

EVALUATION OF STUDENT ATTENDANCE

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ABSTRACT

Student evaluation system help us to maintain the student record and to evaluate. This system is useful to improve the shortcomings of tradition of traditional classroom evaluation method. His is done based on the computer vision technology, machine learning and image processing methodology. Student attendance is obtained by face detection. The distance measurement function is obtained by using the fitting method to calculate the distance between the student and the camera in the classroom. By using the facial expression recognition technology to identify students' up-or-down state and expressions respectively, the ratios of students' raising their heads and positive emotions are obtained. This system also helps to evaluate students and prepare the report card based on the interaction of students with teachers.

Keyword: Computer Vision, Machine Learning, face recognition, statistical learning, python, Image Processing, Speech-To-Text (STT), Support Vector Machine (SVM), Speech recognition.

1. INTRODUCTION

A Facial expression is the visible manifestation of the affective state, cognitive activity, intention, personality and psychopathology of a person and plays a communicative role in interpersonal relations. It has been studied for a long period of time and obtaining the progress recent decades. Though much progress has been made, recognizing facial expression with a high accuracy remains to be difficult due to the complexity and varieties of facial expressions. Generally human beings can convey intentions and emotions through nonverbal ways such as gestures, facial expressions and involuntary languages. This system can be significantly useful, nonverbal way for people to communicate with each other. The important thing is how fluently the system detects or extracts the facial expression from image. The system is growing attention because this could be widely used in many fields like lie detection, medical assessment and human computer interface. The Facial Action Coding System (FACS).

One of the most commonly used applications of NLP is sentiment analysis, which basic tasks are emotion recognition and polarity detection. While the former emphasizes on collecting a set of emotion labels, the latter discovers the targets on which opinions were expressed in a sentence, and then determines whether the opinions are positive, negative or neutral. In our case, the target is the student, and its attributes are the student's behavior. For example, in the sentence, "John is a cheerful, positive pupil who always gives of her best", the comment is on "John" and the opinion is positive.

2. IMPLEMENTATION OF MODULES

Phases in Facial Expression Recognition The facial expression recognition system is trained using supervised learning approach in which it takes images of different facial expressions. The system includes the training and testing phase followed by image acquisition, face detection, image preprocessing, feature extraction and classification.

Face detection and feature extraction are carried out from face images and then classified into six classes belonging to six basic expressions which are outlined below:

a) Image Acquisition Images used for facial expression recognition are static images or image sequences. Images of face can be captured using camera.

b) Face Detection Face Detection is useful in detection of facial image. Face Detection is carried out in training dataset using Haar classifier called Viola-Jones face detector and implemented through OpenCV. Haar like features encodes the difference in average intensity in different parts of the image and consists of black and white connected rectangles in which the value of the feature is the difference of sum of pixel values in black and white regions

c) Image Pre-processing Image pre-processing includes the removal of noise and normalization against the variation of pixel position or brightness.

a) Color Normalization.

b) Histogram Normalization

d) Feature Extraction Selection of the feature vector is the most important part in a pattern classification problem. The image of face after pre-processing is then used for extracting the important features. The inherent problems related to image classification include the scale, pose translation and variations in illumination level period symbol (.), question mark (?), exclamatory mark (!) and the total number of sentences present in the document are also identified.

Convolution layer after the computer reads an image in the form of pixels, then with the help of convolution layers we take a small patch of the images. These images or patches are called the features or the filters. By sending these rough feature matches is roughly the same position in the two images, convolutional layer gets a lot better at seeing similarities than whole image matching scenes. These filters are compared to the new input images if it matches then the image is classified correctly. Here line up the features and the image and then multiply each image, pixel by the corresponding feature pixel, add the pixels up and divide the total number of pixels in the feature.

