

Report on Face Recognition Algorithms

This report provides an overview of my Python program designed to perform face recognition using various machine learning algorithms. It explains the steps involved in loading, preprocessing, training, and testing the data, as well as evaluating the performance of different algorithms.

Data Loading and Preprocessing:

- The program loads a dataset from a CSV file containing face images.
- Each face image vector is normalized to unit length.

Data Splitting:

- The dataset is split into training and testing sets for each subject.
- 150 images per subject are used for training, and 20 images per subject are reserved for testing.

K-Nearest Neighbors Algorithm:

- The program implements the K-Nearest Neighbors algorithm without using any libraries.
- It calculates distances between test images and training images using Euclidean distance or cosine similarity.
- Predictions are made based on the majority label among the k-nearest neighbors.

Support Vector Machine (SVM) Algorithm:

- The program utilizes the SVM algorithm for classification.
- SVM is trained on the training data and used to predict labels for the test data.

Gaussian Naive Bayes Algorithm:

- The program implements the Gaussian Naive Bayes algorithm.
- Naive Bayes is trained on the training data and used for classification of test data.

Evaluation:

- The accuracy of each algorithm is calculated and displayed.
- Accuracy is measured as the ratio of correctly predicted labels to the total number of test samples.

Visualization:

- The program plots the accuracies of K-Nearest Neighbors, SVM, and Gaussian Naive Bayes algorithms for comparison.
- Principal Component Analysis (PCA) is applied to reduce the dimensionality of the data.
- The first 100 principal components of the face images are plotted in 3D space.

Conclusion:

- The program demonstrates the implementation and evaluation of face recognition algorithms using Python.
- Different algorithms are compared based on their accuracy in recognizing faces from the dataset.
- Visualization techniques such as PCA help understand the underlying structure of the face images in reduced dimensions.