Study of Face Recognition Techniques for marking Attendance in Online Classes

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Abstract: ***It's been one year, Since Covid has hit our world & everything has been flipped upside down. There are complete lockdowns in almost every country & everyone got locked in their homes. Even the schools got shut & online classes got started.***

Attendance is very important & a compulsory task in terms of discipline, so that they attend their classes regularly but maintaining attendance in online classes is a big task. Students are joining & leaving online class conferences every other minute & there are so many students in one conference call that it becomes difficult to take into account their attendance. Automatic Face Recognition technique comes really handy at such situation. Whenever student will join the class, it will automatically recognise their face & mark their attendance, easy and quick.

Keywords: Face Recognition, Attendance, Online Classes.

INTRODUCTION

Face Recognition is a technique of recognising a person identity by measuring his/her facial feature co-ordinates, storing it in database as templates & later using it for identification. Nowadays, we are using Face Recognition in many ways & using it for attendance is also one of them. There are many algorithms which can be used to recognise face but there are many factors which one should take into account like bad lighting, different angles, different poses, beard, moustache, different accessories etc.

LITERATURE REVIEW

Facial Recognition attendance system is quite quick & good way to maintain attendance as well as feedback of students [1]. In some Researches, it is concluded that facial recognition is a difficult task as face is quite complicated biometrics, it differs with pose, viewing angles, expressions & emotions. Face appearance also changes with age, a student who is right now in 3rd grade will have different facial appearance or texture when he will be in 8th grade. Beard, Moustache, accessories also effect face recognition [2]. There are some systems who identifies student face with the help of iris detection, it's a good way of detecting faces as it will not be affected by other face changes with age, pose, expressions but it's quite slow. Iris detection takes time & it's quite a disadvantage as we are including face recognition so that it would be quick [3]. To take attendance during a lecture is difficult as continuous observation is required in every position & camera angle [4].

CHALLENGES

Nowadays, Face Recognition is counted as a safe option as obviously has different faces & in terms of security it is safer rather than pin, passwords or fingerprints. But every technology has some challenges, likewise with Face Recognition.

1) Light Variations: Each place has a different lighting, not even places, at one place if there is light coming from window, when you will sit facing window there would be different lighting & facing backwards would be totally different so face recognition would also be difficult in that

manner & recognising face on low light is quite difficult.

2) Head Movement/ Viewing Angle: It is quite difficult to recognise face from all angles when the person/head is moving. If there is only front face data stored in database then recognising the person from all angles is impossible.

3) Occlusion: Occlusion means when your face is covered with some accessories like glasses, or with beard/moustache. Occlusion is one major challenge in face Recognition Technique.

4) Emotions: Human emotions is quite normal & with emotions person's face expression changes. Even slight change in expression can change facial identification & makes it more complicated.

5) Aging: Human Face changes with age, a kid when becomes adult, his face visuals change drastically, so it also effects facial recognition.

6) Low Resolution Camera: Camera quality plays a major role in facial recognition. Low resolution cameras don't capture minor details of face & hence it could confuse persons with similar features.

FACE RECOGNITION ALGORITHMS

LBP

LBP means Local Binary Portal. It is a traditional model which is still used a lot. It works on grey levels if there is a difference in central pixel value with neighbouring grey level, then it will be marked as 0 else 1, in that way, it will create a binary form.

HOG

HOG means Histogram of Oriented Gradients. HOG was introduced in 2005, sometimes it is combined with LBP for higher accuracy rate. HOG follow some steps like Computing the Gradients first, Orientation binning, create blocks, normalize the blocks and SVM classifier. It is quite efficient algorithm in terms of facial feature extraction.

SIFT

Scale-Invariant Feature Transform (SIFT) could be very helpful & can manage in challenges like lighting issue, bad camera resolution, viewpoint or clutter scene. It basically works on key points & distance or direction between various key points. The key points are selected in such a way that should not change with lighting effects or other factors but its quite difficult to perform in real time [4].

SURF

Speeded-Up Robust Features (SURF) is based on SIFT. It's a good feature detector as well as descriptor. It can be used quite well in such projects as it works very fast and could be used for 3D reconstruction. SURF performs major point detection & describes about the neighbouring points and then performs multi-resolution pyramid technique to copy the original image with Pyramidal Gaussian [5].

APPLICATIONS OF FACIAL RECOGNITION

1. Security Surveillance: Facial Recognition is used a lot for security surveillance, so that it can identify if any kind of criminal is going through the camera. It's a good method but also it creates privacy issue, so it's banned in some cities.

2. Face ID: Nowadays, Face ID is quite famous for identification in phones, laptops, house locks etc. Even with so many errors, it is still used in so many ways as it is modern, fast and easy to use.

3. Identify People on Social Media: Facial recognition is used to identify people faces on social media whenever anyone post a new photo.

4. Image Database Investigations: These are mainly used by police departments to identify criminals face in criminal database or for finding any citizen record. Database search

through images is quite quick but complicated as well.

CONCLUSION

With technology advancement, it is important to change & carry functional works accordingly. Face Recognition is quite tricky when you are using live video & it should be fast as well but there are many methods to achieve it successfully, one should focus on their own requirements. Facial Features should be recognised properly, so that one face should not be confused with others.

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