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Facial Recognized Attendance Using Deep Learning

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***Abstract*--- We are Living in a 21st Century where everything around us has become dependent on technology to make our life much easier and to work faster. People often use technology to complete the daily task . To the best of our knowledge, the process of recording attendance at the schools, universities, offices is still manual. In schools and universities the Attendance sheet is passed to all the students to sign on it and record attendance. Where as in office the employee should sign on the record book to make sure that he is present in office. This is slow, inefficient and time-consuming. This project is to offer system that can automate the process of recording and tracking the attendance using Facial Recognition Technology using Deep Learning. Facial Recognition Technology is becoming much popular in different areas such as Airports, Banks, Military, etc. Best example is our Mobile phone where we can unlock device using Face Recognition Technology. We will use Deep Learning techniques to detect, recognize and verify the captured faces. We aim to provide a system that will make the attendance process faster and more precisely.**

***Keywords*--- Deep Learning; Face Recognition; Attendance**

I. INTRODUCTION

Every organization in the world requires a robust, fast, accurate and stable system to record the attendance of their employees or students. and every organization has their own method and techniques to do so, some of the universities, colleges, schools etc take attendance manually with a sheet of paper by calling their names during on going classes and some have adopted bio-metrics system. This traditional method of calling the names of students/employees manually is time consuming. There are many bio- metrics such as finger print, iris or voice recognition, they all have their own flaws and also they are not 100% accurate.This Project can be suitable to any of the areas such as offices, schools, colleges, banks, universities etc. For the demonstration lets take classroom.

In the traditional attendance system, Attendance sheet is passed to entire class during on going class and request to sign their names on the attendance sheet. Another Traditional approach is Roll call where the lecturer will call the students roll number and mark the attendance. This is slow and time consuming. It has many disadvantages such as proxy attendance, Imposters, Hard to manage other than that, unethical problem may be occurring such as cheating in signature. For example, A student remains absent to his class but his attendance is signed by his classmates or friends. As there is a progress in technologies many new Attendance systems are available Example : RFID, Bluetooth, GPS, fingerprint, face detection , etc. Each of this methods has its own advantages and disadvantages.

Face recognition is one of the most emerging biometric technology. Lot of research is going on to improve the accuracy of Face Recognition technology. In our project we will be using convolutional neural network (CNN), which is one of the most popular deep neural networks in computer vision applications, This will help us in face recognition. Using CNN we need to train the model from scratch hence to avoid this we will be using Transfer Learning such as VGG16 or VGG19. This helps us in assigning pre-trained weights which are used to detect faces from the video.

In this project we will perform the image burst mode which captures a bunch of images simultaneously of an employee/student then we perform the data Augumentation technique(editing image: Rotation, brightness etc) on these image and pass these images to CNN model for the training this is how the training is done.In the testing part we will capture the Image frames from the live input video from the CCTV/high definition camera and then pass this input to our convolution neural network (CNN) where we use Transfer Learning technique such as VGG16 or VGG19 which consists of pre-trained weights where helps us to assign weights to the CNN model and then we try to find out the pattern from the input frames, recognize the face and mark the attendance present in the Database Finally send message to the person whose face is recognized by our model saying that " he is present in today's class/office at respective time".Our primary goal is to improve and organize the process of tracking and manage

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an individuals attendance. Our major goals are :

i. Provide automated, fast, accurate attendance service for an organization.
ii. Reduce errors in the system by providing automated and a reliable attendance system using face recognition technology.
iii. Increase privacy and security which an individual cannot presenting himself or others while they are not.
iv. Produce monthly reports for an organization.
v. Flexibility, admin capability of editing attendance records.

II. RELATED WORK

Many Authors in [reference 1] proposed a model that performs Face detection system for attendance of class students.

In [reference 3], authors proposed an attendance system Face Recognition and RFID Verified Attendance System. Authors in [reference 4] Designed and implemented student attendance system using iris biometric recognition.

In this paper [reference 2], authors have proposed a model that Automated Attendance System Using Image Processing.

Authors in [reference 5] proposed a model Face Recognition via Deep Learning Using Data Augmentation Based on Orthogonal Experiments.

Authors in [reference 6] proposed a model that Automated attendance system using machine learning approach.

