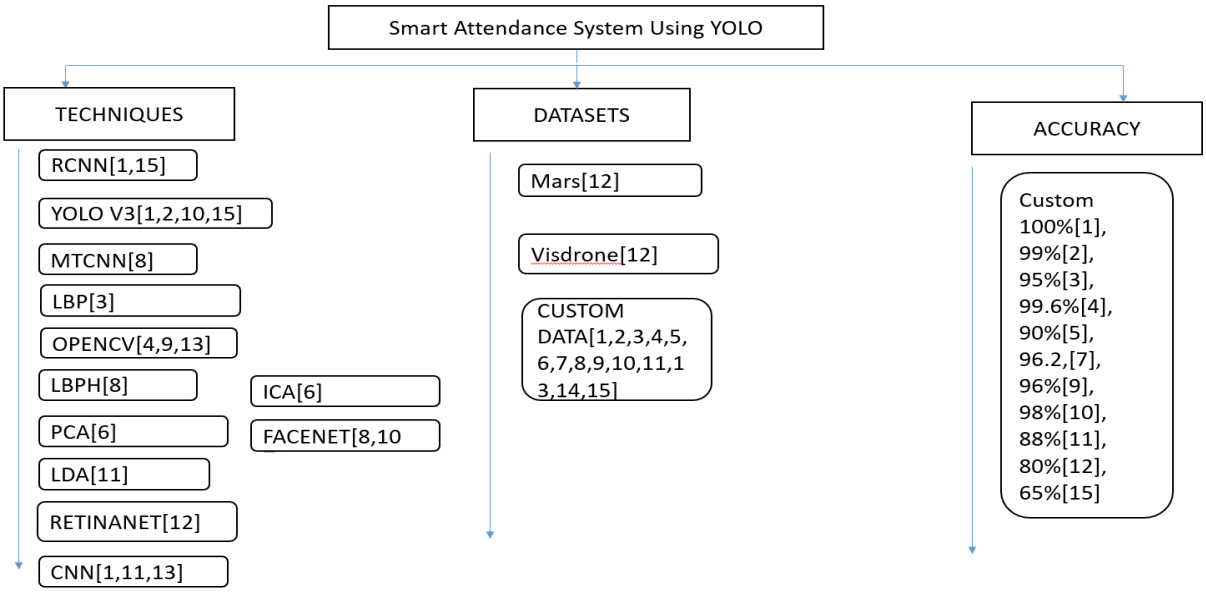


Fig.2.1:

3.METHODOLOGY:

- You only look once (YOLO) is a state-of-the-art, real-time object detection system. YOLO is an algorithm that uses neural networks to provide real-time object detection. This algorithm is popular because of its speed and accuracy. It has been used in various applications to detect traffic signals, people, parking meters, and animals.
- YOLO is an abbreviation for the term ‘You Only Look Once’. This is an algorithm that detects and recognizes various objects in a picture (in real-time). Object detection in YOLO is done as a regression problem and provides the class probabilities of the detected images.
- YOLO algorithm employs convolutional neural networks (CNN) to detect objects in real-time. As the name suggests, the algorithm requires only a single forward propagation through a neural network to detect objects.
- This means that prediction in the entire image is done in a single algorithm run. The CNN is used to predict various class probabilities and bounding boxes simultaneously. The YOLO algorithm consists of various variants. Some of the common ones include tiny YOLO and YOLOv3.
- YOLO algorithm works using the following three techniques: Residual blocks, Bounding box regression, Intersection Over Union (IOU).
- **Residual blocks:** First, the image is divided into various grids. Each grid has a dimension of S x S. The following image shows how an input image is divided into grids.

- **Bounding box regression:** A bounding box is an outline that highlights an object in an image.
- Every bounding box in the image consists of the following attributes: Width (bw), Height (bh). Class (for example, person, car, traffic light, etc.)- This is represented by the letter c. Bounding box center (bx, by).
- The following image shows an example of a bounding box. The bounding box has been represented by a yellow outline.
- **Intersection over union (IOU):** Intersection over union (IOU) is a phenomenon in object detection that describes how boxes overlap. YOLO uses IOU to provide an output box that surrounds the objects perfectly. Each grid cell is responsible for predicting the bounding boxes and their confidence scores. The IOU is equal to 1 if the predicted bounding box is the same as the real box. This mechanism eliminates bounding boxes that are not equal to the real box.
- Object detection algorithm is broadly distributed into two groups. First group is algorithm based on classification which works in two stages. First stage is selection of regions of interest in the image and after this during second stage classification of those regions occurs with support of CNN.
- This strategy prioritizes inference speed. The proposed technique, on the other hand, does not require a re-sampling of the image, but relies on convolutions to recognize the object and its position in a single forward propagation.
- This offers a large acceleration in the light of the fact that the image is not re-sampled and the calculation for detection and position assessment is shared.

- That is a lot faster and significantly more appropriate for cell phones. The most well-known instances of one-stage object detectors are YOLO, SSD, Squeeze Det and Detect Net. The most popular benchmark is the MSCOCO dataset. Models are commonly assessed according to a Mean Average Precision metric.

- Benefits of YOLO: Fast. Good for real-time processing and Predictions (object locations and classes) are made from one single network. Can be trained end-to-end to improve accuracy. YOLO is more generalized. It outperforms other methods when generalizing from natural images to other domains like artwork.

Fig 3.1: Residual Blocks

Residual blocks: In the image, there are many grid cells of equal dimension. Every grid cell will detect objects that appear within them. For example, if an object center appears within a certain grid cell, then this cell will be responsible for detecting it.

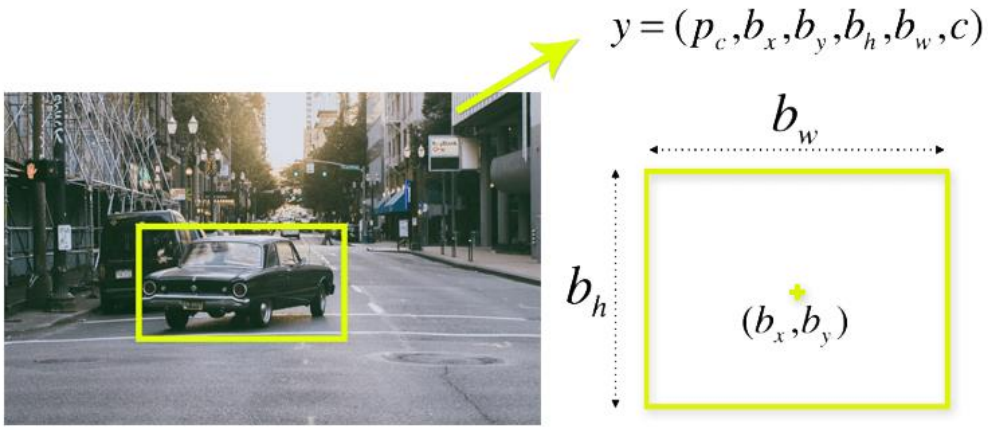


Fig 3.2: Bounding Box Regression

Bounding box regression: YOLO uses a single bounding box regression to predict the height, width, center, and class of objects. In the image above, represents the probability of an object appearing in the bounding box.