- 1) Noise removal Noise removal algorithm is the process of removing or reducing the noise from the image. The noise removal algorithms reduce or remove the visibility of noise by smoothing the entire image leaving areas near contrast boundaries.
- 2) Median Filtering The median filter is a non-linear digital filtering technique, often used to remove noise from an image or signal. Here 0's are appended at the edges and corners to the matrix which is the representation of the grey scale image.
- 3) Basic Global Thresholding Thresholding is a type of image segmentation, where we change the pixels of an image to make the image easier to analyze. $A(i,j)$ is greater than or equal to the threshold T , retain it. Else, replace the value by 0. Here, the value of T can be manipulated in the frontend, to suit the varying needs of different images. We use trial and error method here to obtain threshold value which may be best suited for us. Thresholding using basic global thresholding.
- 4) Image Sharpening Image sharpening refers to any enhancement technique that highlights edges and fine details in an image, Increasing yields a more sharpened image.
- 5) High-Pass Filtering A high-pass filter can be used to make an image appear sharper. These filters emphasize fine details in the image. Here the output from the thresholding is given as input. Here, we are making use of a filter.

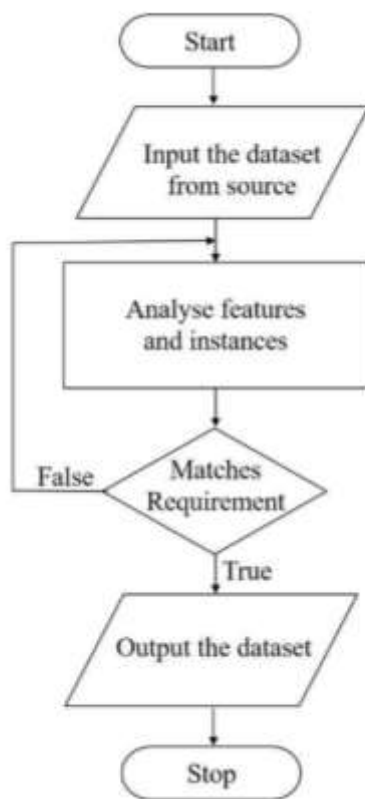


Fig. Flowchart of Student Attendance System

3. ARCHITECTURE DESIGN

The system design mainly consists of:

1. Image Collection
2. Image Preprocessing
3. Image Segmentation
4. Feature Extraction
5. Training
6. Classification

The Original matrix:				
246	250	246	246	237
251	253	246	251	249
262	262	173	127	152
112	110	123	126	105
124	123	117	108	109

Append 0s at edges and corners:									
0	0	0	0	0	0	0	0	0	0
0	246	250	246	246	237	0	0	0	0
0	251	253	246	251	249	0	0	0	0
0	262	262	173	127	152	0	0	0	0
0	112	110	123	126	105	0	0	0	0
0	124	123	117	108	109	0	0	0	0
0	0	0	0	0	0	0	0	0	0

The enhanced matrix:					
0	246	246	237	0	0
262	246	246	251	152	0
262	262	173	132	126	0
112	110	123	126	104	0
0	112	114	104	0	0

Fig. Original and enhanced matrix

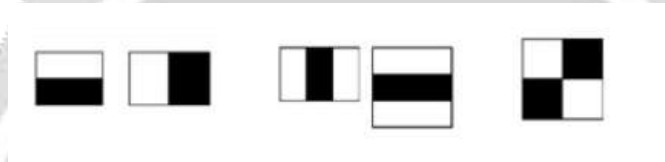


Fig. Haar- Cascade Types

1) Image Collection: Input to proposed system is Classification of CT Scan images, CT images are images taken. It is kind of magnifier used to take pictures of CT Images.

2) Image Preprocessing: Goal of pre-processing is an improvement of image data that reduces unwanted distortions and enhances some image features important for further image processing. Image pre-processing involves three main things

a) Gray scale conversion

b) Noise removal

c) Image enhancement.

3) Image Segmentation The next step after image pre-processing was to segment the Bone Tumor area from the surrounding CT Images. A black and white image was produced with its contrast adjusted to provide better segmentation.

4) Feature Extraction: Feature extraction plays an important role in extracting information present in given image. Here we are using GLCM for texture image analysis. GLCM is used to capture spatial dependency between image pixels. GLCM works on gray level image matrix to capture most common feature such as contrast, entropy, energy, homogeneity, correlation, ASM, cluster shade.

