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Monitoring Students Using Different Recognition Techniques for Surveilliance System

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Abstract - *People now living in a world of corporate culture like workplaces and colleges, schools, hospitals. In particular educational institutions will ensure the students to maintain dress code to obtain uniformity among the students. It is a difficult task to the management to identify the students who doesn't follow the dress code. To observe manually it requires more human involvement and it is not possible for the entire day. To overcome across those issues, the proposed model presents a neural network based classification system to identify and differentiate the students. Systematic learning of analytics is becoming an essential topic in the educational area, in which requires effective systems to monitor the learning process and provides feedback to the staff. The software records the entire session and identifies when the students pay attention in the classroom, and then reports to the facilities. In this paper we want to deviate from the old approach and go with the new approach by using techniques that are there in image processing. Here in this paper we representing spontaneous presence for students in classroom.*

Key Words: **— Convolution neutrals, Pooling, Flattened, Fully Connected, Visual attention, Digital Attendance, Mobile Phone**

1. INTRODUCTION

From the survey of the current period we came across that Artificial Intelligence can plays a vital role in the computer technology. It can do all the work which can do by the human. It reduces the work of the human in different ways. It can map the behavior of the human in the computers. This technique can perform a large amount of data in a reduced period of time. The data can be classified based on the several parameters. It can interconnect various techniques such as linguistics, computer intelligence. The datasets that is trained already at the period of starting the program. ML is the branch of the artificial intelligence it does not follows the strict order performed by the program it follows the data in the training set. Recognition of face is the latest technique it can execute the data from the comparison, identification and classification. This also can be applied in the medical research where the medical report can collect the details of the patient including ID, kind of disease, and the medical diagnostics. The computer can maintain the all the kind of data. The AI can be applied and differentiate the data into two path one is the useable data and the other is the unusable data. The useable data can be separated and the data are stored by applying the face recognition method is useful method to pick the particular report of the patient from the overall report from the database.

The machine learning can undergoes the raw data extracting to find the patterns it will not follow the extraction of the data extraction. The structure of proficient algorithm comprised of bit by bit process which enables the network model to classify the ideal dress code and others. The proposed model is accomplished to differentiate the dissimilarities between the appropriately dressed individual and inappropriate dress code members. The proposed algorithm comprises of different layers such as convolution layer, pooling layer, flattening layer, and Full Connection layer. The figure 1 gives an illustration of convolutional layer. In this the feed in input consists of definite shapes which is formed based on laughing face and the area of the image is flagged as 1's and others are flagged as 0's.In these day's mobile phones has become an integral part of people lives. In which they are not only used for communication via short messaging service (SMS), calls, emails and internet, but it is mainly used for advanced applications such as remote health monitoring systems and security systems have been integrated with mobile phones. The recent years have seen rapid advancements in the value addition applications in mobile phones such as high definition cameras and high speed internet connection. The country has also experienced developments in the infrastructures to support the rising need of faster internet connectivity. It has been rolled out their 4G internet infrastructure which is now available in over thirteen towns in the country.

Many academicians and educators expect that at least class rooms should be free from these mobile phones. As per rules and regulations, students should not use their mobile phones while attending the lectures. In the other way, latest researches clearly show the increasing use of mobile phones by the students in their class rooms. The recent study conducted by the University of Haifa, 94% of Israeli high school pupils access social media via their cell phones during class. Based on analysis of report only 4% reported not using their cell phones at all during class. A study about effects of social networking using mobile phones by the students was done in college of applied sciences, Nisswa, Oman by Mahmoud and Tastier. The new findings of this study confirms that 80% students use a social networking site on phone, 10% of them spent half an hour, 35% spent two hours per day and 25% spent more than two hours on mobile phones in a day.

