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SMART ATTENDANCE SYSTEM USING REAL TIME FACE RECOGNITION

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Abstract: Attendance management system is a necessary tool for taking attendance in any environment where it is essential and critical. In this proposed method, an automated attendance system will recognize the face of the student and the features are extracted using History of Oriented Gradients(HOG).Support Vector Machine (SVM) is used for clustering the extracted features by comparing with the student face in the database and marks it as present. An automatic message is sent to the parent in case of the absence of the student. An automatic mail is sent to the faculty reporting the number of students present and absent on daily basis. Thus, this method helps in saving time when attendance is taken manually and also no proxy can be given as well. This method of recording the attendance using face recognition automates the records for further reference.

Key Words: Attendance Management System, Face Recognition, HOG. SVM.

Introduction

Attendance plays a vital role for measuring the academic performance of the students. In educational institutions like schools, colleges and any other institutions, marking of the attendance for the students to mark their presence. The teachers are taking the attendance in their classrooms for each of the periods is consuming more time, needs paper work and sometimes it leads to proximities. Attendance management system is a software developed for the students who are in schools, colleges and any other institutes. This system helps to access the attendance information of the particular student in the particular class. A facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work,but in general, they work by comparing selected facial features from given image with faces within a database. It is also described as a Biometric Artificial Intelligence based application that can uniquely identify a person by analysing patterns based on the person's facial textures and shape.

Literature review

A Face Segmentor-Enhanced Network (FSENet) for face recognition to exploit facial localized property. Most existing methods emphasize the holistic characteristics on entire face images, which have limit discriminative ability due to large intra-class variations and inter-class fine-grain. To address this, we present a face segmentor to parse the face into local components and explore their internal correlations, which strengthens the discriminability to discern identities. Specifically, we introduce a semantic parsing module to assign each pixel with a semantic part label. This module generates a set of parsing maps, where each of them represents the pixel- wise occurrence probability of a certain facial component [1]. Deep cascade model (DCM) based on SRC and NMR with hierarchical learning, nonlinear transformation and multi-layer structure for corrupted face recognition. The contributions include four aspects. First, an end-to-end deep cascade model for small-scale data without back-propagation is proposed. Second, a multi-level pyramid structure is integrated for local feature representation. Third, for introducing nonlinear transformation in layer-wise learning, softmax vector coding of the errors with class discrimination is proposed. Fourth, the existing representation methods can be easily integrated into our DCM framework [2]. Sketches obtained from eyewitness descriptions of criminals have proven to be useful in apprehending criminals, particularly when there is a lack of evidence. A very deep convolutional neural network is utilized to determine the identity of a subject in a composite sketch by comparing it to face photos, and is trained by applying transfer learning to a state of-the-art model pre-trained for face photo recognition. 3D morphable model is used to synthesis both photos and sketches to augment the available training data, an approach that is shown to significantly aid performance, and the UoM-SGFS database is extended to contain twice the number of subjects, now having 1200 sketches of 600 subjects [3]. Extensive experiments using three challenging NIR-VIS face recognition databases demonstrate the superiority of the

WCNN method over state-of-the-art methods. The novel Wasserstein convolutional neural network (WCNN) approach for learning invariant features between near-infrared (NIR) and visual (VIS) face images (i.e., NIR-VIS face recognition). The low-level layers of the WCNN are trained with widely available face images in the VIS spectrum, and the high-level layer is divided into three parts: the NIR layer, the VIS layer and the NIR-VIS shared layer. The first two layers aim at learning modality-specific features, and the NIR-VIS shared layer is designed to learn a modality-invariant feature subspace. The Wasserstein distance is introduced into the NIR-VIS shared layer to measure the dissimilarity between heterogeneous feature distributions [4]. A novel Set-to-Set (S2S) distance measure to calculate the similarity between two sets with the aim to improve the accuracy of face recognition in real-world situations such as extreme poses or severe illumination conditions. S2S distance adopts the kNN-average pooling for the similarity scores computed on all the media in two sets, making the identification far less susceptible to the poor representations (outliers) than traditional feature-average pooling and score-average pooling. This allows to choose the appropriate metric depending on the recognition task in order to achieve the best results [5]. A novel face verification algorithm which starts with selecting feature-rich frames from a video sequence using discrete wavelet transform and entropy computation. Frame selection is followed by representation learning based feature extraction where three contributions are presented: (i) deep learning architecture which is a combination of stacked de-noising sparse auto encoder(SDAE)and deep Boltzmann machine (DBM), (ii) formulation for joint representation in an auto encoder, and (iii) updating the loss function of DBM by including sparse and low rank regularization. Finally, a multilayer neural network is used as classifier to obtain the verification decision [6]. A scale invariant feature transform (SIFT) features corresponding to a set of landmark points of each facial image are firstly extracted from each facial image. A DNN model for learning optimal discriminative features for expression classification. To evaluate the effectiveness of the proposed method, two non- frontal facial expression databases, namely BU-3DFE and Multi-PIE, are respectively used to testify our method [7].

