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SURVEY ON ATTENDANCE MANAGEMENT SYSTEM USING FACE RECOGNITION

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Abstract - As one of the most successful applications of image analysis and understanding, face recognition has recently received important attention, mainly during the past several years. The development of automatic attendance management system is very important research topic in computer vision. Therefore, it is very necessary to discuss the effective system which records attendance of student automatically. This paper provides an up-to-date critical survey on different feature extraction and classification techniques for face recognition. In the process of system development literature reviews conducted to understand the theory, methods and technologies associated with the attendance management systems that have been developed. In addition, relevant topics such as psychophysical studies, system evaluation, and issues of lighting and pose distinction are covered.

Keywords:Attendance Management System (AMS), Local Binary Pattern (LBP), Support Vector Machine (SVM) algorithm, Modified Viola-jones algorithm and Matlab Graphical User Interface (GUI).

I. Introduction

Attendance recording of a student is an important role in scholastic sector which is time consuming. Students enrollment increases every year and recording each student attendance plays a vital role. Therefore, it is very necessary to discuss the effective system which records the attendance of a student automatically. This system is developed by using face recognition which is used to detect the face of an individual. There are different face recognition algorithms introduced to increase the efficiency of the system. However, the face recognition still remains a challenging problem because of its fundamental difficulties regarding various factor as illumination changes, face rotation, facial expression.

Attendance management system is to count the number of students and urge students to attend class on time, so as to improve the quality of teaching. usually, a roll-call is taken to determine whether the student presents in the class, which usually waste a lot of time. In recent years, with the development of deep learning, face recognition has made great achievements, which leads to a new way of thinking to solve the problem of student's enrollment. In order to save time, the idea to count the number of students automatically based on face recognition is incorporated.

II. Literature Survey

Class participation enrollment system based on face recognitionwhich gives new method of achieving automatic enrollment based on face recognition with the use of android application. Considering the accuracy and speed they have used haar classifier for face detection, Visual Graphic Group (VGG) model for face recognition including illumination preprocessing algorithm. This system can achieve l00% accuracy under good illumination. Under the environment of poor illumination, the accuracy is 85.9%, but the accuracy can reach more than 90% through preprocessing. When the illumination is poorer, the accuracy of the recognition decreases which is as shown in table 1, and the accuracy is slightly improved after preprocessing. This system also has some drawback, such as the attitude and expression of individual changes a lot when take photos which will have a certain effect on the face recognition results. And when the illumination is too poor, the accuracy of this system is not constant [1].

Table 1: Accuracy of face recognition under poor illumination with processing [1]

Experiments	Class	Students	Recognition rate	Accuracy (%)
1	A	64	55	85.9%
2	A	64	52	81.2%
3	B	55	45	81.8%
4	B	55	46	83.6%

AMS using hybrid face recognition techniques which uses modified viola-jones algorithm and free partial face recognition algorithm for face recognition for face detection for high accuracy. The method uses Gabor Ternary Pattern (GTP) for robust and discriminative recognition. This system improves the existing AMS by avoiding manual recording of attendance. The efficiency of face recognition depends upon the number of faces detected. The higher the detected faces the greater the face recognition rate. From the table 2, it is observed that the percentage of detected faces is 95% and percentage of recognized faces is 47.36% and it keeps changing for each frame [2].

Table 2: Percentage of detected face in each frame [2]

Frame number	Number of students recognized	Percentage
1	9/19	47.36%
2	14/20	70%
3	5/12	41.67%

An efficient automated AMS based on eigen face recognition is integrated by the face recognition technology using Eigen face database and Principal Component Analysis (PCA) algorithm with MatlabGUI. By using PCA technique facial characteristics are extracted from the database. By calculating distance between feature vectors, the test image is compared with the training image. The PCA approach requires full frontal image is to be hand over each time else the performance is reduced. The histogram equalization technique is used to direct the contrast of image depending on the threshold value the accuracy of the image is compared i.e. recognized image and test image are

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compared with the resemblance score with respect to threshold score. If matches then face are recognized else the face is not recognized [3].