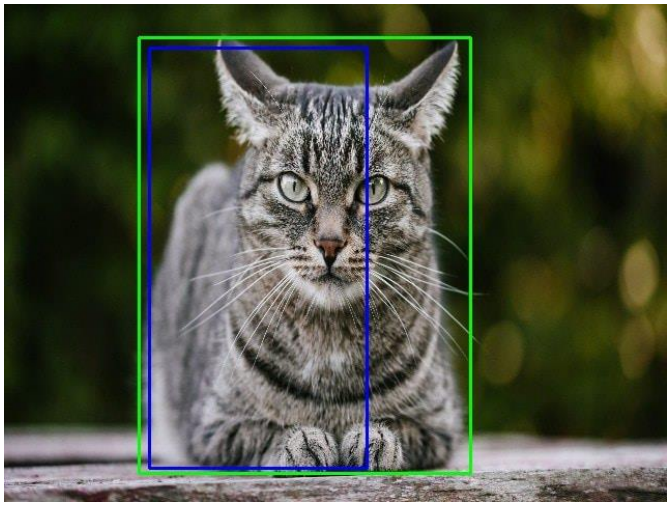


Fig 3.3: Intersection over Union(IOU)

Intersection over union (IOU): In the image, there are two bounding boxes, one in green and the other one in blue. The blue box is the predicted box while the green box is the real box. YOLO ensures that the two bounding boxes are equal.

	Yolo	RetinaNet
Definition	Yolo is a one-stage object detection model that uses neural networks to provide real-time object detection.	RetinaNet is a one-stage object detection model that utilizes a focal loss function to address class imbalance during training
Model Size	89M	157M
MAP(%)	79.02	79.61
FPS	69	22
Speed	High	Low
Accuracy	High	Low

Table 3.1: Yolo vs RetinaNet

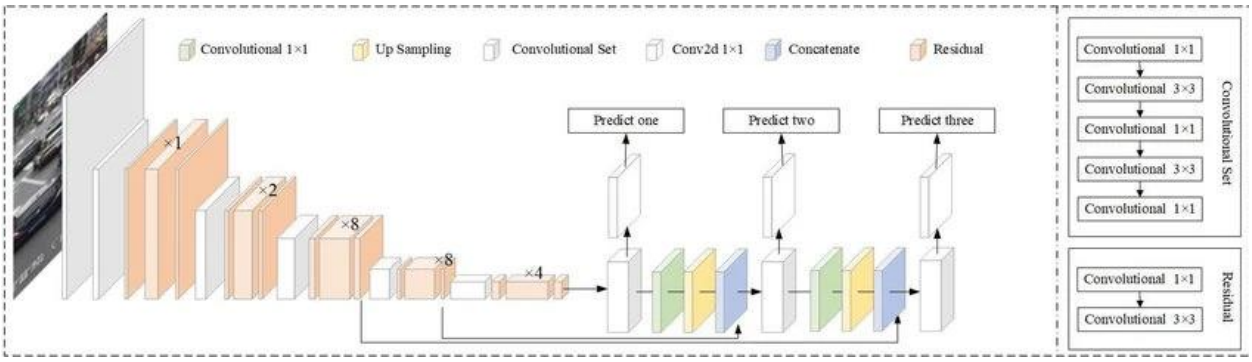


Fig.3.4: Architecture of YOLO

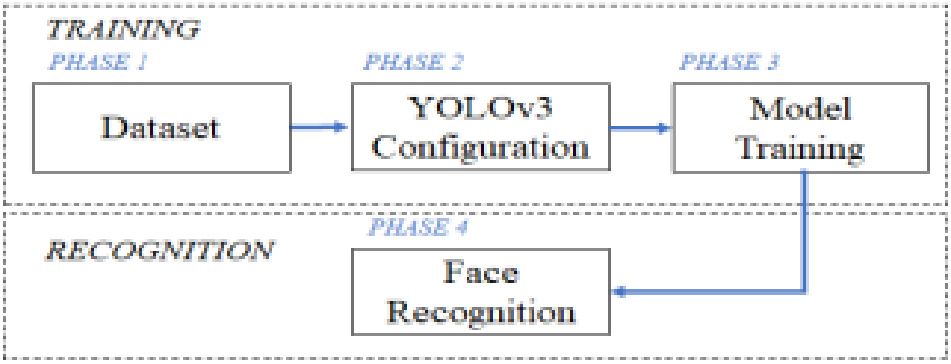


Fig.3.5: Face Detection using YOLO Architecture

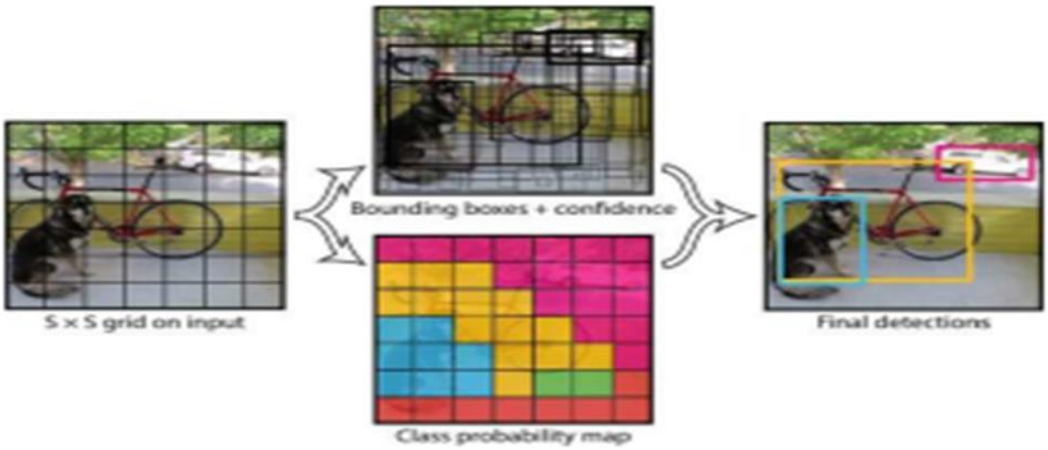


Fig.3.6: YOLO working process

4.EXPERIMENTATION & RESULTS:

Create a Dataset:

Machine Learning (ML) has had a profound influence on a diverse range of applications. This has been possible mainly due to the better computing power and large amounts of training data. I cannot emphasize enough the importance of training data in ML systems.

