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#### CrossRef DOI of original article:

1	Performance Enhancement of Face Recognition Algorithms based
2	on Principal Components Analysis
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#### 7 Abstract

In this paper many face recognition algorithms and codes were studied and tested, and it was 8 concluded that they still face the challenge of not providing optimal accuracy and precision, 9 especially in the case of images that have some distortions such as those resulting from poor 10 illumination, different angles of taking the image and different facial expressions or wear hats, 11 masks or glasses. Although recognition technologies using iris and fingerprint are more 12 accurate, face recognition technology is the most common and widely utilized since it is simple 13 to apply and execute, in addition it can be used directly anywhere and does not require any 14 physical input from user. The results show that the best performance of face recognition 15 depends on the number of principal components (PCs), the percentage of face recognition 16 increases in the ranges of 10 17

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19 Index terms—face recognition, PCA, image processing.

### <sup>20</sup> 1 I. Introduction

ace recognition systems (FRS) is a biometric identification mechanism, like other methods such as (fingerprint, 21 voice recognition, iris recognition and handwritten recognition), is shown to be more important both theoretically 22 and practically [1,2]. Face is a complex multidimensional structure and needs good computing techniques for 23 recognition. To find out exact identity of any person, face recognition is very essential technology. Can recognize 24 a number of faces learned throughout our lifespan and identify that faces at a glance even though that persons 25 became old in age. There may be variations in faces due to aging and distractions like beard, glasses or change 26 of hairstyles [3,4,5,6]. Face detection from a single image or sequence of image is a challenging task, because of 27 the variance in size, orientation, color, expression, occlusion, and luminance of image, to build a fully automated 28 system that extracts information from images of human faces, it is essential to develop efficient algorithms to 29 detect human faces. The primary objective of facial discovery algorithms is to determine whether there is any 30 face in the picture or not. Recently, a lot of the studies work in facial recognition and facial detection has been 31 suggested to make it more progressive and accurate, but it is revolutionizing in this area when a realtime facial 32 detector, able to discover faces in real-time accurately [7]. 33

### <sup>34</sup> 2 II. Proposed System

The proposed system of this paper were based on the tries to recognize the input image by matching it with 35 36 existing images (data base), by selecting the stage of image acquisition (Acquired), extracting the face image from the total image (Detection), aligning stage and image standardization (adjusting the angle of the face By 37 camera angle) (Alignment), extraction of important features of the image (Extract), The stage of matching 38 between the desired image and the image store (Matching) and The stage of issuing the report is closer to 39 the image or no report (Report), this steps illustrated in figure 1. Biometric approaches aim to identify an 40 individual by his unique physical characteristics and biological traits. Given these problems, the development of 41 biometrics approaches such as face recognition, fingerprint, and voice recognition proves to be a superior solution 42

43 for identifying individuals over that of PIN codes. Using of biometric techniques not only uniquely identifies an 44 individual, but also minimizes the risk of someone else using the unauthorized identity.

# 45 **3** III. Methodology

Our work aims to improve the performance enhancement of the face recognition algorithm using PCA by 46 increasing the number of PCs including one dimensional value for face recognition. Experiments were carried 47 out using MATLAB. The investigation was used to adjust the best number of images for each individual to be 48 used in the training set, that gives the highest percentage of recognition. the highest matching ratio was made 49 by multiples of images in the training set for each person. In this experiment, the number of PCs in the test 50 database was increased by ten images per person in the training database as provided by the experiment. We 51 change the PCs, trying to decide the best matching. PCA flow chart for feature extraction process can be seen 52 in figure (2). 53

# <sup>54</sup> 4 V. Discussion

Increasing the number of images for each person in the training set were get best recognition rate, by comparing the results of the experiments, the enhanced algorithm gives high recognition ratio when the PCs were increased.

## <sup>57</sup> 5 VI. Conclusion

This paper discusses how to augment the PCA feature with the selected optimization method by increasing the 58 PCs to improve the accuracy of face recognition models. Enhancement is one of the most useful tools that can 59 be used in image processing and, in particular, in areas such as object matching. This paper aims to optimize 60 the face recognition using the PCA algorithm, by increasing the PCs and number of images in the training set. 61 Our enhanced algorithm reduces the participated eigenvectors in the algorithm to reduce the computation time. 62 63 Increasing the number of images for each person in the training set to get the best recognition rate causes a long computational time, which increased exponentially with the database size. By comparing the results of the 64 experiments the improved algorithm gives a reduction of the recognition ratio when the PCs is smaller, while the 65 enhanced algorithm shows noticeable improvement and gives considerable increase of the recognition ratio when 66 increasing the PCs. Future work will focus on success and increasing the face recognition rate for huge databases. 67 To improve the results, the algorithms for face recognition could be upgraded to detect multiple faces in the same 68





Figure 2: Figure 2 :



Figure 3: Figure 3 :







Figure 5: Figure 6 :



Figure 6: Figure 7 :

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Global Journal of Researches in Engineering	$1 \ 2$	$1 \ 3$	$1 \ 4$	10  40
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	4	7	8	80
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	6	15	10	100

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Figure 7: Table 1 :

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### 5 VI. CONCLUSION

- 69 Year 2023
- [Haider ()] 'A survey on face detection and recognition approaches'. Waqas Haider . Research Journal of Recent
  Sciences 2277. 2014.
- 72 [Schofield et al. ()] 'Chimpanzee face recognition from videos in the wild using deep learning'. Daniel Schofield ,
- Arsha Nagrani , Andrew Zisserman , Misato Hayashi , Tetsuro Matsuzawa , Dora Biro , Susana Carvalho .
  Science advances 2019. 5 (9) p. 736.
- 75 [Tran et al. ()] 'Disentangled representation learning gan for pose-invariant face recognition'. Luan Tran , Xi Yin
- , Xiaoming Liu . Proceedings of the IEEE conference on computer vision and pattern recognition, (the IEEE
  conference on computer vision and pattern recognition) 2017.
- <sup>78</sup> [Maia and Trindade ()] 'Face detection and recognition in color images under MATLAB'. Deise Maia , Roque
  <sup>79</sup> Trindade . International Journal of Signal Processing 2016. 9 (2) . (Image Processing and Pattern Recognition)
- 80 [Barnouti and Hazim ()] 'Face detection and recognition using Viola-Jones with PCA-LDA and square euclidean
- distance'. Nawaf Barnouti , Hazim . International Journal of Advanced Computer Science and Applications
  (IJACSA) 2016. 7 (5) .
- [Kumar et al. ()] 'Face detection techniques: a review'. Ashu Kumar , Amandeep Kaur , Munish Kumar .
  Artificial Intelligence Review 2019. 52.
- [Mahmud ()] 'Human face recognition using PCA based Genetic Algorithm'. Firoz Mahmud . 2014 International
  Conference on Electrical Engineering and Information & Communication Technology, 2014. IEEE.
- 87 [Li et al. ()] 'On low resolution face recognition in the wild: Comparisons and new techniques'. Pei Li , Loreto
- Prieto, Domingo Mery, Patrick J Flynn. *IEEE Transactions on Information Forensics and Security* 2019.

<sup>89 14 (8)</sup> p. .