2. LITERATURE SURVEY

The problems in detecting whether a person or a student dress code is overcome by employing a Convolution Neural Network (CNN) Image processing algorithm. Network model used in this algorithm is successfully trained with datasets consists of different images collected from random websites and college surveillance systems which will be recording all the student moments in the main entrance. All the collected images in database are trained with network model and the results are stored in multiple library locations which are present within the system. Some of these libraries will act as an operating system of network model which will provide permission to access various image data sets and file systems within the network model system. Once permission is granted the network model starts to read images present in training and testing directories. To ensure the performance of network model different types of students and their dressing styles are considered without any bias and selection of image is performed as a random function. Random functions lumber all the images in the datasets so that the network model will be able to learn perfectly each and every image from the Closed Circuit Television (CCTV) surveillance. [1]

Many factors affect a student's academic performance. Student performance and achievement depends on teachers, education programs, learning environment, study hours, academic infrastructure, institutional climate, and financial issues [1, 2]. Another extremely important factor is the learner's behavior. H.K. Ming and K. Downing believe that major constructs of study behavior, including study skills, study attitude, and motivation, to have strong interaction with students learning results and performance. Student perception of the teaching and learning environment influence their study behavior. This is more helpful to teachers to grasp the bad attitudes of students, they can make more reasonable adjustments to change the learning environment for the students. For the conclusion that whether good or bad behavior of a particular student is not an easy task to solve, it must be identified by the teacher who has worked directly in the real environment. From this teachers can track student behavior by observing and questioning them in the classroom. This method is not difficult in a classroom which consisting of few students, but it is a big challenge for a classroom with a large number of students. This method is valuable to develop an effective tool that can help teachers and other roles to collect data of student behavior accurately without spending too much human effort, which could assist them in developing strategies to support the learners to performances could be increased. [2]

The camera captures the face images and compared to the data in the database. Here the captured images does not possess high quality and resolution. This poor resolution is due to the camera limited specifications. In this wild environment the face image is captured is subjected to query algorithm. Super resolution algorithm is used to increase the resolution of the images at the time of resolution the size of the image is increased when it is small. From this paper they propose the state art algorithm for the super image resolution. The images from the wild database are used for applying the 3D face alignment two cases are consider which is the before and the after alignment. The functions of the proposed algorithm are featured. The results of the images are considered for the test in a recognition protocol by the use of the unsupervised learning algorithm. This unsupervised algorithm which posses the high level of extracted features. On the analysis of the recent results rate of recognition is increased that is extracted from the unsupervised algorithms. [3]

Organization requires a robust and stable system to record the attendance of their students. organization have their own method to do so, some are taking attendance manually with a sheet of paper by calling everyone by names during lecture hours and some have adopted biometrics system such as fingerprint, RFID card reader, Iris system to mark the attendance. This conventional method of calling the names of students manually is time consuming event. The RFID card system, each student assigns a card with their corresponding identity but there is chance of card loss or unauthorized person may misuse the card for fake attendance. When we observe in other biometrics such as finger print, iris or voice recognition, they all have their own flaws and also they are not 100% accurate Face recognition involves two steps, first step involves the recognition of faces and second step consist of identification of those detected face images with the existing database. We have several number of face detection and recognition methods. The Recognition of face works either in form of appearance based which covers the features of whole face or features like eyes, nose, eye brows, and cheeks to recognize the face. [4]

The automatic methods are available and one of them is the biometric attendance. This method is not good because it waste the student's time by standing in the queue to give

their thumb impression on the system. Actually this method is developed for identifying of the individuals. The proposed method examines the behavioral features and the physiological of the individuals based on plastic cards, pins and tokens to identify the person, and also it includes identification because of the physiological features such as finger prints, face, hand veins, iris it also had a geometry and features such as keystroke dynamics and the signature are used as the behavioral features for the analysis. Almost all the institutions follow these attendance systems to keep a record of the students and also to know in which department they are studied. The applied method is good benefit for the parents because the colleges will send the information student attendance to their parents via mail or system and there is also a chance that the student may delete the mail before their parents recognize it but with this method they will be having soft copy of image and can be directly sent to the parents mail. The first system that is successful based on the pattern matching is applied to the facial features providing a compressed face picture. [5]

The implementation and enforcement of dress codes are some of the steps that must be considered when it comes to security protocols of both public and private schools. Dress codes in such learning institutions are said to help socio1economic that affects the students who can't afford the latest trends especially at urban schools. This could also instill discipline and sense of community among the students. It also helps the school staff and security to quickly spot the intruders and any other individuals who do not belong to the institution. As school uniforms are considered as an indicator of safety from school crimes caused by intrusion, though uniforms alone cannot solve all the issues with regards to security, they can still be a positive element to discipline. School administrations are responsible for the safe, secure and productive learning environment. Proper implementation of policies and strategies for dress and appearance are within the scope of reasonable actions which can be done by school officials to promote a positive school environment. Schools may choose to include appropriate measures to enforce their dress code in their student engagement policy as these support to create a positive school culture, clearly articulating school-wide expectations and consistent processes to address concerns with regards to the dress code. [6]