In fact, most of the machine learning models' problems aren't caused by the models but by issues in the dataset. And yet, the process in which a dataset is created is an underrated topic. This is because creating and improving datasets is a human task and tends to be very time-consuming. In the world of artificial intelligence, tasks that require human labor aren't considered exciting.

The process of creating a dataset involves three important steps:

1) Data Acquisition
2) Data Labeling

Data Acquisition:

The process of data acquisition involves finding datasets that can be used for training machine learning models. There are a couple of ways you can go about doing this, and your approach will largely depend on the problem that you are trying to solve and the type of data that you think is best suited for it. There are largely two key approaches.

i) Data generation:

The Data Generation technique is applied when there is no existing dataset that can be used for training. It involves:

Synthetic data generation:

Synthetic data is the data created via a computer to increase the size of our training data or introduce changes in the data that we would like our model to handle in the future. Generative models such as the Generative Adversarial Network is good example of a computer program that generate synthetic data.

We need these large amounts of data to have enough information to train a machine learning models properly. Thus, synthetic data generation usually offers us a cheaper and more flexible way of expanding our datasets. Generative Adversarial Networks (GANs) is an advanced technique that we can use to generate synthetic data.

It involves training two contesting networks: a generator and a discriminator. The generator's role is to learn to map a latent space to a data distribution (from a dataset). The discriminator's role is to discriminate (compare) between examples from the true distribution and the generated distribution.

The goal is to increase the error rate for the discriminator network to make the generator networks so good at generating samples, that it will fool the discriminator into thinking that the samples are from the true data distribution (the dataset). Using GANs effectively generates synthetic videos and images that look realistic for use in different applications. It takes in

existing data and creates new data that looks like your original dataset. Thus, generating more data.

ii) Data Augmentation:

Data Augmentation is another method for data acquisition. The process involves augmenting existing datasets with newly-acquired external data. Some basic steps in the data augmentation process might include cropping, flipping, rotating, adjusting the brightness, and contrast of the existing input images. This technique enhances the size and quality of training datasets enabling you to collect more data without actually going out to physically collect more data. Another advantage of data augmentation is that, it makes models generalize better to new unseen data.

Data labeling:

Data Labelling is an important part of data pre-processing that involves attaching meaning to digital data. Data labelling is the process of identifying raw data (images, text files, videos, etc.) and adding one or more meaningful and informative labels to provide context so that a machine learning model can learn from it. For example, labels might indicate whether a photo contains a bird or car, which words were uttered in an audio recording, or if an x-ray contains a tumour. Data labelling is required for a variety of use cases including computer vision, natural language processing, and speech recognition.

Today, most practical machine learning models utilize supervised learning, which applies an algorithm to map one input to one output. For supervised learning to work, you need a labelled set of data that the model can learn from to make correct decisions. Data labelling typically starts by asking humans to make judgments about a given piece of unlabelled data. For example, labellers may be asked to tag all the images in a dataset where “does the photo contain a bird” is

true. The tagging can be as rough as a simple yes/no or as granular as identifying the specific pixels in the image associated with the bird. The machine learning model uses human-provided labels to learn the underlying patterns in a process called "model training." The result is a trained model that can be used to make predictions on new data.

In machine learning, a properly labelled dataset that you use as the objective standard to train and assess a given model is often called “ground truth.” The accuracy of your trained model will depend on the accuracy of your ground truth, so spending the time and resources to ensure highly accurate data labelling is essential.

Computer Vision:

When building a computer vision system, you first need to label images, pixels, or key points, or create a border that fully encloses a digital image, known as a bounding box, to generate your training dataset. For example, you can classify images by quality type (like product vs. lifestyle images) or content (what’s actually in the image itself), or you can segment an image at the pixel level. You can then use this training data to build a computer vision model that can be used to automatically categorize images, detect the location of objects, identify key points in an image, or segment an image.

Fig: Classification

Data labeling be done efficiently:

The process to create the training data necessary to build these models is often expensive, complicated, and time-consuming. The majority of models created today require a human to manually label data in a way that allows the model to learn how to make correct decisions. To overcome this challenge, labeling can be made more efficient by using a machine learning model to label data automatically.

In this process, a machine learning model for labeling data is first trained on a subset of your raw data that has been labeled by humans. Where the labeling model has high confidence in its results based on what it has learned so far, it will automatically apply labels to the raw data. Where the labeling model has lower confidence in its results, it will pass the data to humans to do the labeling. The human-generated labels are then provided back to the labeling model for it to learn from and improve its ability to automatically label the next set of raw data. Over time, the model can label more and more data automatically and substantially speed up the creation of training datasets.