Limitations

- Not User Friendly
- Difficulty in report generating
- Manual Control
- Lots of paper works
- Time consuming

Proposed methodology

Smart Attendance Management System is built using real time face recognition system this includes automatic attendance marking in the database which should be mailed to respective faculty at the end of the class timings. Also automatic message alert should be send to parents for those who are marked as absent in the database. In order to do this, the first step is to collect the dataset, capture the images of the students, apply different algorithms such as HAAR cascade, HOG and linear SVM techniques and to build a model to identify faces, apply noise removing techniques to increase the accuracy.

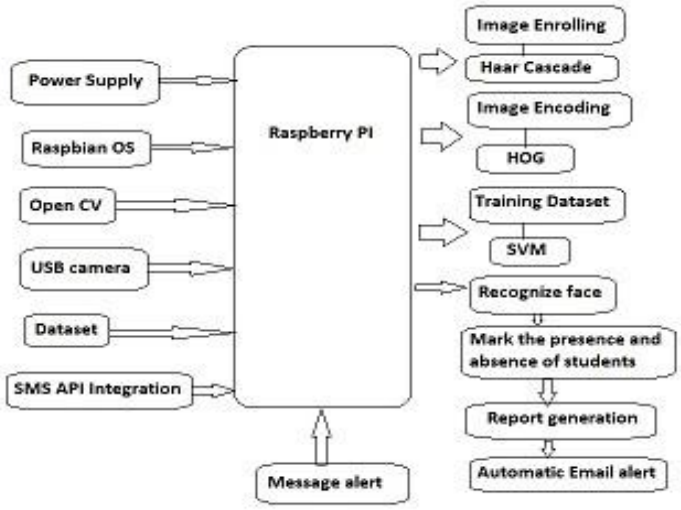

Figure 1: Block Diagram

Attendance Management System is designed using Raspberry Pi. Raspberry pi should be installed with Raspbian OS. Then database have to be initialized in order to create the class. Once the class is created multiple students faces has to be enrolled. Enrolling is used to capture around 30 images of each students. This is done using HAAR cascade algorithm. The next step is to encode the faces. This is done to extract the different features of each student face using HOG

algorithm. Then the dataset has to be trained. Training is done to group the features of every student and make it as a cluster, this is done using SVM. Finally when main file is executed, the faces get recognized and marked respectively in the database. This database is mailed to respective faculty. Also automatic message alert is sent to parents regarding their absence.

1. Raspberry pi: In this project Raspberry pi is used as a processing module. The Raspberry Pi is a series of small single-board computers to promote teaching of basic computer science in schools and in developing countries. 2. USB Camera: Webcams are typically small cameras that sit on a desk, attach to a user's monitor. Webcams can be used during a video chat session involving two or more people, with conversations that include live audio and video. 3. Power Supply: The power supply circuit consists of step-down transformer which is 230v step down to 12v. The filtered DC voltage is given to regulator to produce 12v constant DC voltage. 230V AC power is converted into 12V AC (12V RMS value wherein the peak value is around 17V), but the required power is 5V DC for this purpose, 17V AC power must be primarily converted into DC power then it can be stepped down to the 5V DC.

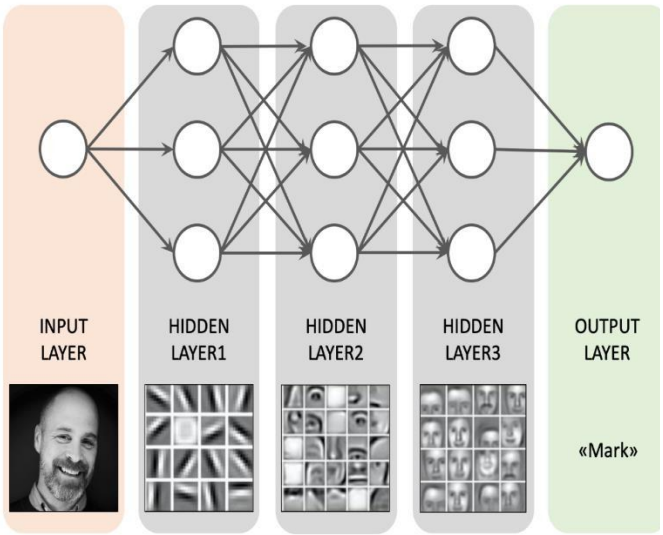

Figure 2: Deep Learning Layers

4. SMS API Integration: A SMS API is well-defined software interface which enables code to send short messages via a SMS Gateway. 5. HAAR Cascade: HAAR cascade algorithm is used for detecting the presence of face in this project. HAAR Cascade is a deep learning object detection algorithm used to identify objects in an image or video.

