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Attendance in Online Classes using Face Recognition

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Abstract:Attendance plays a major role in classes so that discipline could be maintained in students and they attend their classes regularly, but in Online classes taking attendance of so many students could be tricky, This Face Recognition technology can recognise their faces during class & mark their attendance on excel sheet. This could be very helpful & quick.

Keywords: Face Recognition, Detection, Attendance, OpenCV.

INTRODUCTION

Face Recognition is quite advanced technology & with this growing world, Face Recognition technology is used for various reasons, here, we are using it for marking student attendance during Online Classes. During online class, there could be so many reasons for failure, like Light issues, detect faces at dark environment is not easy, Head Movement or Viewing Angle, Face accessories like glasses, moustache etc., Low Resolution Cameras or with aging facial changes etc. [1] But to make a perfect attendance system, it is very important to take into concern all these challenges & overcome them.

OPENCV

Computer is not like human brain, if we place a human face in front of a machine,it can't identify the face like any human brain does not even taking a second, that's what OpenCV module do for computer. OpenCV is computer vision that help to make computer understand things like human visual system. OpenCV is an open-source module and supports all operating system, hence used a lot by many companies [2].

EVOLUTION OF FACE RECOGNITION TECHNOLOGY

Classical Face Recognition Algorithms

When Facial Recognition came intoexistence, Eigenface system started at first. According to that system, it collects basic features from the face & less than hundred values to accurately define the face.

Artificial Neural Network

According to this method, there is requirement for great number of templates, so that face could be recognised under partial distortion and occlusion.

Gabor Wavelets

This approach is quite impractical for real time applications & quite sensitive to lightning variations but it could be helpful for recognising in broad landscapes.

Face Descriptor Face Methods

This method defines the localfeatures that basically works in minimising thedifference betweenimages of the same individualand maximising that betweenimages from the other people.This method is quite effective in illumination andexpressionchanges.

3D Based Face Recognition

If anything is capturing data from more angles, obviously it would be better. In 3D technology, rate of accuracy is higher as it gets in- depth information and doesn't depend on pose or illumination and also works fast.

Video Based Recognition

Video based recognition means recognising faces in real time when persons are moving or changing their posture so that there would be no need to stand still. Its little difficult but is very progressive.

FUNCTIONS USED IN PROJECT (METHODOLOGY)

Changing colour Spaces

Grayscale images contain only single pixel values, while coloured images contain 3 values for each pixel i.e., of Red, Green and Blue. Maintaining colour spaces according to requirement is very important & it is recommended to stick to grey scale if possible as it takes less space and also easy to operate on.

Resizing Images

Most of the model works with fixed size input, so that there won't be much pressure on databases, & as it's a good practice to resize input images to a fixed value. Image resizing should be done properly, it should not affect cutting of features or too blurry.

Image Rotation

Image Rotation is very useful function of OpenCV as human face can't be always at one pose, it could be moving, angles can change& Image Rotation rotate the image to achieve certain angles.

Image Translation

Image Translation can be used to map the position of the object. If object is not in centre or going out of frame, Image translation maps it to centre & complete the image. This could be very helpful.

Image Thresholding

Thresholding can help in Image Segmentation; it matches image pixel values with given threshold & update the pixel value accordingly. It could be helpful in varying light conditions, if threshold is adaptive [3].

Image Segmentation

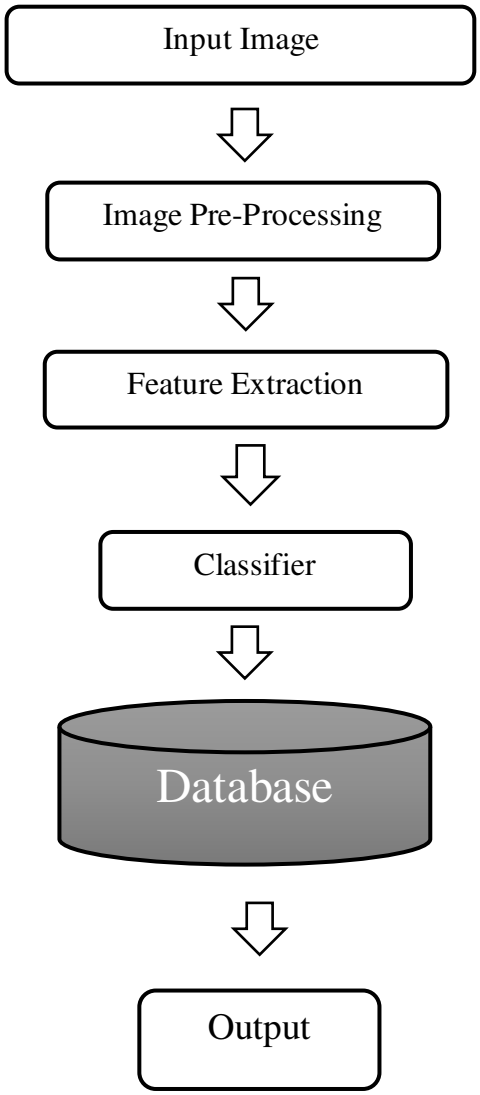
Image Segmentation is an important part as it focuses on important parts & separates the background like here we want only face & hence it should remove the background & other parts and zoom to face.

