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A NOVEL FACE RECOGNITION TECHNIQUE BASED ON COLOR AND EDGE FEATURES

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ABSTRACT

In current age of the internet, numerous services and apps have gone online, and each service is provided based on their identity management methods. This technique requires a user id and a strong password that cannot be broken by a standard brute force assault. However, maintaining a large number of passwords secret is a difficult effort, hence bio-matric authentication systems are used in a variety of critical environments to prohibit suspected or malevolent individuals. As a result, the various bio-matric authentication methods are evaluated first, and it is chosen to work with a face-based authentication system. In such systems, accuracy is the key criterion for system development, while resource preservation is the secondary concern of the face recognition system. Therefore, the goal of the proposed work to identify a face picture identification method that was both accurate and efficient. Accuracy, error rate, time complexity, and space complexity are utilised as performance metrics. Because of its high degree of accuracy in identifying user faces, the suggested model can be adopted. Additionally, the performance yields an image categorisation accuracy of 90–100%. As a result, the suggested face recognition method is effective and suitable for both object and face identification applications.

KEYWORDS: Face recognition, LDA, PCA & ICA.

INTRODUCTION

Face recognition systems are utilised in bio-matric image processing applications. Due to the high need for strong passwords and identities, this has been a major study topic in recent years. Biometric information may be used for identification more easily than fingerprints, iris scans, signatures, and so on, because these sorts of biometrics are not acceptable for some people. Face recognition technologies are often used and favoured for authentication and security purposes. These systems can be used for crime prevention, video monitoring, identity verification, and other security purposes. The proposed work is driven by the need to increase the performance and detection accuracy of face recognition applications. As a result, a novel face identification approach is provided that does not rely on all of the standard aspects in the image to differentiate the facial identity. The primary goal of the proposed study is to create and construct a face recognition system that operates on a face image. The primary goal of the proposed paper is to create and construct a face recognition system that operates on a face image. As a result, step research and development includes the following aims.

RELATED STUDY

Yong Xu et al [1] enhance the minimal squared error (MSE) technique for classification by changing the classification criteria. In contrast to the conventional MSE algorithm, which first obtains the mapping that can best transform the training sample into its class label and then uses the obtained mapping to predict the class label of the test sample, the modified minimum squared error classification (MMSEC) algorithm predicts the class labels of the test sample and the training samples closest to it at the same time and then combines the predicted results to classify the test sample. George D.C. Cavalcanti et al [2] offer two feature extraction techniques that reduce distortions caused by differences in light, rotation, and head attitude in automatic face recognition systems. The suggested methods are Modular Image Principal Component Analysis (MIMPCA) and Weighted Modular Image Principal Component Analysis (wMIMPCA). Both strategies are based on PCA and employ modular image decomposition to reduce local variance. Jian-XunMi et al [3] Present an innovative idea for facial recognition. This notion holds that a test face picture should be distant from the furthest subspace (FS) covered by all training photos, with the exception of images from the test image's class. Based on this concept, we introduce the FS classifier for facial recognition. According to diverse interpretations, NS and FS classifiers take advantage of distinct properties of the class-specific subspace. Ying Wen et al [4] offer an improved discriminative common vector and support vector machine-based face recognition technique. The discriminative common vectors (DCV) algorithm is a relatively new discriminant approach that outperforms other popular linear discriminant algorithms in terms of face recognition. For cases with small sample sizes, the DCV is based on a version of Fisher's Linear Discriminant Analysis. However, for multiclass problems, the Fisher criteria is definitely not ideal. We create an improved discriminative common vector by adjusting for the Fisher criteria, which allows us to more precisely

estimate the within- and between-class scatter matrices for classification. Leandro D. Vignolo *et al.* [5] offer a multi-objective wrapper that uses evolutionary algorithms to determine the most relevant collection of characteristics for face recognition tasks. The suggested technique examines the space of different possible selections in order to reduce the cardinality of the feature subset while increasing its discriminative ability. Experimental results reveal that, when compared to existing state-of-the-art methodologies, the suggested methodology improves classification performance while lowering dimensionality.