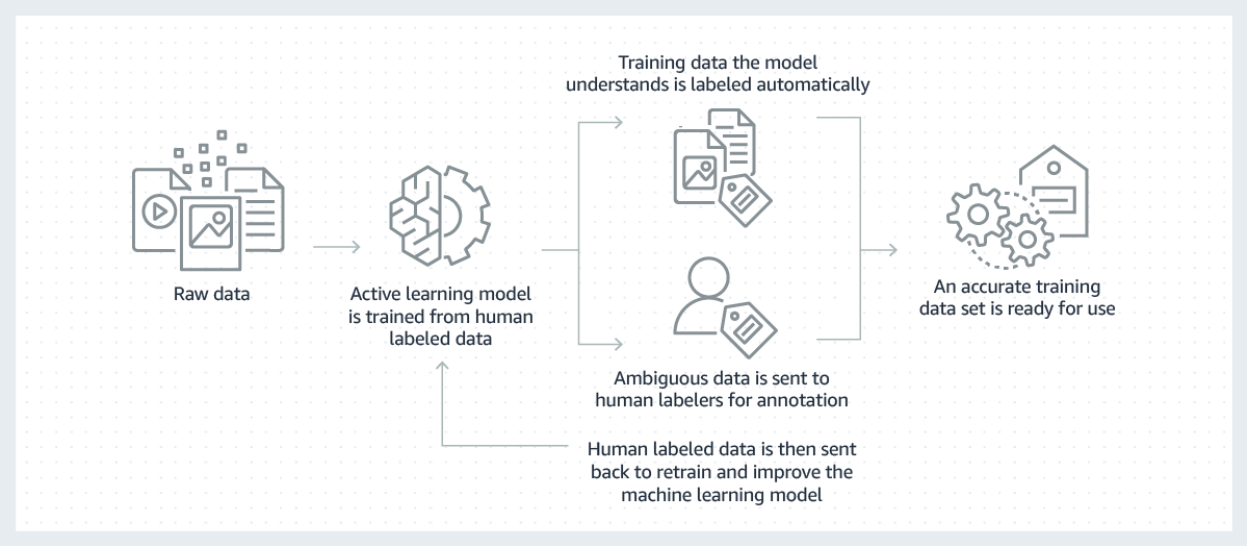


Fig: Data Labeling

Auto Labeling:

Auto labeling is a feature found in data annotation tools that apply artificial intelligence (AI) to enrich, annotate, or label a dataset. Tools with this feature augment the work of humans in the loop to save time and money on data labeling for machine learning.

Active learning is a machine learning technique that identifies data that should be labeled by your workers. In Ground Truth, this functionality is called automated data labeling. Automated data labeling helps to reduce the cost and time that it takes to label your dataset compared to using only humans.

We recommend using automated data labeling on large datasets because the neural networks used with active learning require a significant amount of data for every new dataset. Typically, as you provide more data, the potential for high accuracy predictions goes up. Data will only be auto-labeled if the neural network used in the auto-labeling model can achieve an acceptably high level of accuracy. Therefore, with larger datasets, there is more potential to automatically label the data because the neural network can achieve high enough accuracy for auto-labeling. Automated data labeling is most appropriate when you have thousands of data objects. The minimum number of objects allowed for automated data labeling is 1,250, but we strongly suggest providing a minimum of 5,000 objects.

Automated data labeling is available only for the following Ground Truth built-in task types:

1. Image Classification (Single Label)
2. Image Semantic Segmentation
3. Object detection (Bounding Box)
4. Text Classification (Single Label)

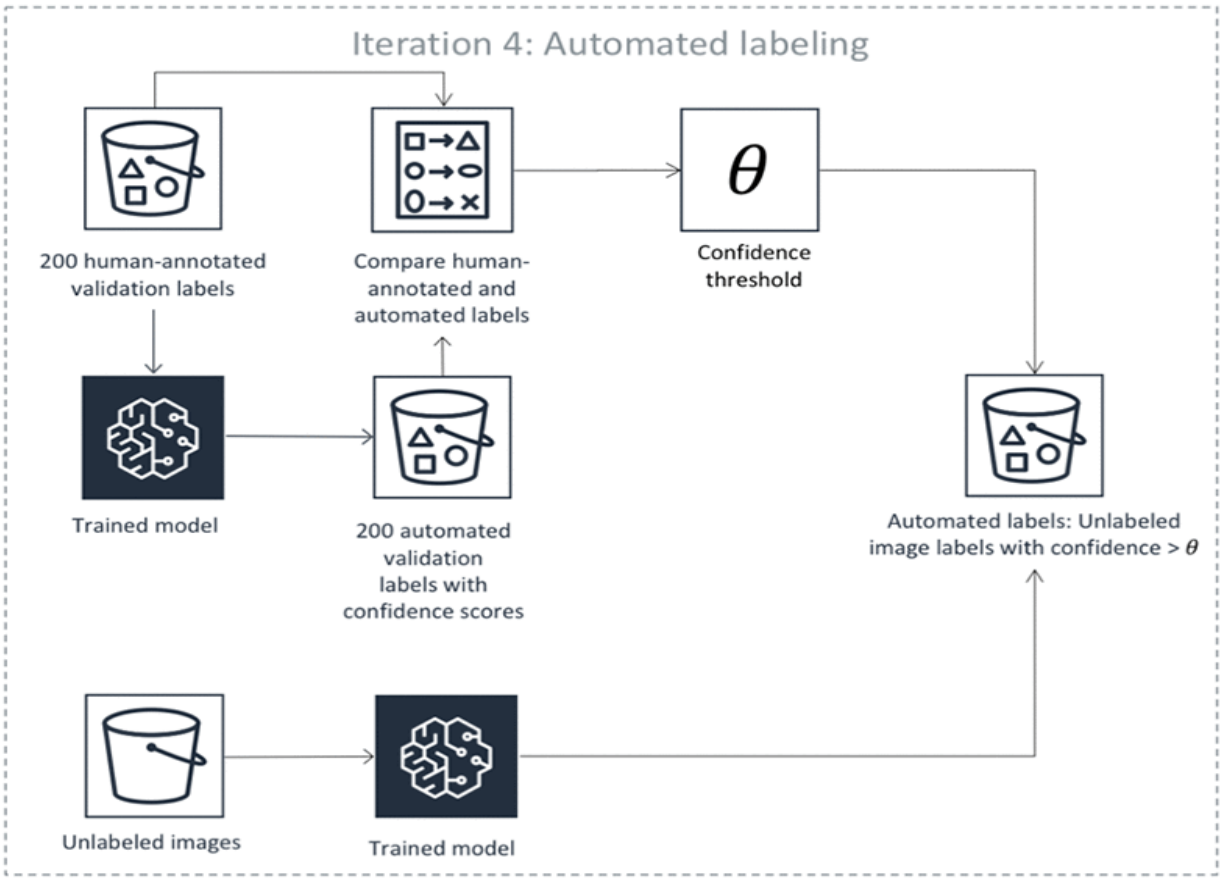


Fig: Automated labeling

The project focusses on providing attendance through a picture taken by the camera in the classroom and detection of faces in the images later giving the validation. The work includes YOLO algorithm for the detection of multiple faces or objects at a time which reduces the work of scanning each person. The generation of the custom dataset needs much of images per class and the work is completed using darknet 53 - A convolutional neural network-based algorithm.