Asymmetric Local Binary Pattern (AS-LBP) for facial expression recognition along with the modified convolution techniques results in high rate of face recognition without the loss of appearance information. The face image is detected with the help of viola jones algorithm. SVM is used to identify the facial expression which has high accuracy. The face recognition rate increases when the width is more than the height of the operator. Thisprovides maximum of 95.71% for 13x3 and 15x3 sizes with an exception for 5x7 size. When the width and height of the operator is same the recognition rate will not improve, though there is an increase in the operator and recognition rate of 79.46% on FGNET database for the size 15x7. It is unbalanced to compare with same work performed with LBP as the face recognition rate rely on some parameters such as image size, image sub-region size, databases used, classifier parameters [4].

The performance of face detection, which uses skin color division with thresholding skin color model combined with AdaBoost algorithm. The facial properties extraction is obtained with the help of PCA and K-Nearest Neighbor(KNN) based classification. Additionally, they have used morphological operators to increase the face detection performance. Some images for which the expected results have not been reached are no proper orientation of faces, image illumination is not good and if the distance of faces from the camera is not same. For very few images that vary in the high level of orientation are not recognized properly. This results 96% recognition rate for the accessible database [5].

Various approaches like Discrete Wavelets Transforms(DWT), Discrete Cosine Transform(DCT), Local Ternary Pattern(LTP), are used for face recognition and Equalized Uniform Local Binary Pattern(EULBP) is used for images with the less resolution, but with respect to accuracy this is not acceptable. Combination ofDCT and DWT using LTP is accommodated to improve the low resolution of image and improves the accuracy face recognition. Performances of various approaches on the basis of accuracy, False Acceptance Rate(FAR) of the images using various approaches and False Rejection Rate(FRR) of images using different approaches are discussed and false rejection rate of resolution image using different approaches are also discussed [6].

Component-based face detector using SVM classifier is required to achieve sufficient accuracy and speed in a face recognition system. This proposal uses main approach in developing SVM classifier with a Gaussian kernel that detects eyes in grayscale images. Details on design of an iterative bootstrapping operations are provided, and training parameter values are verified to give best results. The disadvantages are time consuming to identify the face region and it is less accurate [7].

Generalizations to the gray scale and rotation invariant texture organization method based on LBP derive a presentation that permits for realizing a gray scale and rotation invariant LBP operator for any quantization of the angular space and for any spatial resolution.Thispresents a method for combining multiple operators for multi-resolution analysis. This technique provides recognition rate of 98% for various textures [8].

The application of LBP for facial expression recognition is suggested the textures modelled with Volume Local Binary Patterns (VLBP), which are an enlargement of the LBP operator generally used in ordinary texture analysis, by adding appearance and motion. The disadvantages of this system are accuracy reduces when illumination changes and it is not suitable for Real time application [9].

Local Binary Pattern Histogram Fourier (LBP-HF) unlike most other histogram based invariant texture explanations which normalize rotation locally, the suggested invariants are built globally for the whole region to be described. In addition to being rotation deviating, the LBP-HF features maintain the highly discriminative nature of LBP histograms [10].

PCA is used for face recognition to address the problem of face recognition from the images stored in the database.TheMahalanobis distance measure can be used toidentify the distance between the query and the images stored in the database.Mahalanobis distance is used for data clustering and disingenuous, the two data points measured in the space described by the related features. This system uses improved PCA algorithm which is integrated with curvelet transforms. The recognition rate of this system is 89.12%. This system is not suitable for real-time applications and accuracy reduces when the number of face image increases [11].

Acharacteristics of facial expression extraction algorithm is introduced for face recognition, PCA, Linear (LDA) Discriminant Analysis, Nonnegative Matrix Factorization (NMF) and Independent Component Analysis (ICA) based on curvelet transform. Curve let based feature extraction takes the input as face image which is then decomposed into different sub band scales and orientations. Further it is processed along with the PCA for dimensionality reduction for the sub band to get lower dimensionality representation. This in turn increases retrieval accuracy.Disadvantages of this system is accuracy reduces when there is change in illumination and it is not suitable for real-time implementation [12].