Electronic gates or E-gates are progressively significant in developing a mere secured entry way of its users. E-gates requires all the users to disclose their biometric data to the device. It was discovered that security observations and advantages of exposure impacts affected revelation, while positive & negative feelings impacted user's impression and security. This concept is related to this design project but differ in totality because uniform recognition has an image processing to detect the proper dress code and also has an ID barcode scanner to add more security. The device is consisting of microcontroller, fingerprint and barcode scanner, camera and servo motor. The input is from the biometrics, barcode and camera or the image processing, all of this sensors should have the qualified input to operate the device. Biometric confirmation frameworks for example, electronic (e-) gates are progressively significant in air travel due to the developing voyager streams and security challenge. Such frameworks take into account exact validation and the improvement of the air travel involvement, while upgrading the security of the general travel framework. To verify, the travelers are required to reveal biometric data. [7]

The hardware is arranged to naturally open entryways or gates for vehicles while there are still empty parking spots. While is about the advancement of entryways to have a more secure workplace. The concept is almost related to the uniform recognition but they differ in terms of security ways as well as its major application. In study, biometric is used to recognized individuals and direct access to data. Uniform recognition used biometrics to recognize student and to be allowed inside the university. But the researcher's study is also requiring a proper uniform dress code to fully access the university gates. It introduce a programmed framework for controlling and ruling structure door dependent on digital image processing. The framework starts with a digital camera, which catches an image for that vehicle which means to enter the structure, at that point sends the image to the PC. Picture examinations performed to identify and perceive the vehicle, and coordinating the vehicle's picture with the stored database of the passable vehicles. At that point, the PC send a signs to the electromechanical parts that controls door to open and allows the vehicle to enter the structure in the event of the vehicle's picture coordinates any picture in the database, or sends an apology voice message if there should arise an occurrence of no indistinguishable picture. [8]

Upon increasing the technology there is a vast usage of using embedded devices by humans. All our lives are more contingent on embedded devices. In this digital environment these devices provide security and safety. Over 97% of processors are using in embedded systems. These processors cannot be visible to users. New processors, sensors, actuators, communications and infrastructures are developing which provides a significant role in pushing the economic growth. In these recent times "vision" challenges to researchers in development. This development impacts on several aspects like context-awareness, intelligence, natural interaction, restricted resources, hard real-time applications, Automotive, Medical Devices, military services, etc. In this ongoing technology there is a large requirement of applications for text recognition, object recognition, face recognition, navigation which helps to assist people to provide them safety and security. Deep learning has become one of the leading surge for object detection. Many algorithms like YOLO, faster RCNN and SSD are developed to recognize object but SSD method provides more accuracy in recognizing objects. The detecting frames in SSD framework is more than Faster RCNN. We have different datasets like

PASCAL VOC800, MS COCO and GOOGLE Nets are having thousands of images but 'Mobile Nets' which was developed by Google researchers have millions of images with in a less storage and are designed for the applications of smart phones effectively for object detection, face attributes and large scale geo-localization. [9]

The versatility of mobile phones cannot be underestimated, they are very portable and compact and can perform an array of functions ranging from a simple call, SMS, data services, a simple digital organizer to those of a low end personal computers. Almost all the mobile phones have a basic set of comparable features and capabilities. From the analysis the features of most cell phones show that they have a microprocessor, a read only memory (ROM) that provides a storage for the operating system, a random access memory (RAM) that temporarily provides the space for data when the cell phone is powered, ssradio module, a digital signal processor, a microphone, a speaker, a variety of hardware keys and interface and a liquid crystal display (LCD). Before focusing on detection of mobile phones one has to focus on these features to determine the potential vulnerability as entry points. The tests were carried at Pacific Northwest National Laboratories (USA) to determine the vulnerability of the microphone, speaker and RF system as entry points for detection.

