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Real Time Face Attendance System using Face Recognition

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Abstract: *Making Attendance as smarter using recent technology and recognition in deep learning algorithms to build a system that will detect and recognize frontal faces of students in a classroom. —A face is the front part of a person's head from the fore head to the chin, or the corresponding part of animal ‖ (Oxford Dictionary).Face identification is one of the biometric methods to make essential for this system. In human sociable, the front part of face is the most useful data as it contains important data about a group or individual. All person has the skill to identify individuals from their individual faces. The suggested solution is to develop a working model of a system that will promote attendance system in a classroom by recognize the frontal faces of students from a picture taken in a classroom. By making this framework, the problem of intermediary and students being marked present even though they are not physically present can easily be solved. In recent years, research has been taken out and face identification and recognition systems have been developed. Some of which are used on social media platforms, banking apps, government offices, etc. Since face recognition plays a vital role in mobile devices to make it perform and functions on particular operations. Using this idea as a base we make this for smart attendance system and it will spend minimum time than manual attendance. This model will be a successful technique to conduct the attendance and records ofstudents.*

Keywords: Convolutional Neural Network (CNN), Deep Learning, MXNet, TensorFlow, Onnx Model, Database, Training and Recognition

I. INTRODUCTION

Every institution requires a robust and constant system to record the attendance of their students. and every institution have their own methodology to do, many in numbers are taking attendance manually with a attendance registers by calling their respective names during lecture periods and little have takeup biometrics system such as RFID card reader [1], fingerprint and iris system to take the attendance in daily basis.The ordinary method of calling the names of students manually is time consuming process. RFID card system is assigned to each student with their corresponding identity but there is posibility of card loss or unapproved person may mistreat the card for fake attendance. while in other biometrics such as voice recognition, iris[2] or fingerprint [3], they are not 100% accurate.

A **facial recognition system** is a technology capable of recognizing or validating a person from a digital image or a continuous image frame from a video source. There are numerous methods in which facial recognition systems works, they work by differentiating selected facial information from given information with faces within a database. It is also termed as Biometric Artificial Intelligence based on use cases that can individually identify a student by figure out patterns based on the student's facial information and shapes.

The main use of face recognition [4] for the direction of attendance marking is the quick and smartest way of attendance management system. Face recognition [5] is more proper and faster technique among other approach and scale down chance of proxy attendance.

Face recognition contribute static identification that is a student which is to be determined does not to need to take any action for its integrity. Face recognition contain following two steps, first step concern the detection of faces and second step contain of recognition of those identified face images with the existing database that contain existing images [6].Hence it contains number of face detection and recognition methods introduced. Face recognition entirety either in

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form of actualization based which covers the information of whole frontal face or element based which covers the mathematical feature like eyes, nose, eye brows, and cheeks to perceive the face. Our system accepts face recognition progress to slow down the defect of existing system with the help of deep learning, it have need a good quality camera to capture the images of students, the detection process is done by Scatter diagram of oriented angle and recognizing perform through deep learning. The frontend side (client) which consist of GUI which is established on electron JS and backend side consist of logic and python (server), an IPC (Inter Personal Communication) bridge is developed to communicate these two loads. The images that obtained by the camera is transfer to system for further analysis, the input image is then correlated with a set of reference images of each of the student and record the attendance of the students.