YOLO being the cnn algorithm uses darknet which consists of 106 layers (53 darknet and 53 detection layers) is used for effective and efficient detection of faces or objects. DarkNet-53 is a

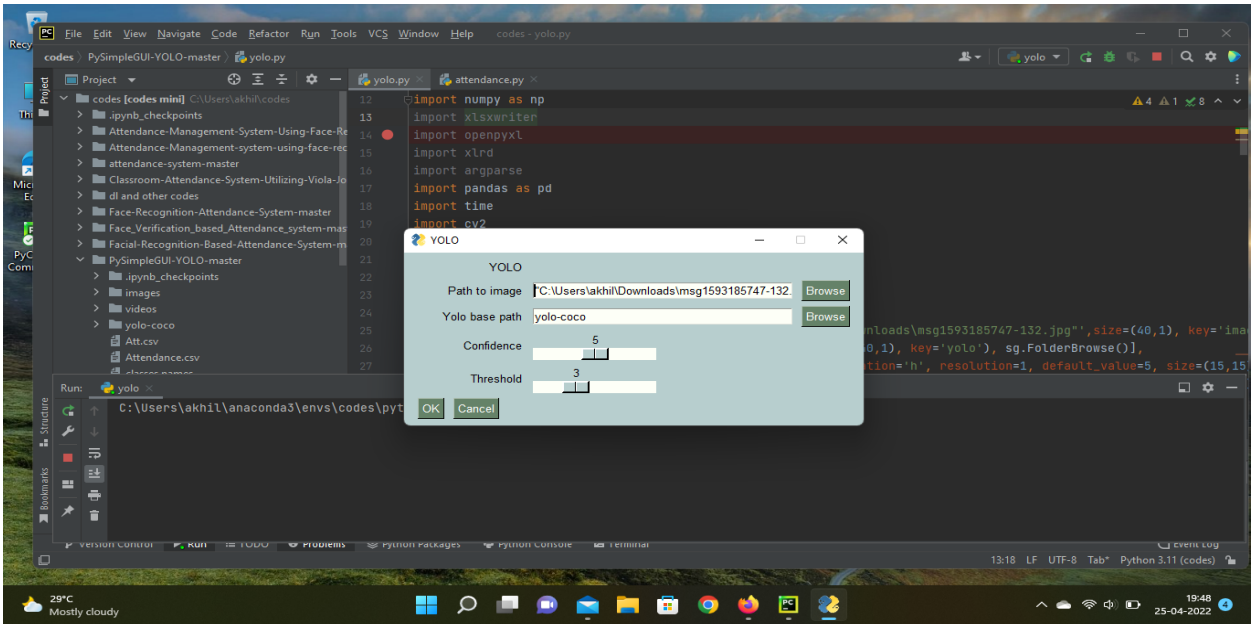
convolutional neural network that is 53 layers deep. One can load a pretrained version of the network trained on more than a million images from the ImageNet database.

The training of the input images needs a proper computation speed with GPU for better training. After creation of weights a picture taken by camera will be checked for attendance and the detected faces will be checked with local database and if there exists the same label as detected then attendance is marked yes and the time and date are also noted.

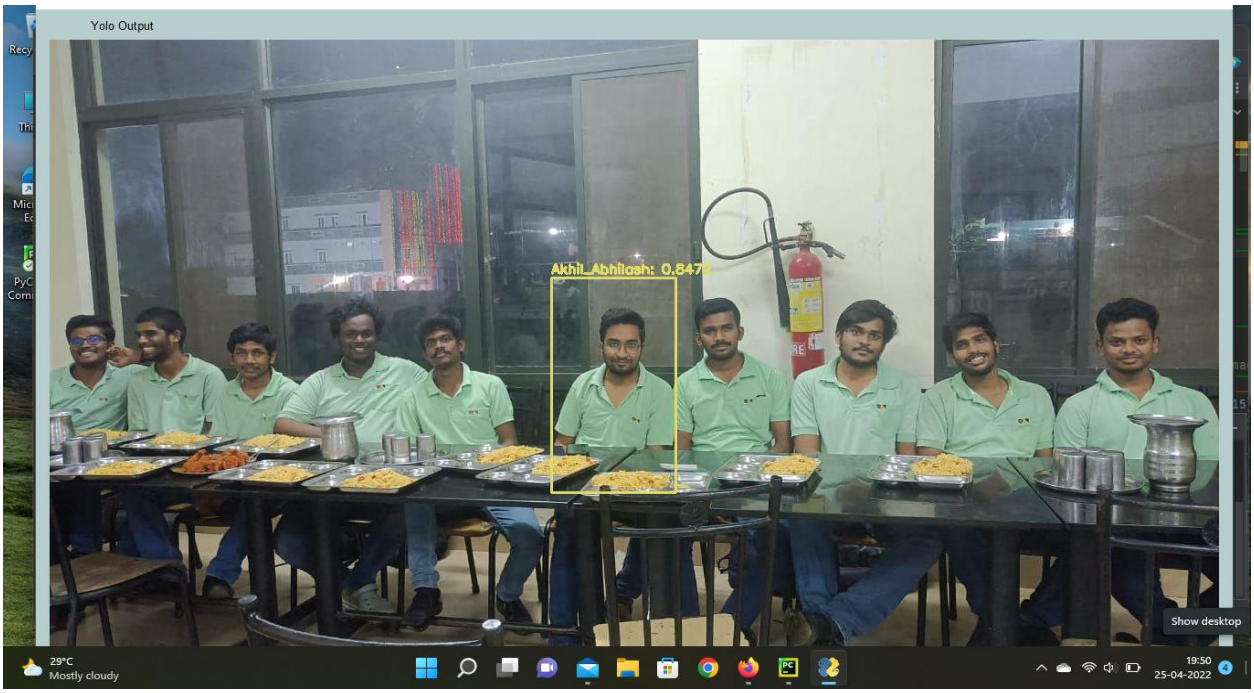
There was a web interface model deployed where students and the faculty members can access the attendance and options were given to faculty to change or modify the details of the students whereas students can view their attendance profile.

The attendance excel sheet can also be downloaded from the given web interface. The main aim of the work is to reduce the human services in the process of marking attendance in classrooms which is time consuming and is prone to get manipulated E attendance has less chances of getting manipulated. YOLO being one time detection, would be able to provide better and more accurate in the sense of capacity and time complexity.