The first part of determining the RF system as potential detection point was carried out by looking for the internal oscillators necessary to operate the microprocessor and RF synthesizer. Extracted results were not satisfactory and it was established that the cell phones had been designed to meet the electromagnetic interference specifications. Here the second part of the experiment was carried out to detect the cell phone by detecting the RF transmitted. All these are done by the use of an RF signal strength meter, an amplifier, a mixer and a filter. All these found out that since the mobile phone keeps a continuous communication with the tower, this technique was successful. [10]

3. PROPOSED METHODS FOR FACE RECOGNITION, UNIFORM IDENTICATION AND FOR MOBLE PHONE DETECTION

The main aim of this system is to recognize the face of the school/college student and to recognize the color of the uniform through the color identification which is under algorithm method. Recognition of face follows the identification, pattern segmentation and classification, comparison and extraction. The input is image is trained in the training set and the following process takes place. Once after the stage of face recognition, the color identification is made by the RGB and neural network method which measures the edges of the images and color of the images. The edges are measure when the image shows identical color.

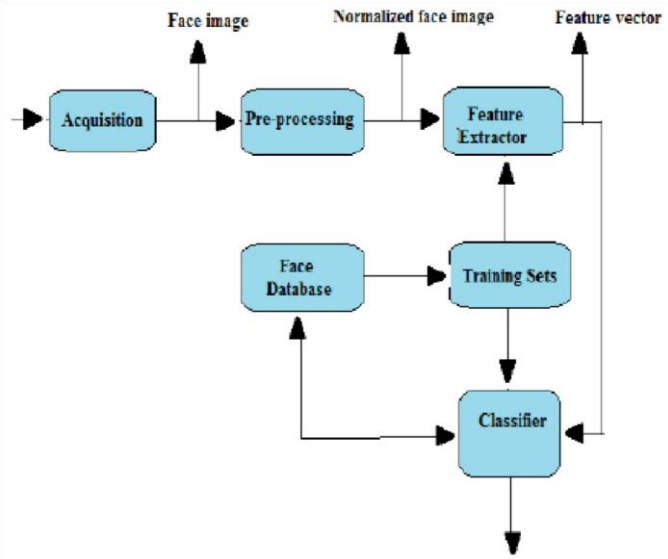


Fig 1: Face Recognition Block Diagram

As our model will be given more and more passages it will start to turn out to be more and more precise as it will learn investigate every single Data1set and use it for future entries. To isolate the pictures into two sections have taken the states of dress code like the individual should wear Identity Card and should take care of his Shirt and any picture which isn't having the above is considered as the individual isn't in dress code. The sample images which were taken below are from different sources including Google images, Fashion blog websites and university surveillance cameras.

The presence deposited system that all right to use administrations or blood relation the learners can use for them only. The device is used to take picture that is attached

to that of the system takes the pictures endlessly to identify and also to find the students those who are sitting in the classroom .For avoidance of false recognition of images skin classification method is used.[20]This skin classification method progresses the proficiency and the correctness that acknowledgement procedure. Mainly it is considered all other images recaps the other images then kept as black in skin classification method, it expressively improves truthfulness face tracking procedure. In the experimental arrangement show in figure1 two databases are shown. Assembling of face images and the images that are mined geographies at period procedure of registration is done by using of the face database .The data around instructors and learners take presence the second attendance of database is used.

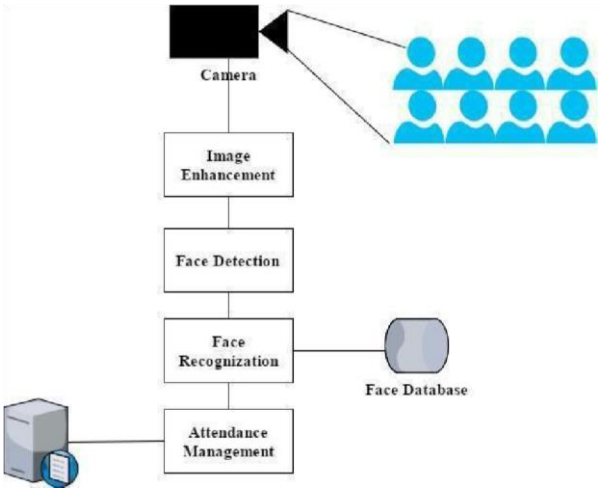
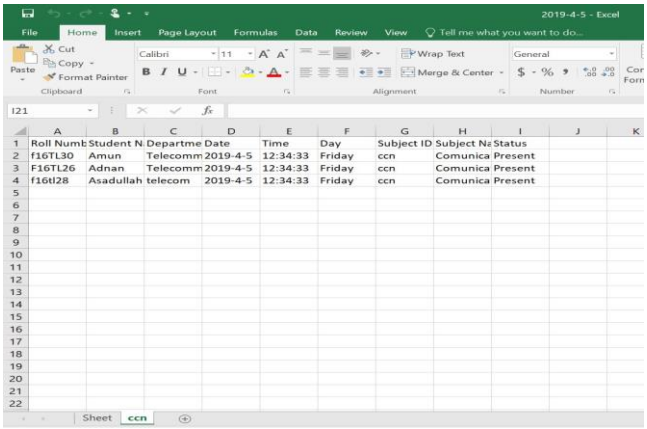