II. PROPOSED METHOD

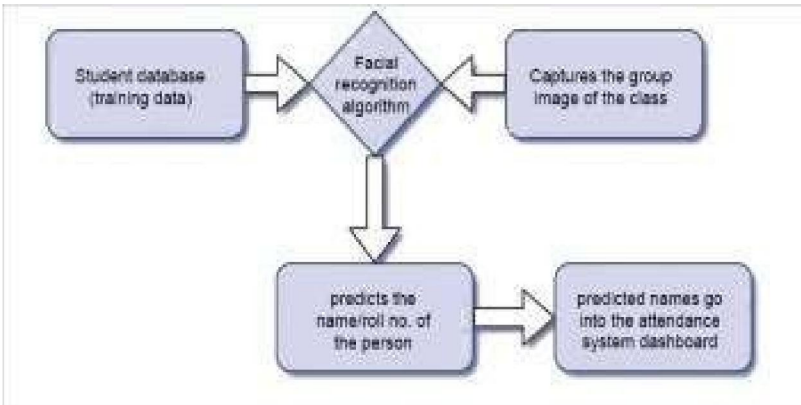

Fig. 2.1: Model of Proposed Method

2.1 Model

The usage of Open Neural Network[7] Exchange, it is accessible to give the ability of optimization to the Data Scientists. It implement the advance of ONNX compatible runtimes and libraries to every tool which prefer the exported ONNX models, and it ensure in the development of the performance on some of the use cases in the reality. At a immense level, ONNX is described to allow framework interoporability. There are many essential machinelearninglibrariesindifferentlanguages—ÞyTorch,TensorFlow[8],MXNet,andTheconceptisthatyou can train a model with one tool stack and then arrange it using another for assumption and prediction. To establish this interoperability you must consign your model in the model.onnx format which is serialized representation of the model in a protobuffile.

2.2 Face Detection

In order to detect 0e a face, we would first need to detect a face from an image. The Ultra-light face detector [9] was matchless in terms of speed and introduce a relatively good accuracy.

ultra light	80	0.102

To use the ultra light model, python is highly required and it need specific model to perform an action. we will be using the pretrained ultra_light_640.onnx model, we have to resize the input image to 640x480. After pre- processing the given image, we need to prepare the ONNX model and create an ONNXruntime.

2.3 Face Recognition

MobileFaceNet is a deep learning algorithm and attain accuracy upto 85 percent on labelled faces in the given dataset [10], and a 90 percent accuracy on recognising faces in the given dataset. The network consume around a million parameters taking only 24 ms to run and introduce results on gpu. On comparing this performance to accuracies of 98.70 percent and 89.27 for ShuffleNet, which had more parameters and takes a little longer to execute on the CPU.The developers have made it easy to replace the global average pooling layer in the CNN with a depth

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wise convolution layer [11] and it will improves performance on facial recognition. The remarkable achievement is that MobileFaceNets achieves comparable accuracy with very small budget

III. RESULT AND DISCUSSION

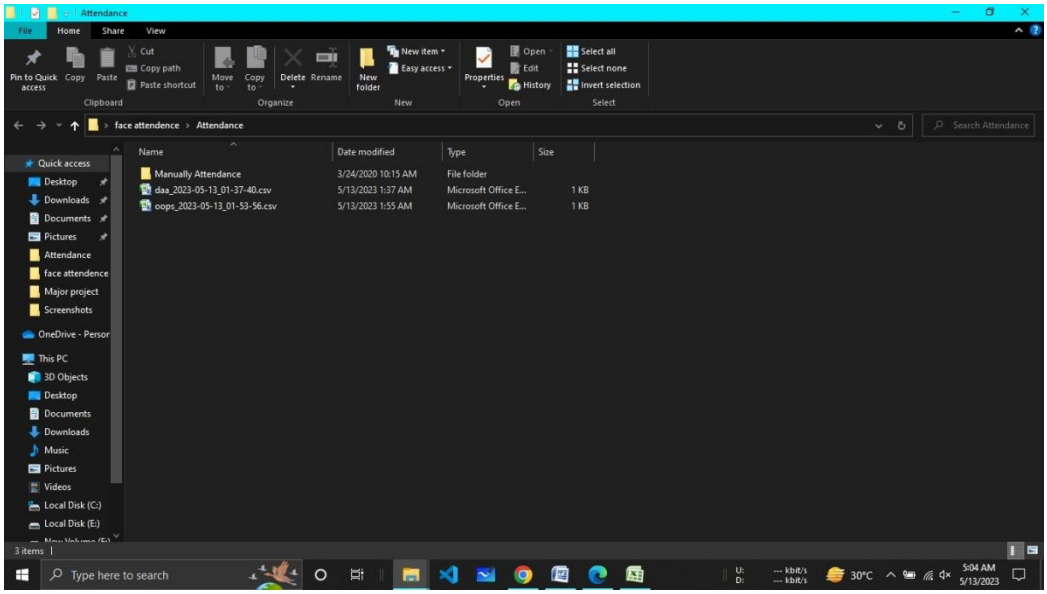
The working of the system we proposed involves three steps:
1. Creating a database.
2. Training the model.
3. Recognizing the real-time data.