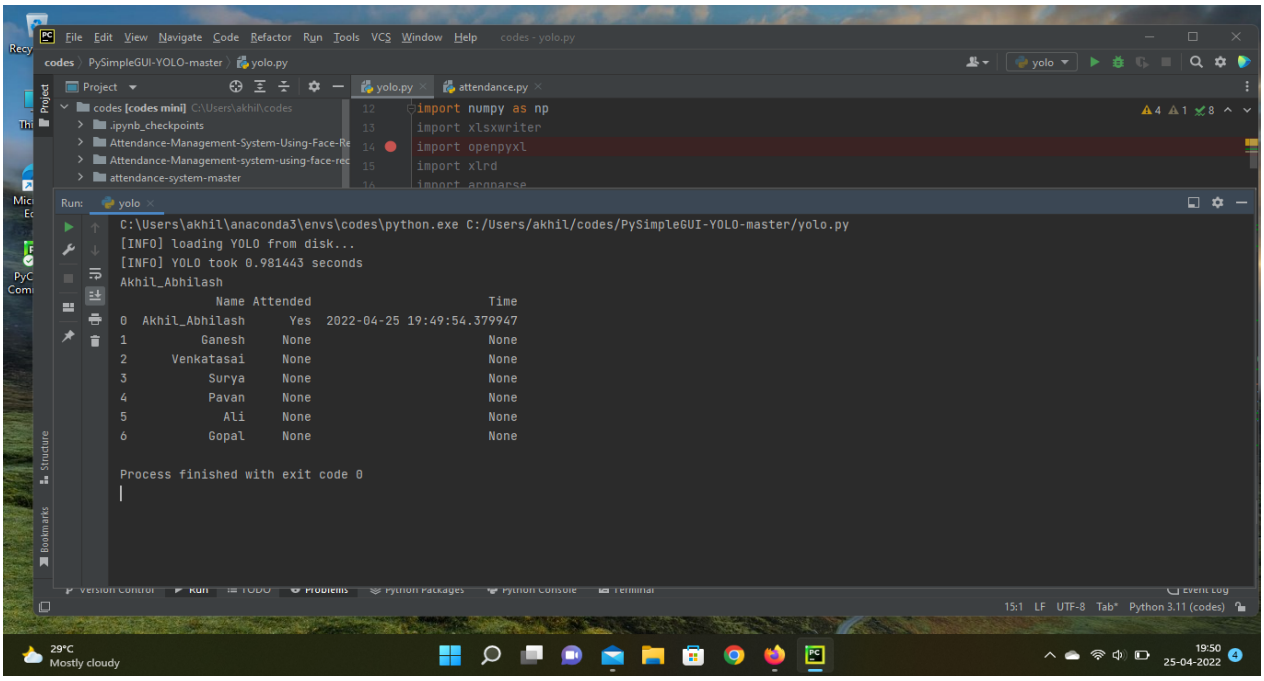
Here In this picture the yolo code is written and debugging is taking place and also giving the images path to the code to find the required target. In the path the download directory of particular person image is given. The whole code is written in PyCharm and it is saved as yolo with extension(.py). Here threshold and confidence value can be as per the requirements based on the images or pictures.



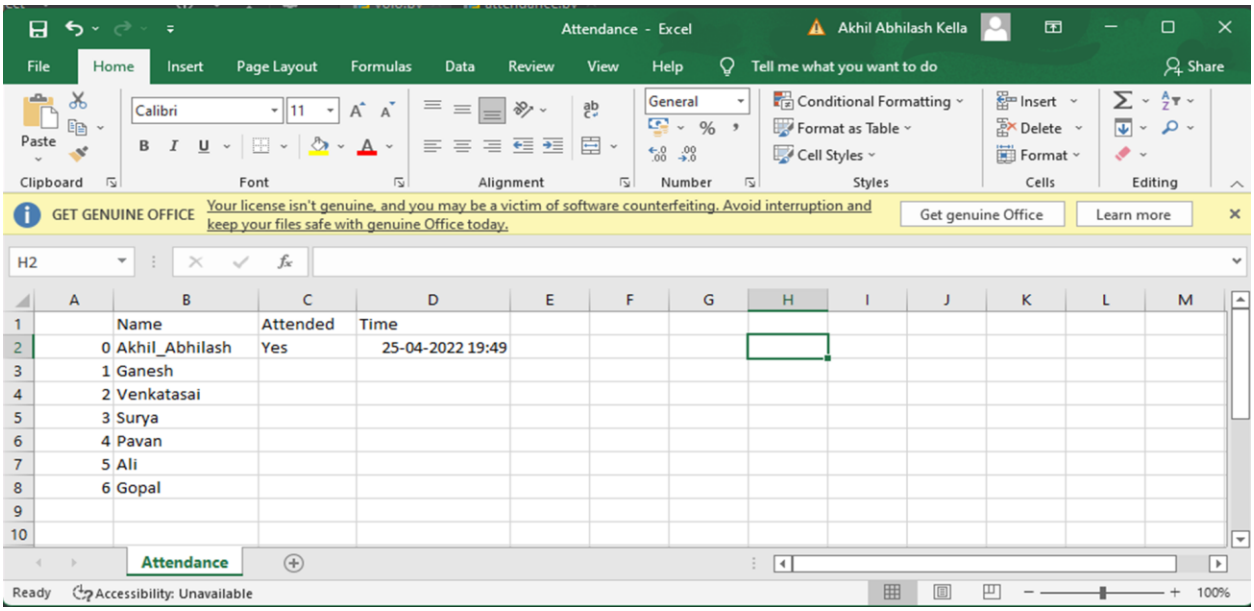
In the above picture, only the person who was given before to the yolo code database that person is detected remaining person will not be detected by the algorithm because this code checks the person identity in the database if it found it specifies otherwise, not. Identified person is shown within the square box.



In the above picture, a database is created in that database some photos or images is stored and marked with names. Here attendance is given to the Akhil_Abhilash and date & time also mentioned in the database. At the time of detecting the person the attendance will be given to the person for that particular requirement. It will show the all names in the database by marking them as yes/none. It shows the time taken to search the person in the input photo.



In the above picture, the attendance which was stored in the database can be printed in the form of Excel Sheet and the person's name, time and date of the picture detected will be in the sheet. The data which was stored before in database will be given to the excel sheet for posting according to the requirements. It can be downloaded at any time from the database with the require conditions. It will show the identified and unidentified names w.r.t the person is Yes\None.