Fig 2. Experimentation setup

To initialize this system, the administrator first register their student data along with their name roll number and department. We have created a training dataset of 6 students (total of 120 images for each) for testing purpose.



Roll Numb	Student N	Departme	Date	Time	Day	Subject ID	Subject Na	Status
f16TL30	Amun	Telecomm	2019-4-5	12:34:33	Friday	ccn	Comunica	Present
F16TL26	Adnan	Telecomm	2019-4-5	12:34:33	Friday	ccn	Comunica	Present
f16tl28	Asadullah	telecom	2019-4-5	12:34:33	Friday	ccn	Comunica	Present

Fig 3. Excel sheet

The attendance system has proved to recognize images in different angle and light conditions. The faces which are not in our training dataset are marked as unknown. Attendance of recognized images of students is marked in real time, and import to excel sheet and saved by the system automatically. First part in determining the RF system as potential detection point was carried out by looking for the internal oscillators necessary to operate the microprocessor and RF synthesizer. The found results were not satisfactory and it was established that the cell phones had been designed to meet the electromagnetic interference specifications. The second part of the experiment was carried out to detect the cell phone by detecting the RF transmitted. This was done by the use of an RF signal strength meter, an amplifier, a mixer and a filter, they found out that since the mobile phone keeps a continuous communication with the tower, this technique was successful.

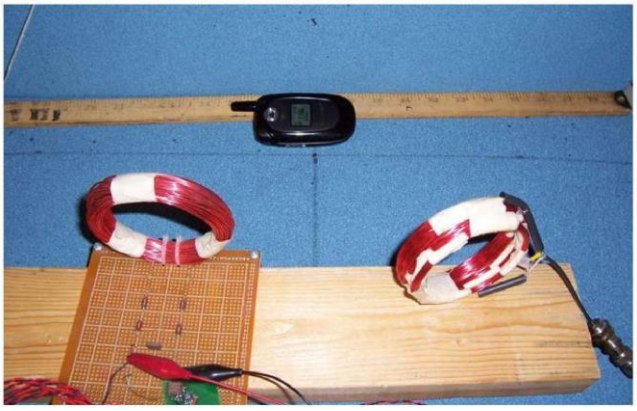


Fig 4. Magnetic coupling test set-up

A modification was made that incorporated an audio speaker to make the cell phones microphone or speakers react to the audio signal of an RF spectrum analyzer configured to demodulate AM signals.

Fig 5. Combined Audio and RF set-up

A block diagram of the setup is in fig below. The RF transmitter and receiver was to be used to sense cell phone when reacting to the audio signal.

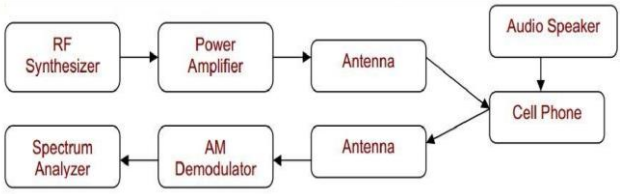


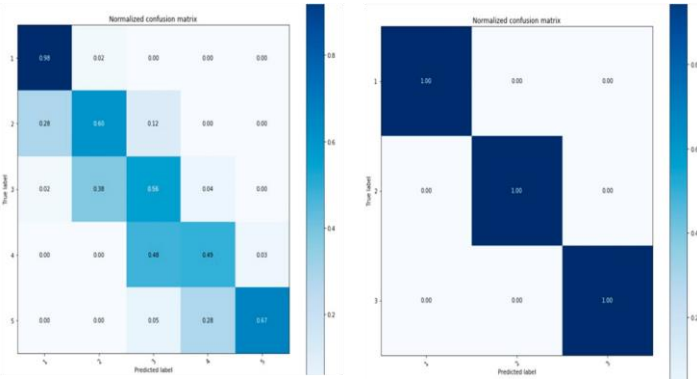
Fig 6. Combined Audio and RF block diagram