Before starting, let us import all necessary libraries. The libraries includes,
Opencv: to process the image/video.
Numpy: to work with pixels in form ofarrays.
Onnx: to work with onnxmodels.
Dlib: for facial mappings(landmarks).
Os: to change/create directory and also to open files in the directory.
Imutiles: to manipulate the image(preprocessing).
Tensorflow: to create layers and create/loadmodels.
Pickle: to serialize or deserialize to python objects (like list, tuples,dictionary).
Xlsxwriter: to create/read/write to excelsheet.

3.1 Database

Firstly, a database is to be created, where the data of students are uploaded. It is preferred to be in proper format, for the model to extract features from it. More clear and variated label is, the more features it could generate. And each folder is allotted for each student to have their corresponding data.

Fig. 3.1: Database



3.2 Training

Then next we have to train the model. The is trained with the images extracted from the dataset. There is a preprocessing step [12], that is taken to extract features from the dataset and to generate variations or alignments from the source dataset. It is done by using face_mutils feature of imutils and shape_predictor_68_face_landmarks.dat file. Then these extracted features are dumped to a.pkl file, with names and images mapped properly using pickle

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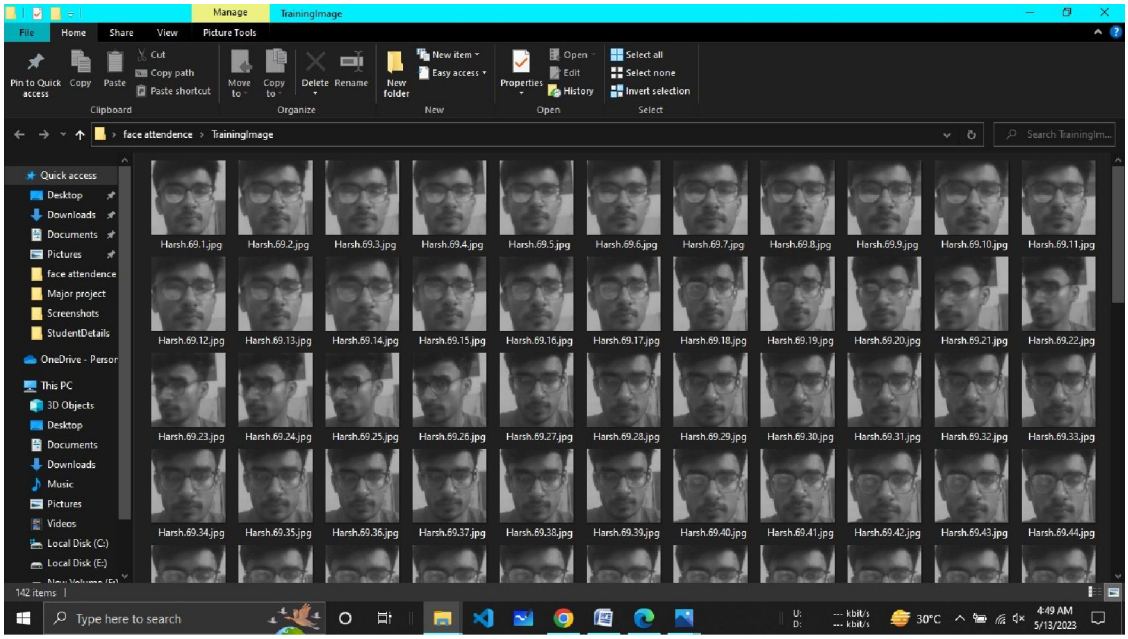

Fig. 3.2: Training

3.3 Recognition

To recognise a face, it is mandatory for it to be detected. We have tried many face detectors like Yoloface, MTCNN, HOG, Ultra light face detector. And due to an accurate detection with less computational power, we have chose ultralight face detector. It is capable of detecting probably 70-80 faces even in a single frame. And the computational time is also less in compared with other detectors.