Functions that helped in Image Segmentation:

- Edge Detection: Edges are the points where image has discontinuities like depth, brightness & many other properties. Edge detection could really help in Image Segmentation [4].

- Image Contours: Contours basically are the points in the edge line of object, this can help to detect the shape of an object or to get the count of objects in image.

BLOCK DIAGRAM OF FACE RECOGNITION



WORKING

1. For the first step, Student will enter his Name & Roll No.
2. After that, automatically a screen will appear with camera on, student has to record his profile from all angles, like left, right etc.
3. Once it will get all the angles required, camera screen will automatically close.
4. After recording his/her face, student will press save.
5. When student will press save, image will be converted to binary image & get trained with respect to functions defined above.
6. After Image got trained, image template will be created which will get stored automatically in the database with student Name & Roll No.
7. Whenever student will enter into online class, His face will be checked with templates.
8. If there is any match, he will get a notification you are recognised as name & roll no.
9. There is a condition, if student attend the class as per teacher has set the time credentials, student attendance will be automatically marked in the system.

FEATURES

1) Scalability: Face recognition should be able to work at all possible conditions & camera angles. Scalability is the most important feature in any face recognition system. Most of the face recognition software are scalable but this value should be higher.

2) Speed: Speed of any software matters a lot, any type of delay in any kind of software, delays the whole process. Here, as well, when software recognises the face, at that moment only it should reflect in screen as well as database.

3) Accuracy: Accuracy has always been a big concern in face recognition. Faces should not be mixed with each other, means when someone's face with someone else's name. Accuracy rate of this software is quite high.

4) Live Face Detection: Facial recognition software can be easily fooled by placing someone else photo in front of camera but this software has technology to differ between photo & a real face.

5) Multiple templates: This software takes multiple templates, so that there should be accuracy as well as scalability. It helps to identify person under any lighting condition or face postures.

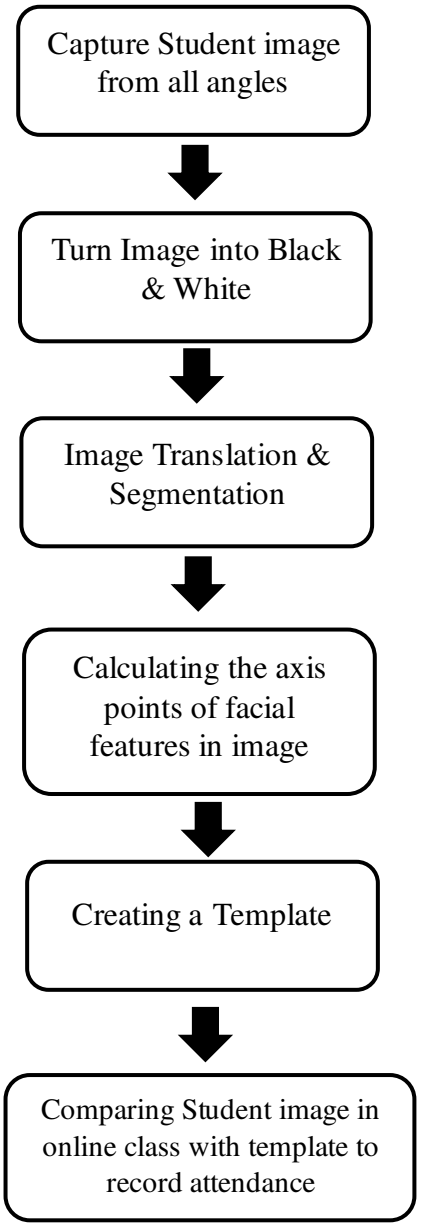
6) Template Size: Template size are very small, so that there should be many templates but by not occupying much database space. Many templates can still take much space but they give more benefits as compare to issue.

7) Time Factor: There is an inclusion of time constraint, means student has to attend the class for a given time by teacher to get the attendance, teacher can fill in the time during the start of every class or can fix the time frame forever for that class, this could help in maintaining discipline among students.

8) Database: Database is well maintained, whenever attendance will be taken, it will be maintained with date & time of that class & how many times has been attended by student.

9) Display information on Screen: It is important for the student to know when software is recognising you and when not, so that student can also adjust himself accordingly, not only that, it also makes sure, software is showing accurate roll no and name of student.

WORKFLOW



BANS ON FACE RECOGNITIONAL TECHNOLOGIES

There are many cities where putting face recognition technology is not allowed, they have to take proper permissions with well-defined reasons to use them. Face recognition technology or surveillance is banned in San Francisco, Berkeley, Oakland, Portland, Cambridge, Northampton etc.

CONCLUSION

This Project is overcoming all the obstacles that I have explained in Introduction, it identifies image with co-ordinates of facial features, that way extra facial features can be ignored & there would be no issue with slight facial changes like beard, it supports image translation & thresholding which enhances the accuracy of face recognition. Face Recognition could be tricky, but if we modify it according to desired output, it could help in major ways.

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