4. RESULTS AND DISCUSSIONS

We did the evaluation to verify the results in three main phases: student ID, the position of the student and gaze. First, it is the student ID that needs to be detected primarily. ID of a student plays an important role in this context. Once all student IDs have been identified and located, the tracked data of individuals' behaviors will be attributed to them

later. Student ID identification is evaluated through all the data of the dataset. Because the data are imbalanced, F1-scores are necessary. A confusion matrix is also plotted. The first column and row represent the label of "unknown," and the other columns and rows show the results of corresponding student IDs. Secondly, row and column are evaluated. The row and column represent the current position of the student in the class which is going to be combined with the head-pose direction to denote the origin and the direction of the gaze vector. The row and column are evaluated with MAE (mean absolute error). Besides, confusion matrices are also constructed for those estimations; vertical and horizontal values of the matrices are matched with the ranges of parameters. Finally, the gaze plays the most pivotal role in the system, to check if the students are focusing on the board/slides, on laptops, or on other things. The summarized statistics of gaze could be exhibited for educators to observe the behaviors of attention over the studying period. Gaze estimation is acquired through re-trained models. Hence, the dataset is divided into training and testing sets, and then one-third of the dataset (7556 rows) is used for evaluation. The F1-score is also applied to evaluate the result of gaze estimation.

We can observe from Table 1 that column estimation gets an infinitesimal mean error, which represents a reliable outcome. For row estimation, this difference is trivial. Moreover, the confusion matrices (Figure 7) have shown that the error is often one that is acceptable for the expectation of estimating an approximation of seat position. In this context, different positions have the same vision direction but may not look at the same object.



(A) (B)

(A)The confusion matrix of row seat estimation.

(B)The confusion matrix of column seat estimation.

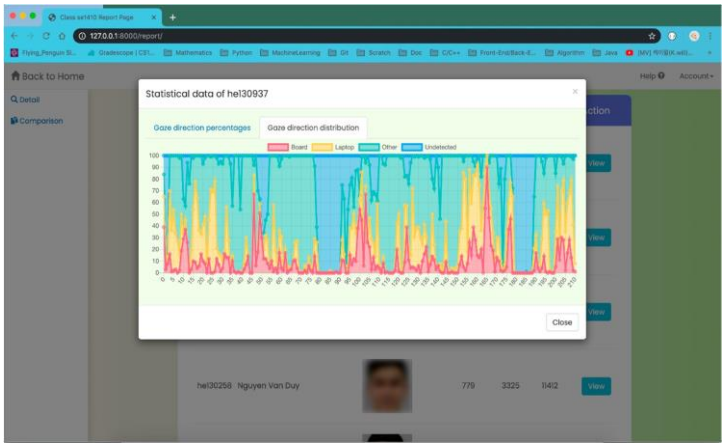


Fig 7: The pie chart shows the numerical proportion of gaze direction data during the class.

The amplifier was simulated. In the place of the current to voltage converter, a signal generator was used. An amplifier was simulated at 50mV voltage and the voltage waveforms at the LED monitored.

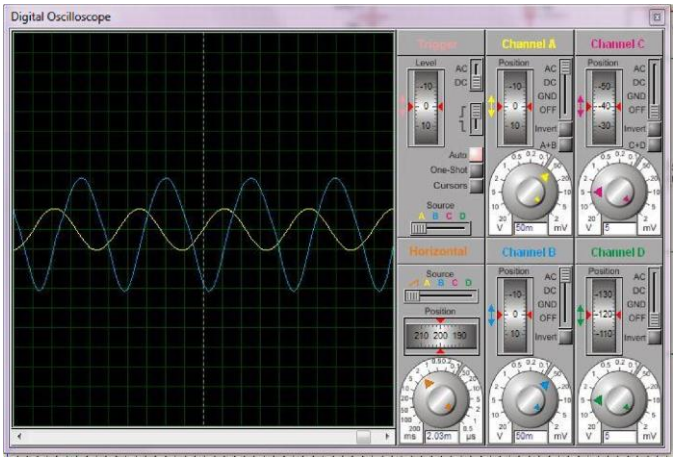


Fig 8: Output simulation results

With the swinging of the voltage at the output, the LED was found to be blinking. Therefore it was expected that upon connection of the detector and current to voltage converter to the amplification stage, the LED would blink as expected in these simulated results.