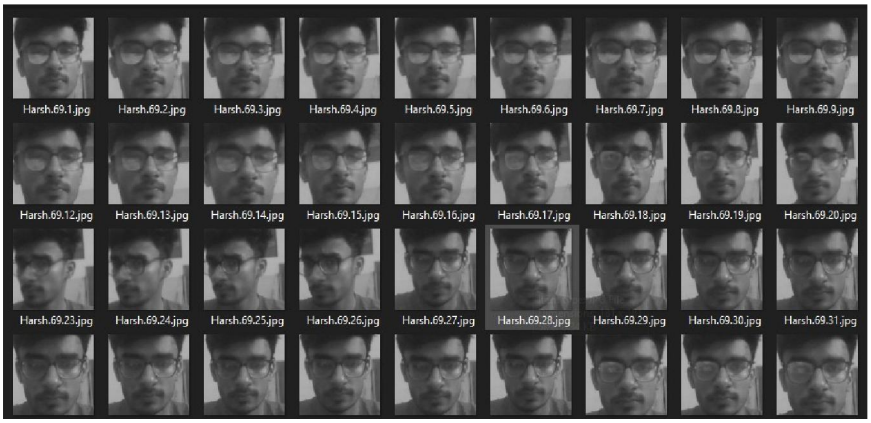

Fig. 3.3: Recognition

tousetheultralightmodel,thefollowingpython(pythonversion3.6)packagesarerequired: onnx==1.6.0, onnx-tf==1.3.0, onnxruntime==0.5.0, opencvpython==4.1.1.26, tensorflow==1.13.1

As we will be using the pretrained ultra_light_640.onnx model, we have to resize the input image to 640x480. If you are using the 320 model, please resize accordingly.

After pre-processing the image, we will have to prepare the ONNX model and create an ONNX inference session.

After detection, the next main step is recognition. Face recognition can be done through many techniques like Openface, Resnet, FaceNet, VGGFaceNet,MobileNetV2. Among this we have chosen MobileNetV2, due to its high-accuracy real-time face verification [14] on mobile and embedded devices

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To recognise a face, simply load the embeddings dataset with corresponding names(.pkl file).Then use Euclidean distance and threshold to determine the difference between the target face with that of a person in the database. And the one with the minimum difference will be predicted to be the person from dataset. The minimum difference must be greater than that of the threshold to consider it as known person. When the difference is more, the person will be subjected as unknown.

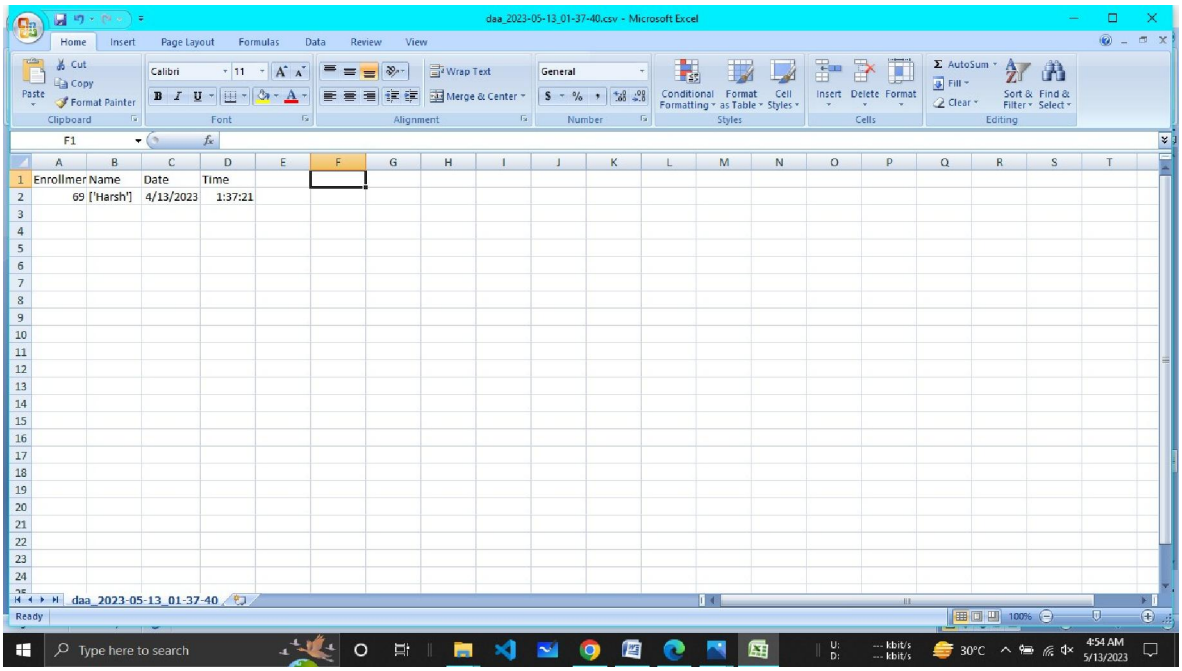

Fig. 3.4: Result

With that, we have created a system that can perform real-time face recognition with CPU. Although it is only running at around 13 FPS, it is comparably much faster than using complex CNNs.