III. IMPLEMENTATION

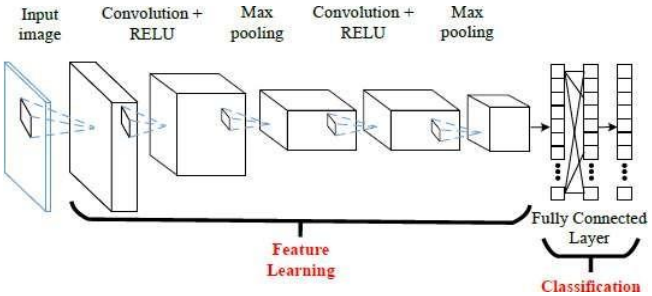

Figure 1. Convolutional Neural Network

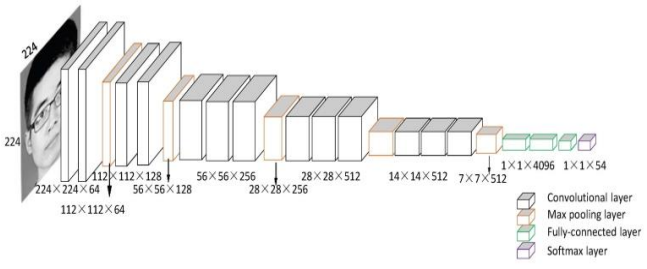

Figure 2. Architecture of the VGG-16 model

VGG16 CNN for Attendance Taking

ConvNet Configuration					
A	A-LRN	B	C	D	E
11 weight layers	11 weight layers	13 weight layers	16 weight layers	16 weight layers	19 weight layers
input (224 × 224 RGB image)					
conv3-64	conv3-64 **LRN**	conv3-64 **conv3-64**	conv3-64 conv3-64	conv3-64 conv3-64	conv3-64 conv3-64
maxpool					
conv3-128	conv3-128	conv3-128 **conv3-128**	conv3-128 conv3-128	conv3-128 conv3-128	conv3-128 conv3-128
maxpool					
conv3-256 conv3-256	conv3-256 conv3-256	conv3-256 conv3-256	conv3-256 conv3-256 **conv1-256**	conv3-256 conv3-256 **conv3-256**	conv3-256 conv3-256 conv3-256 **conv3-256**
maxpool					
conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512 **conv1-512**	conv3-512 conv3-512 **conv3-512**	conv3-512 conv3-512 conv3-512 **conv3-512**
maxpool					
conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512 **conv1-512**	conv3-512 conv3-512 **conv3-512**	conv3-512 conv3-512 conv3-512 **conv3-512**
maxpool					
FC-4096					
FC-4096					
FC-1000					
soft-max					

As we know that images are stored in pixels and now these pixels are fed into the input layer in the form of numbers which is in between 0 to 255. These numerical values denote the intensity of pixels in the image. The neurons in the hidden layers apply a few mathematical operations which is shown by author in [reference 5].we train the CNN model with Transfer Learning

VGG16 weights and performing forward propagation, calculate the loss and then performance backward propagation by adjust the weights of the CNN model.

Evaluation Measures

These are the three ways for measuring the accuracy of our CNN model:

- Use Automatic Verification Datasets.
- Use Manual Verification Datasets.
- Use Manual k-Fold Cross Validation

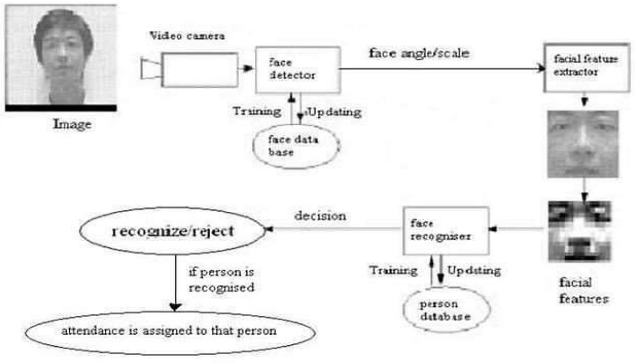

Figure 3. This is the process of attendance-taking method

During training : In this project we will perform the image burst mode which captures a bunch of images simultaneously of an employee/student then we perform the data Augmentation technique(editing image: Rotation, brightness etc) on these image and pass these images to CNN model for the training this is how the training is done.

During testing/deploying : The cctv/camera captures the video of the class with all the students faces. Then, face detection and face recognition is used to capture each student's face by perform feature extraction and feature selection we recognize the face and mark the attendance as present in the database and finally send message to the person whose face is recognize.

Software and Hardware Requirements

In this project we will be using Python based deep learning libraries for the development and experiment of the project.

Tools such as Anaconda and libraries such as OpenCV, Tensorflow, and Keras will be used in our project. Hardware such as camera is used. Training will be conducted on NVIDIA GPU for training of CNN based object detection model.

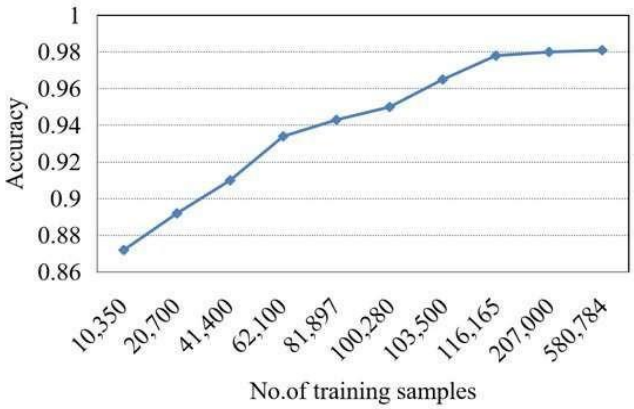

Figure 4. performance of our CNN model

IV. CONCLUSIONS

In this paper, we proposed a model using Deep Learning and Transfer Learning technique to automate the attendance system by detecting the students/employees faces and marking there attendance as present in the database and finally send message to the person whose face is recognized. Our model has an accuracy of more than 95%.

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