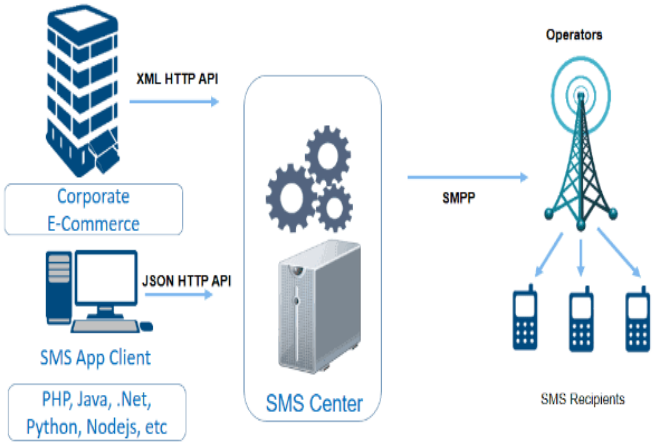

Figure 3: SMS API Integration

6. HOG and SVM Implementation: The HOG descriptor technique counts occurrences of gradient orientation in localized portions of an image - detection window, or region of interest (ROI). Support Vector Machine (SVM) is used as comparison module and it is a supervised machine learning algorithm which can be used for both classification or regression challenges.

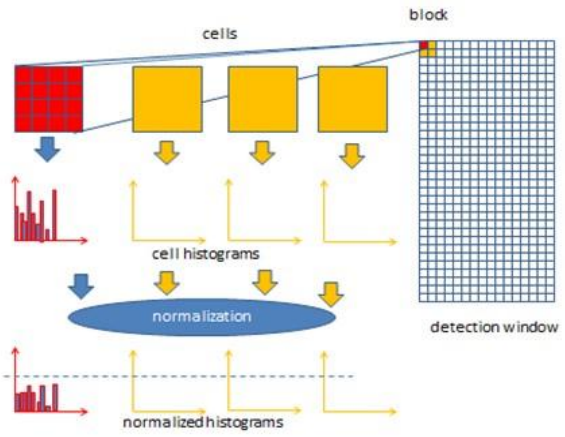

Figure 4: HOG Algorithm

7. Email Integration: For integrating email we will be using the SMTP protocol which is used for sending and receiving mail as configured by us.

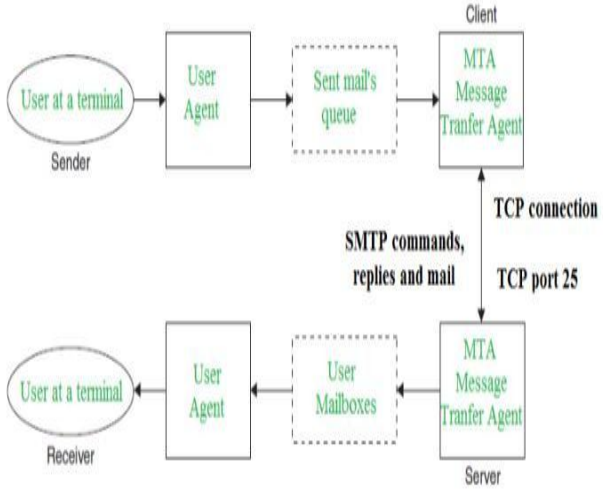

Figure 5: Email Integration

Results

The captured images are trained and recognized. Then the attendance will be marked for the particular student from the particular class. From the below images it is clear that we can determine the current level of attendance system. This project helps in monitoring and detecting face for attendance system effectively.

Figure 6: Live Streaming and Face Detection

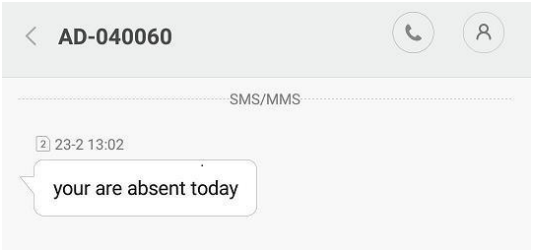

Figure 7: Automatic message to parents

Figure 8: Automatic mail to staff

Conclusion

An automated attendance system is designed which will recognize the face of the student and his or her presence or absence will be entered in the computing system. This method savestime and avoid manual work. It also helps in finding the students who are absent andan automatic message is sent to their parents .Also the attendance report is sent to the faculty by mail.. Thus, thissystem helps in monitoring the student whether they attend the class effectively or not effectively. This system shall be implemented in any organizations that will facilitate the monitoring of attendance of theemployees.

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