FACE RECOGNITION

based on Principle Component Analysis

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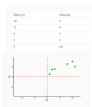
Introduction

Principal Component Analysis (PCA) is a commonly used dimensionality reduction technology and data analysis method. It can convert high-dimensional data into low-dimensional representation while retaining the main information in the data. Due to these characteristics of PCA, it has wide applications in the field of face recognition

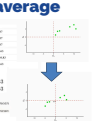
Principles of mathmatics

The idea of PCA is to map dimen- sionality features to dimensionality, which is a new orthogonal feature. This dimension feature is called the principal element and is a reconstructed dimension feature. In PCA, the data is transformed from the original coordinate system to the new coordinate system.

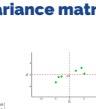
1) Initialization



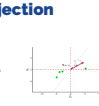
2) Deaverage



3) Covariance matrix



4) Projection



5) Eigenvectors

6) Results

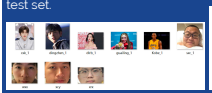
The PCA algorithm, by reducing dimensions and discarding some information, can increase the sampling density of samples, thereby achieving a denoising effect to some extent.

Conclusion

We loaded the training images using MATLAB code and computed their average face and features. Subsequently, we calculated the relevant features of the test image and compared them with the training image data to identify the identity, yielding the matching results.Finally, the results revealed that the accuracy of the face recognition achieved a rate of 90%.

Code Implementation

We created two folders. One is called "face source", which is used to store the face photos of the training set.The other is called "face test", which is used to store the face photos of the test set.

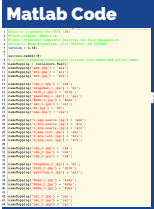


"face_source"

"face_test"

Matlab Code

Data preparation



Calculation of eigenvalues

Evaluation