PROBLEM STATEMENT AND PROPOSED SOLUTION

Most of the time, the issue is related to either classification methods or pattern learning algorithms. Because the latest learning algorithms are unable to accurately learn face patterns. Nevertheless, if the pattern is noisy, issues with feature extraction and selection can occur. Therefore, in order to develop facial recognition technology, both of these concerns need to be considered. Finding some better feature extraction and enhancement strategies is required in order to scale up the significant features for proper learning and identification. However, algorithms need to be able to correctly learn from face data characteristics and classify them using the classes that have already been marked.

The proposed technique is implemented in two different modules first for making a training of the system and secondly use of trained model for authenticating the user faces from the database.

Figure 1 shows the training process of the proposed face recognition model and the figure: 2 shows the testing and performance analysis of the system.

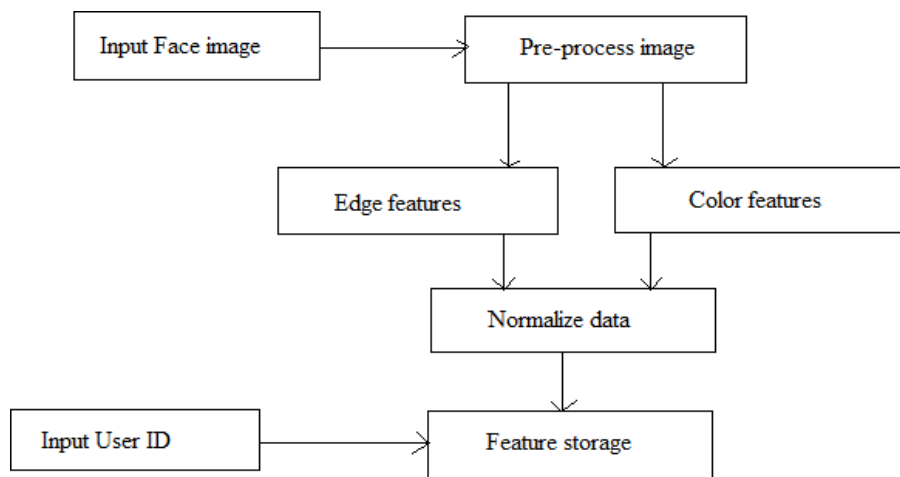


Figure 1: Training process

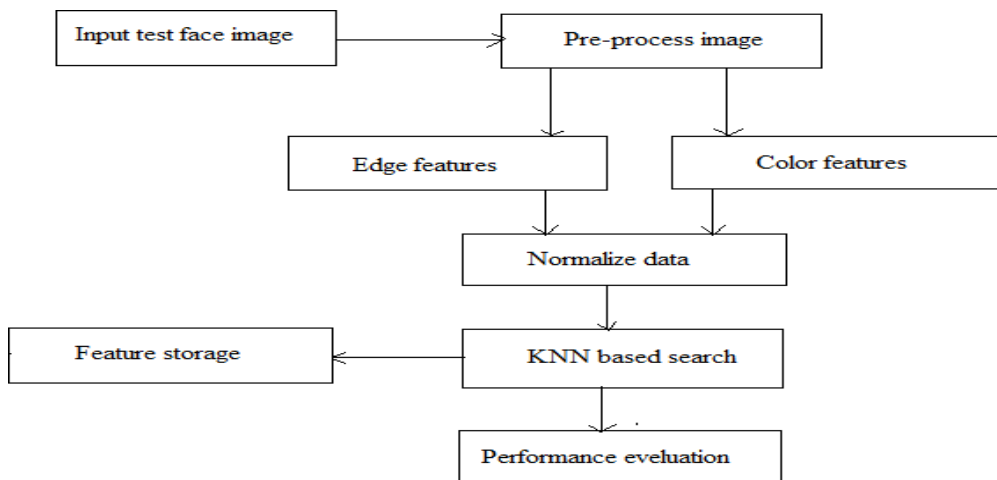


Figure 2: Testing process

RESULTS ANALYSIS

The implementation of the proposed face recognition based authentication system is performed and this section provides the evaluation and comparative performance study of the proposed face recognition system. Therefore the different performance parameters i.e. accuracy, error rate, memory consumption and time requirement is measured and compared.

$$accuracy = \frac{\text{total correctly recognized faces}}{\text{total input sample for test}} \times 100$$