Practical Results.

The practical results obtained from the detector before and after a cell phone is adjacent to the detector are in the figures.

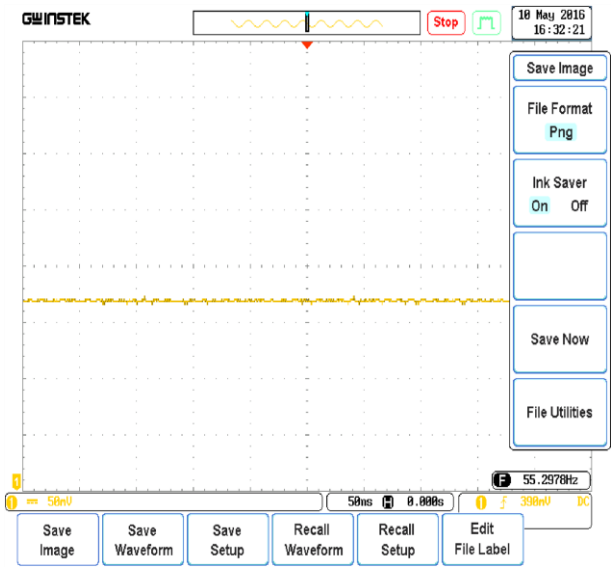


Fig 10: Detector Output when cell phone is not in use.

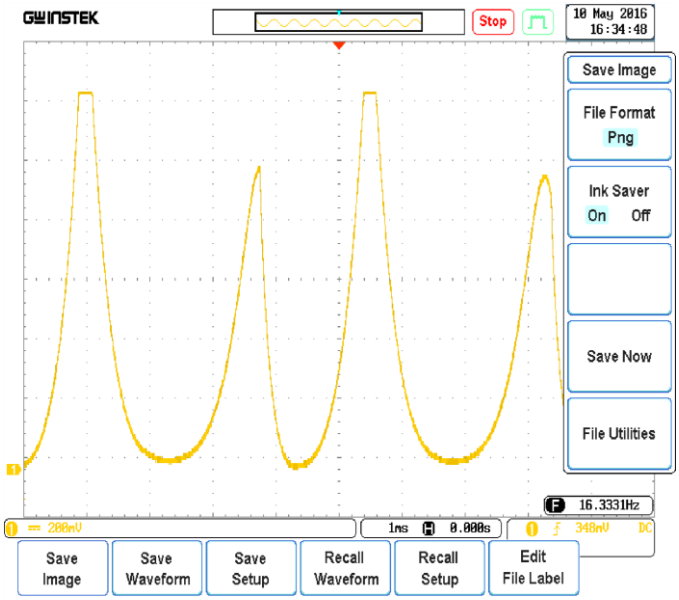


Fig 9: Detector output when cell phone is in use

Smart Attendance Management System is simple and works efficiency. Automatically the system works once the registration of individual student created by the administration.

The front page of our attendance system is based on HTML5, CSS3 & JS. It consist of the following modules,

- Student Registration
- Face Recognition
- Addition of subject with their corresponding time.
- An Attendance sheet generation and import to Excel (xl) format

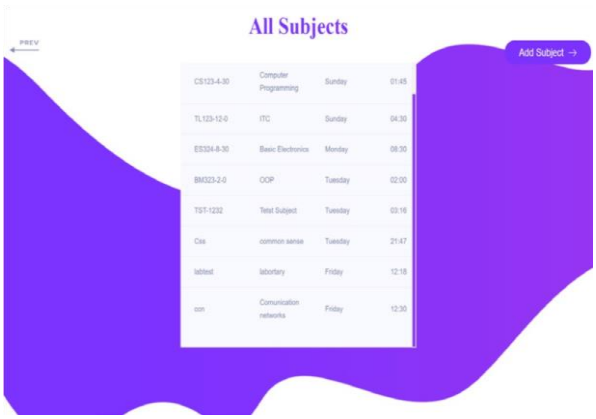


Fig 11: Addition of subjects

This above image represents the subject folder, subjects are to be filled according to time table once the time arrives for the corresponding subject. The system starts capturing