However, there are still many things we could do to improve the performance (both the accuracy and speed) of this system. Potentially, we can apply knowledge distillation to compress the current model and further reduce the model size using low bit quantization. Moreover, we could improve the accuracy using other machine learning classification methods[15] on the embeddings.

IV. CONCLUSION

Nowadays, various attendance and monitoring tools are used in practice in industry. Regardless the fact that these solutions are mostly automatic, they are still prone toerrors.

In this paper, a new deep learning based face recognition attendance system is proposed. The entire procedure of developing a face recognition component by combining state- of-the-art methods and advances in deep learning is described. It is determined that with the smaller number of face images along with the proposed method of augmentation high accuracy can be achieved, 95.02% inoverall.

These results are enabling further research for the purpose of obtaining even higher accuracy on smaller datasets, which is crucial for making this solution production-ready

REFERENCES

[1]. T.S. Lim, S.C. Sim, M.M. Mansor, —RFID Based Attendance System‖,2009 IEEE Symposium on Industrial Electronics and Applications (ISIEA 2009), October 4-6, 2009, Kuala Lumpur,Malaysia.

[2]. S, Kadry; K. Smaili, —A Design and Implementation of A Wireless Iris Recognition Attendance ManagementSystem‖,ISSN1392 – 124XInformationTechnologyandControl,2007,Vol.36,No.3.

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[3]. M. K. P. Basheer, C. V. Raghu, ―Fingerprint attendance system for classroom needs, ‖ in Proc. India Conference (INDICON).

[4]. S. Chintalapati; M.V. Raghunadh, "Automated attendance management system based on face recognition algorithms," Computational Intelligence and Computing Research (ICCIC), 2013 IEEE International Conference on, vol., no., pp.1,5, 26-28 Dec. 2013, doi:10.1109/ICCIC.2013.6724266.

[5]. Nirmalya Kar and Ashim Saha; Study of implementing automated attendance system using face recognition technique unit", Computer Architecture (ISCA) 2017 ACM/IEEE 44th Annual International Symposium on, pp. 1-12,2017.

[6]. Dalal, N. and Triggs, B.: Histograms of oriented gradients for human detection. In: IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR). pp. 886–893.(2005).

[7]. N. Rotem, J. Fix, S. Abdulrasool, S. Deng, R. Dzhabarov, J. Hegeman, et al., "Glow: Graph lowering compiler techniques for neural networks", CoRR, vol. abs/1805.00907,2018.

[8]. N. P. Jouppi, C. Young, N. Patil, D. Patterson, G. Agrawal, R. Bajwa, S. Bates, S. Bhatia, N. Boden, A. Borchers et al., "In-datacenter performance analysis of a tensor processing unit", Computer Architecture (ISCA) 2017 ACM/IEEE 44th Annual International Symposium on, pp. 1-12,2017.

[9]. T.-Y. Lin, P. Dollar, R. Girshick, K. He, B. Hariharan, and ´S. Belongie. Feature pyramid networks for object detection. In CVPR, 2017. 1, 2,4.

[10]. Howard, A. G., Zhu, M., Chen, B., Kalenichenko, D., Wang, W., Weyand, T., et al.: Mobilenets: Efficient convolutionalneural networks for mobile vision applications. CoRR, abs/1704.04861(2017).

[11]. Schroff, F., Kalenichenko, D., Philbin, J.: Facenet: a unified embedding for face recognition andclustering. In: CVPR (2015).

[12]. Han,S.,Mao,H.,Dally,W.J.:Deepcompression:Compressingdeepneuralnetworkwithpruning,trained quantization and Huffman coding. CoRR, abs/1510.00149(2015).

[13]. T.-Y.Lin,P.Goyal,R.Girshick,K.He,andP.Dollar.Focal´lossfordenseobjectdetection.InICCV, 2017. 1, 2, 4.

[14]. G. B. Huang, M. Ramesh, T. Berg, and E. Learned-Miller. Labeled faces in the wild: A databasefor studying face recognition in unconstrained environments. Technical report, 2007.6.

[15]. Sun, Y., Wang, X., Tang, X.: Deeply learned face representations are sparse, selective, and robust. In: Computer Vision and Pattern Recognition, pp. 2892–2900(2015).