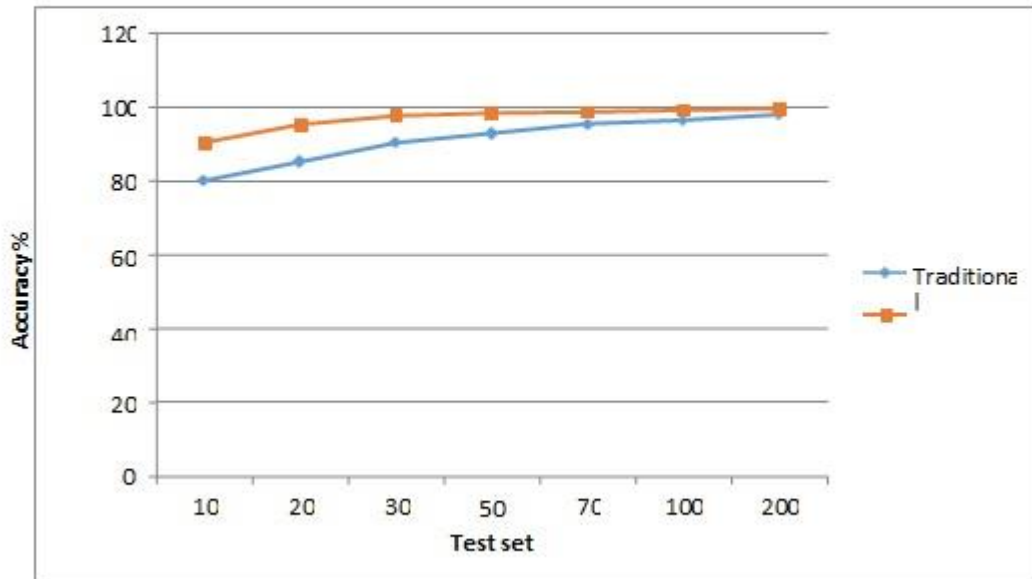


Figure3 : Accuracy

$$error\ rate = \frac{\text{incorrectly recognized faces}}{\text{total input faces to identify}} \times 100$$