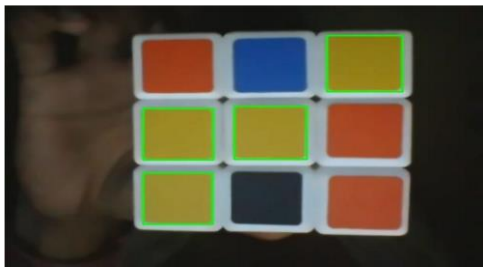
images, detects the faces, compares the faces with existing database, mark attendance and generate excel sheet for the recognize students.

Fig 12: Test image of students during ccn lab at TL-MUET

The Attendance system has proved to recognize images in different angle and light conditions. The faces which are not in our training dataset are marked as unknown. The attendance of recognize images of students is marked in real time. And import to excel sheet and saved by the system automatically.

Students of each year will have different color uniforms. Then we also do the object detection concept in which students who are not wearing ID card, Belt and shoes are been identified separately and database is maintained and given to the corresponding person. The following diagram shows the results obtained in all parameters.

Fig 13: Face recognition output



Object Detection Output

TABLE I. GATE RESPONSE EVALUATION

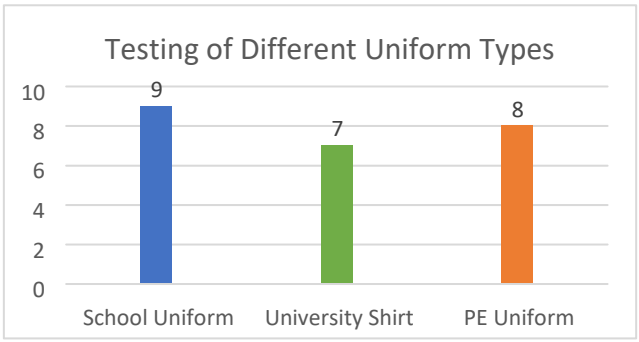
Condition	ID and Bio Matching	Uniform Scan	Target Response	Actual Response
1	1	1	1	1
2	0	0	0	0
3	1	0	0	0
4	0	0	0	0

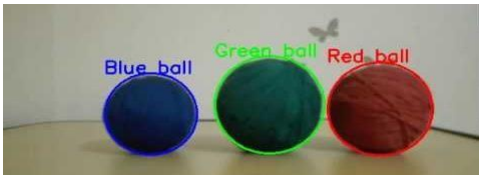
Legend: For ID and Bio match: 1 for match, 0 for unmatched.

For Uniform: 1 for Pass, 0 for Fail.

For Target Response: 1 for Open, 0 for Close

The system is tested for its accuracy for different uniform types. Table 2 shows that the School uniform detection rate is 90%, university shirt is 70% and PE uniform is 80%. These rates are evaluated from 10 trials of uniform detection. Factors that affect non-detection includes lighting and capture view problems.





5. CONCLUSIONS

The proposed model is developed to identify the dress code of the person in an institution. Based on 3 layer convolutional neural network architecture the images are classified to identify the formal and informal persons. Proposed model classifies the dress code percentage accurately. This research aimed to build a system that automatically supports teachers and related educational faculties with monitoring student behavior. Here mainly we focused on the observation targets of the students across time. Our proposed system works as an assistant for the decision-making process. This strategic information may be discovered and delivered to the decision-makers automatically. We accomplish the building of an entire system that supports recording Student behaviors, proceeding statistics, and visualizing the data. Mainly here detector could detect the signal in the frequency range of 0.9GHz to

3.0 GHz thus a cell phone that is in use. Phone usage can be easily indicated by the blinking of the LED. Whenever a cell phone is on standby mode, it keeps a radio silence therefore cannot be detected using this cell phone detector. It can be concluded that the project was successful. Smart attendance management system is designed to solve the issues of existing manual systems. We have used face recognition concept to mark the attendance of student and make the system better. This new method is proposed to be used as a tool to make students follow the dress-code rules that improves a sense of professionalism in them.

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