5) Training: Create training dataset from images of known Cancer types. Train classifiers on the created training dataset. Create testing dataset in temporary folder. Predict results from the test cases. Plot classifiers graphs. Add feature-sets to test case file, to make image Processing models more accurate.

6) Classification: The binary classifier which makes use of the hyper-plane which is also called as the decision boundary between two of the classes is called as Convolution Neural Network. SVM is basically binary classifier which determines hyper plane in dividing two classes.

The Following modules are used to implement the proposed system:

- Preprocessing of images
- Segmentation of images
- Extraction of features
- Classification of images.

Object Detection utilizing Haar include based course classifiers is a viable item recognition strategy proposed by Paul Viola and Michael Jones in their paper, "Fast Object Detection utilizing a Boosted Cascade of Simple Features" in 2001. It is an AI based methodology where a course work is prepared from a great deal of positive and negative pictures. It is then used to recognize objects in different pictures. At first, the calculation needs a great deal of positive (pictures of appearances) and negative (pictures without faces) to prepare the classifier. At that point we have to extricate highlights from it. For this, haar highlights appeared in underneath picture are utilized. They are much the same as our convolution bit. Each element is a solitary worth got by deducting aggregate of pixels under white square shape from whole of pixels under dark square shape.

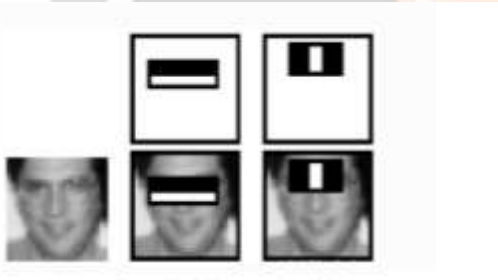


Fig. Different regions of face

For this, we apply every single element on all the preparation pictures. For each element, it finds the best limit which will order the appearances to positive and negative. Last classifier is a weighted total of these powerless classifiers. It is called feeble in light of the fact that only it can't arrange the picture, however along with others shapes a solid classifier. For this they presented the idea of Cascade of Classifiers. Rather than applying all the 6000 highlights on a window, bunch the highlights into various phases of classifiers and apply individually. In the event that a window bombs the main stage, dispose of it. We don't think about residual highlights on it. On the off chance that it passes, apply the second phase of highlights and proceed with the procedure. The window which passes all stages is a face area.

4. CONCLUSIONS

The first step to run the emotion application is to open the Python IDLE prompt.

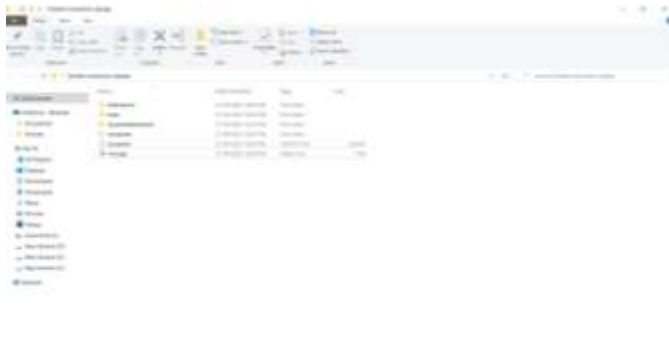


Fig. Python IDLE Prompt to Execute the Program

After directing to the location where the application is present, run the train.py file. When the file is run, the application loads the models. The Figure 7.2 shows where the application starts running from the IDLE prompt.

After Entering the details of the student, click on the Dataset button. On clicking the external camera connected to the system or the inbuilt webcam of the laptop gets started and collects the Student Image and stores in database along with ID, Name, Phone number. Next step is to train the collected dataset to do so we have click on Training Button. On clicking Training Button Image will be trained and it will update as image trained.

The Final step is to recognize the student with their emotions to do so we have click on Recognition button. On clicking the recognition button, a external camera connected to the system or the inbuilt webcam of the laptop gets started to recognize the student emotion's and store the attendance.