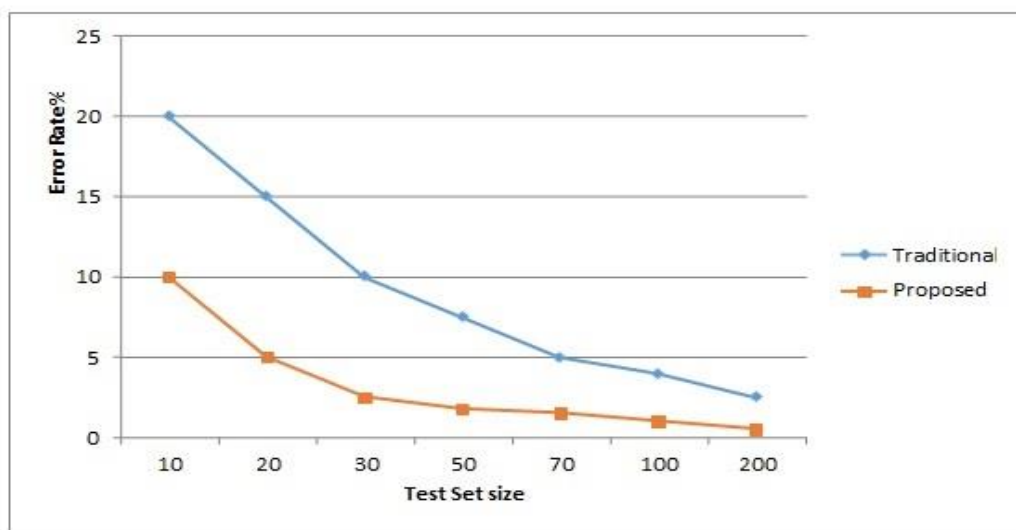


Figure 4 : Error Rate

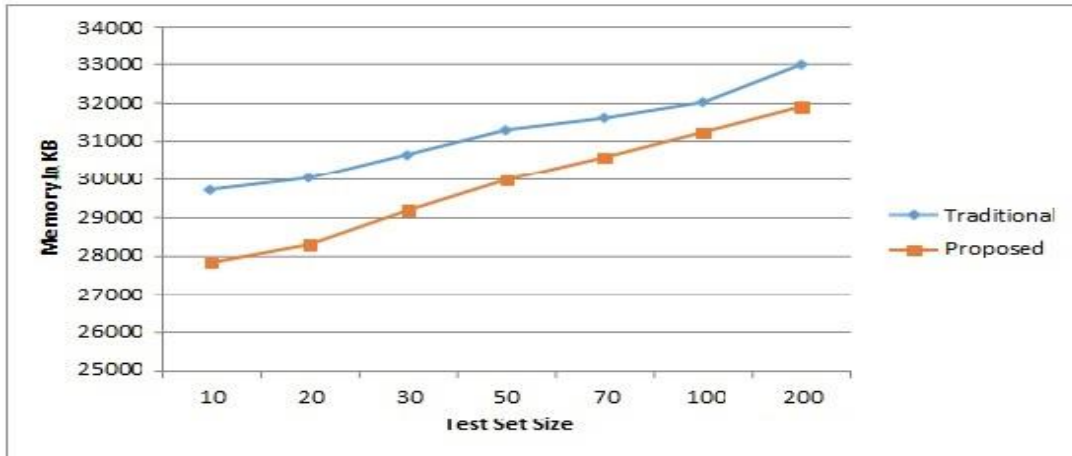


Figure 5 : Memory in Consumption

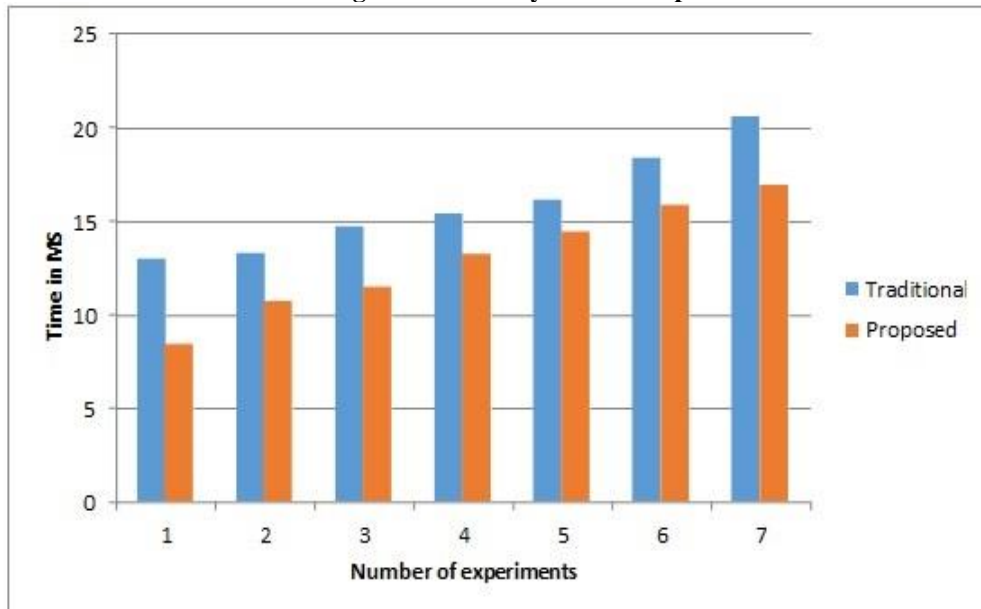


Figure 6: Time Consumption

CONCLUSION

Numerous research publications are examined in an effort to find an accurate and efficient face recognition model, and an accurate and efficient data model is created using the concepts that are now available. In addition to confirming the user's identification, the suggested model also indicates whether or not the user's face is recorded with the system. The suggested data model is created by analysing the colour movement and edge detection of a face image. Because there are fewer attributes for comparison and identification evaluation, the suggested data model uses fewer resources. yields a high level of accuracy in facial recognition results as well. According to result proposed data model for face recognition is accurate and efficient due to less amount of error rate and the error rate is improved as the amount of test set is increases. Therefore the accuracy of the system is higher. On the other hand the edge and color features are reduces the additional computational overhead and amount of comparisons on features therefore the resource consumption of the system is also too fewer.

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