Attendance - Excel
Akhil Abhilash Kella
File Home Insert Page Layout Formulas Data Review View Help Tell me what you want to do Share
Paste Clipboard Calibri 11 Font Alignment General Number
Conditional Formatting Format as Table Cell Styles Styles
Insert Delete Format Cells Editing
GET GENUINE OFFICE Your license isn't genuine, and you may be a victim of software counterfeiting. Avoid interruption and keep your files safe with genuine Office today. Get genuine Office Learn more
H2
Name Attended Time
0 Akhil_Abhilash Yes 25-04-2022 19:49
1 Ganesh
2 Venkatasai
3 Surya
4 Pavan
5 Ali
6 Gopal
Attendance
Ready Accessibility: Unavailable 100%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SEVEN UG PROGRAMS ACCREDITEI
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Welcome to GMR Institute of Technology (GMRIT). Established in the year 1997 by GMR Varalakshmi Foundation – the corporate social responsibility arm of GMR Group – GMRIT offers aspiring engineers high quality technical education.
From Principal's Desk


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Smart Attendance
E-attendance
File | C:/Users/Ganesh/Desktop/E-attendance/E-attendance/student.html
Gmail
YouTube
News
Pathways
JNCAA - Design, As...
700+ Free Stuff on...
Scaler by Interview...
Serial Number Dow...
7700+ Computer S...
Learn to Code — F...
450 DSA Cracker
Other bookmarks
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Year: GMRIT BTech
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Batch: B2
Roll no.: 19341A0585
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View Attendance
Download Attendance
Help Desk
Name of the student
Attendance
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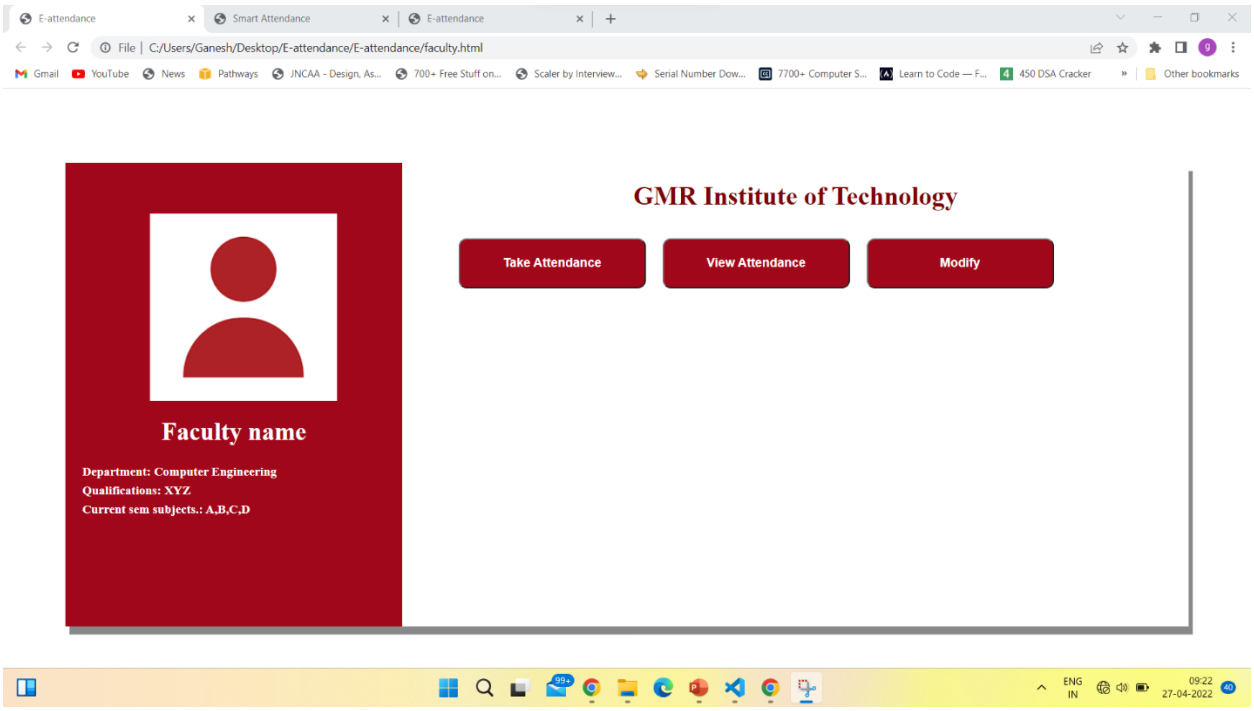
27-04-2022



A system is designed and implemented in real time environment to automate and monitor attendance system. Major goal behind taking attendance automatically is to rectify drawback in conventional method which is time consuming, that causes proxy attendance and wastage of paper. In this work we tried to eradicate all challenges and attendance will be marked using camera in a classroom. Counting of students is done and faces are recognized in image to mark attendance automatically. There are various types of seating arrangement, environment and lightning condition in different classroom. A web page is designed giving Home, about us, contact us details and login will be present which will point to view attendance, download attendance, help desk in student login and in the faculty login the following are present they are take attendance, view attendance and modify attendance. When clicked on take attendance it will point to the python code it will run the code take the photo and it will detect the photos which were already present in the data set it will not detect other photos in this YOLO algorithm is used to detect the students in the class this algorithm is used because it can detect up to 70-80 persons

unlike other algorithms.YOLO V3 will first count the students in an image followed by identifying faces as known and unknown generating spreadsheets separately and an email is send at the end of month to students, parents and faculty In YOLO algorithm we took image labeling by taking video for ten seconds and for that video labeling is done. Image detection is done by Residual box, bounding box regression, Intersection over union. Residual block: A residual block is a stack of layers set in such a way that the output of a layer is taken and added to another layer deeper in the block. bounding box regression, YOLO can only predict a limited number of bounding boxes per grid cell, 2 in the original research paper. Intersection over Union (IoU) is used when calculating mAP. It is a number from 0 to 1 that specifies the amount of overlap between the predicted and ground truth bounding box. an IoU of 0 means that there is no overlap between the boxes. And though that number can be increased, only one class prediction can be made per cell, limiting the detections when multiple objects appear in a single grid cell. The non-linearity is then applied after adding it together with the output of the corresponding layer in the main path. After the detection completed the attendance will be passed to the excel sheet. While using this algorithm conditions are tested and system shows 100% accuracy in most cases. In a classroom student may portraying different facial expressions beard, spectacles, varying hair styles etc. all cases are tested and obtained high efficiency and accuracy. Thus, concluded from above discussion is that our proposed system is cost effective, secure, reliable, fast, better and efficient module is developed to replace unreliable and manual system. The designed system performs efficient in real time implementation for counting and detection. Our entire system has proven to gather high accuracy in face detection and performance.