Title	Algorithms	Techniques	Accuracy	Drawback	Reference number
Class participation enrollment system based on face recognition	Viola jones	VGG and haar classifiers	85.9%	Not used in real time and accuracy is not ideal	[1]
AMS using hybrid face recognition techniques	Viola jones	GTP	85%	Recognition rate keeps changing for each frame.	[2]
An efficient automated AMS based on eigen face recognition	PCA	PCA technique and histogram equalization technique	Depends on image threshold value	Less accurate and time consuming	[3]
ALBP for facial expression recognition	Viola jones	Modified convolution	79.46%	Recognition rate changes with different image parameter	[4]
Face detection and recognition using skin color	AdaBoost algorithm	PCA and KNN	96%	Recognition rate changes with different facial expression	[5]
Face recognition of blurred images using image	Viola jones	DWT, DCT, LTP and EULBP	Less	Accuracy this is not much better.	[6]
SVM for human face detection	Viola jones	SVM	Less	Time consuming and less accurate.	[7]

Table 3: Comparison of different AMS

III. Comparison Of Different Ams

By comparing different AMSwhich is referred in table 3, it is observed that when the illumination is poorer, the accuracy of the recognition decreases and the quality of face recognition depends upon thefaces detected. The recognition rate changes with different facial expression and it also depends on several parameters such as image size, image sub-region size, databases used, classifier parameters.AMS using hybrid face recognition technique exhibits higher recognition rate but it keeps changing for each frame.

IV. Conclusion

To build a secure environment is a primary cause of concern in today's scenario and facial recognition system helps in achieving it. Among all the biometric techniques, facial recognition technique has great advantage in field of education as it can be used to update and manage the attendance automatically in secured way. There are many existing techniques for face detection and recognition, which can classify the given face image by comparing with trained face images. Literature survey results the fact that the intelligent implementation of iterative facial recognition makes AMS more reliable. The percentage of the recognition rate and accuracy varies from one system to another. By comparing the accuracy with respect to all existing system, face detection and recognition using skin color with accuracy of 96% is best. Among differentfeature extraction and classification techniques for face recognitionit is better to use LBP for feature extraction and SVM for classification, which gives high accuracy and recognition rate.Further, it also reveals that the recognition rate changes with different facial expression and existing systems fails to achieve better results in a real-time scenario with indoor and outdoor lighting conditions.

References

[1] Changting He, Ya Wang, Ming Zhu, " A Class Participation Enrollment System Based on Face Recognition", 2017 2nd International Conference on Image, Vision and Computing.

[2] NazareKanchanJayant and SurekhaBorra, "Attendance Management System Using Hybrid FaceRecognition Techniques", 2016 Conference on Advances in Signal Processing (CASP)Cummins College of Engineering for Women, Pune. Jun 9-11, 2016

[3] Rekha.E and Dr.Ramaprasad.P , "An Efficient Automated Attendance Management System Based on Eigen Face Recognition", and published in 2017 7th International Conference on Cloud Computing, Data Science and Engineering.

[4] ShrinivasNaikaC.L ,Pradip K. Das and ShivashankarB.Nair**, "**Asymmetric Region Local Binary Pattern Operator for Person-dependent Facial Expression Recognition,".

[5] C.Sridevi, B. Dhivakar, S.Selvakumar, P.Guhan,"Face Detection and Recognition Using Skin Color", 2015 3rd International Conference on Signal Processing, Communication and Networking (ICSCN).

[6] Deekshakapil_andAbhilashay, "Face Recognition of Blurred Images Using Image", 2015 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India, 4-5 September 2015 Enhancement and Texture Features.

[7] IgnasKukenys and Brendan McCane, "Support Vector Machines for Human Face Detection", NZCSRSC '08 Christchurch New Zealand

[8] TimoOjala, MattiPietikäinen and TopiMäenpaa "A Generalized Local Binary Pattern Operator for Multiresolution Gray Scale and Rotation Invariant Texture Classification",Pattern Analysis and Machine Intelligenc"e, IEEE Transactions (Volume:24 , Issue:7), Jul 2002.

[9] Guoying Zhao and MattiPietikainen,"Dynamic Texture Recognition Using Local Binary Patterns with an Application to Facial Expressions",IEEE Transactions on pattern analysis and machine intelligence, 2007.

[10] TimoAhonen, Jırı Matas, Chu He, and MattiPietikainen"Rotation Invariant Image Description with Local Binary Pattern Histogram Fourier Features", Image Analysis Lecture Notes in Computer Science Volume.

[11] S. Revathi1, K. Rajakumar and G. Deepa, "An Efficient Face Recognition System Using Curvelet with PCA", ARPN Journal of Engineering and applied Sciences, ISSN 1819-6608, VOL. 10, NO. 11, JUNE 2015.

[12] ArvindKourav and Dr. Prashant Singh, "Analysis of Recognition Accuracy Using CurveletTransform",International Journal of Advanced Research in Computer Science and Software Engineering,Volume 3, Issue 3, March 2013.