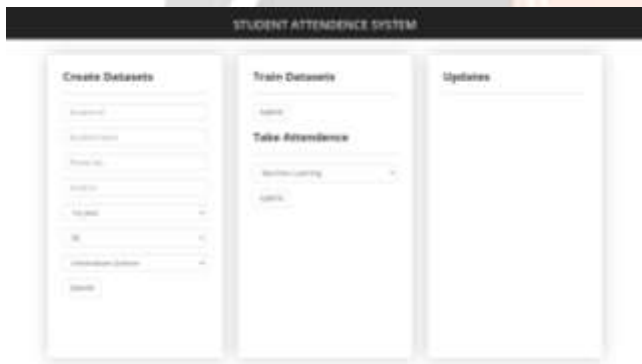


Fig. Student Attendance System front page



Fig. Collecting the datasets

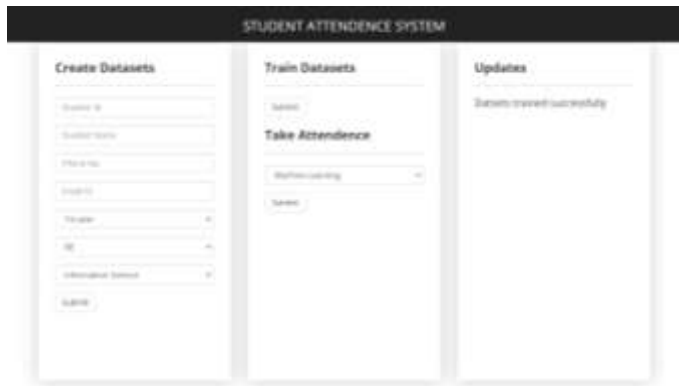


Fig. Training the Datasets

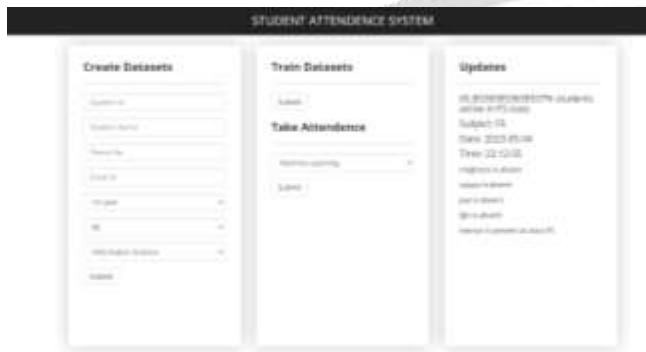


Fig. Collecting the Attendance Subject wise

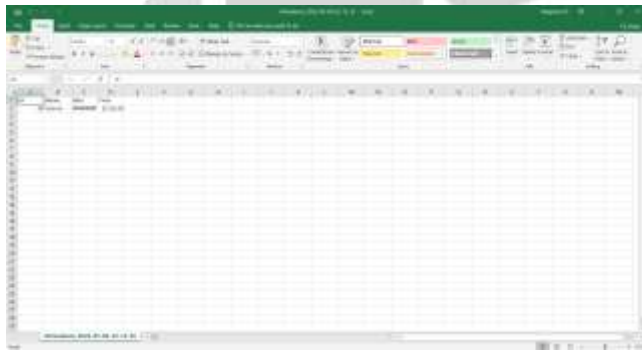


Fig. Collection of Attendance in Excel Sheet

→ Applications

- Early detection of student behavior in online classes.
- It can be used in detecting the emotions of the students and taking the feedback from them.
- This can be used to detect and track a student's state of mind.
- It can be used for education purpose.

By the above-mentioned applications, we can conclude that, this project proposes an approach for recognizing the category of facial expressions. Face Detection and Extraction of expressions from facial images is useful in many applications, such as robotics vision, video surveillance, digital cameras, security and human-computer interaction.

In this project, seven different facial expressions of students' images from different datasets have been analyzed. This project involves facial expression preprocessing of captured facial images followed by feature extraction using feature extraction using Local Binary Patterns and classification of facial expressions based on training of datasets of facial images based on convolutional neural network.

This project recognizes more facial expressions based on JAFFE, COHN-KANADE face database. To measure the performance of proposed algorithm and methods and check the results accuracy, the system has been evaluated using Precision, Recall and score.

6. REFERENCES

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