Yolo.py:

```
# import the necessary packages

import numpy as np

import argparse

import pandas as pd

import time

import cv2

import os

import PySimpleGUI as sg

sg.theme('light green')

layout =        [

                [sg.Text('YOLO')],

                [sg.Text('Path to image'), sg.In(r'"C:\Users\akhil\Downloads\msg1593185747-
132.jpg"',size=(40,1), key='image'), sg.FileBrowse()],

                [sg.Text('Yolo base path'), sg.In(r'yolo-coco',size=(40,1), key='yolo'),
sg.FolderBrowse()],

                [sg.Text('Confidence'), sg.Slider(range=(0,10),orientation='h', resolution=1,
default_value=5, size=(15,15), key='confidence')],

                [sg.Text('Threshold'), sg.Slider(range=(0,10), orientation='h', resolution=1,
default_value=3, size=(15,15), key='threshold')],

                [sg.OK(), sg.Cancel(), sg.Stretch()]

                        ]

window = sg.Window('YOLO', layout,

            default_element_size=(14,1),
```

```
                text_justification='right',
                auto_size_text=False)
event, values = window.read()
args = values
window.close()
args['threshold'] = float(args['threshold']/10)
args['confidence'] = float(args['confidence']/10)
labelsPath = os.path.sep.join([args["yolo"], "classes.names"])
LABELS = open(labelsPath).read().strip().split("\n")
np.random.seed(42)
COLORS = np.random.randint(0, 255, size=(len(LABELS), 3),
        dtype="uint8")
weightsPath = os.path.sep.join([args["yolo"], "yolov3_custom_last.weights"])
configPath = os.path.sep.join([args["yolo"], "yolov3_custom.cfg"])
print("[INFO] loading YOLO from disk...")
net = cv2.dnn.readNetFromDarknet(configPath, weightsPath)
image = cv2.imread(args["image"])
(H, W) = image.shape[:2]
ln = net.getLayerNames()
ln = [ln[i - 1] for i in net.getUnconnectedOutLayers()]
blob = cv2.dnn.blobFromImage(image, 1 / 255.0, (416, 416),
        swapRB=True, crop=False)
net.setInput(blob)
```

```
start = time.time()
layerOutputs = net.forward(ln)
end = time.time()
print("[INFO] YOLO took {:.6f} seconds".format(end - start))
boxes = []
confidences = []
classIDs = []
for output in layerOutputs:
        for detection in output:
                scores = detection[5:]
                classID = np.argmax(scores)
                confidence = scores[classID]
                if confidence > args["confidence"]:
                        box = detection[0:4] * np.array([W, H, W, H])
                        (centerX, centerY, width, height) = box.astype("int")
                        x = int(centerX - (width / 2))
                        y = int(centerY - (height / 2))
                        boxes.append([x, y, int(width), int(height)])
                        confidences.append(float(confidence))
                        classIDs.append(classID)
idxs = cv2.dnn.NMSBoxes(boxes, confidences, args["confidence"],
        args["threshold"])
```

```
#workbook = xlsxwriter.Workbook('C:\\Users\\akhil\\codes\\PySimpleGUI-YOLO-master\\Att.xlsx')

f1=open("C:\\Users\\Ganesh\\Downloads\\Telegram_Desktop\\PySimpleGUI-YOLO-master\\Attendance.csv", "w")

f1.truncate()

f1.close()

f = open("C:\\Users\\Ganesh\\Downloads\\Telegram_Desktop\\PySimpleGUI-YOLO-master\\classes.txt", "r")

listItems = f.read().splitlines()

f.close()

dict1 = {'Name': listItems, 'Attended': None, 'Time': None}

df = pd.DataFrame(dict1)

df.to_csv("C:\\Users\\Ganesh\\Downloads\\Telegram_Desktop\\PySimpleGUI-YOLO-master\\Attendance.csv")

if len(idxs) > 0:

        for i in idxs.flatten():

                (x, y) = (boxes[i][0], boxes[i][1])

                (w, h) = (boxes[i][2], boxes[i][3])

                color = [int(c) for c in COLORS[classIDs[i]]]

                cv2.rectangle(image, (x, y), (x + w, y + h), color, 2)

                text = "{}: {:.4f}".format(LABELS[classIDs[i]], confidences[i])

                print(LABELS[classIDs[i]])

                fum=LABELS[classIDs[i]]

                for hol in range(0,len(df)+1):
```

```
                    gol=df.at[hol,'Name']
                    if gol==fum:
                        df.iat[hol,1]="Yes"
                        df.iat[hol,2]=pd.to_datetime('today')
                        print(df)
        df.to_csv("C:\\Users\\Ganesh\\Downloads\\Telegram_Desktop\\PySimpleGUI-YOLO-master\\Attendance.csv")
                        break
            cv2.putText(image, text, (x, y - 5), cv2.FONT_HERSHEY_SIMPLEX,
                    0.5, color, 2)
imgbytes = cv2.imencode('.png', image)[1].tobytes()  # ditto
layout =        [
                [sg.Text('Yolo Output')],
                [sg.Image(data=imgbytes)],
                [sg.OK(), sg.Cancel()]
                    ]
window = sg.Window('YOLO',
            default_element_size=(14,1),
            text_justification='right',
            auto_size_text=False).Layout(layout)
event, values = window.Read()
window.Close()
cv2.waitKey(0)
```

5. CONCLUSION:

This research demonstrated a face-recognition-based class attendance algorithm based on the YOLOv3 deep learning architecture. The system required that each listed student photograph himself in front of a web camera. The inferential image was then automatically recognized by the facial recognition model. To automate and monitor the attendance system, this system was built and implemented in a real-time context. The main purpose of automatically taking attendance is to address a flaw in the traditional system, which is time consuming and results in proxy attendance and paper waste. We attempted to eliminate all problems in this project, and attendance will be recorded in a classroom using a webcam. Students are counted, and faces are recognized in images to automatically indicate attendance. Diverse classrooms have different seating arrangements, environments, and lighting conditions, and most of them are examined. In a classroom student may portraying different facial expressions beard, spectacles, varying hair styles etc. all cases are tested.

The study shows that you don't always have to rely on general-purpose trained models in situations in order to train the deep learning model where these models are overkill to your problem and performance issues involved. Don't overestimate the power of spending time designing the problem-specific custom neural network. Such unique networks will be a far better solution than the general ones. Training the models often takes too much time, depending on your computer's output. Thus concluded from above discussion is that our proposed system is cost effective, secure, reliable, fast, better and efficient module is developed to replace unreliable and manual system.

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