

Title : FindServ

Department of Computer Engineering & Applications Institute of Engineering & Technology

Sadaf Ali (191500689)

Shyam Krishnan (191500810)

Adarsh Verma (191500051)

Venketesh Mishra (191500905)

Group No: 33

Under the Guidance of Mr. Vivek Sharma Assistant Professor

Abstract

Identifying missing persons and returning them to their families has become a universal problem. A variety of research publications are reviewed in this paper. Each existing mechanism has advantages and disadvantages. However, the issues related to repatriation of missing persons are still not 100% resolved. Computing technology has evolved in recent years and includes many variations that can be used in virtually every field. Despite rapid advances in technology, information still plays an important role in computer systems. Every day, significant numbers of people go missing around the world, including children, young people, the mentally ill, and the elderly with Alzheimer's disease. It is estimated that over 500 missing person concerns go unresolved in India every day. Facial recognition technology has become increasingly important over the past decades. A facial recognition system is a computer application that can recognize or verify a person by analysing digital images or video frames from a video source. Facial feature detection and recognition are widely used in current world scenarios and technologies. Artificial intelligence, on the other hand, has provided solutions to the problems of the hypermodern world. Artificial intelligence (AI) was developed to help humans and machines communicate more effectively. The proposed mechanism has been successfully implemented to accurately identify faces with 90% accuracy compared to 59% using ANN and 43% using his SVM with PCA.

Keywords--Image segmentation, face recognition, PCA, KNN, feature extraction, SVM

Introduction

FindServ is an application created to help Police and higher authorities to track down missing people quickly. The usual process to track a person is using investigation which requires time and experience (to ask right questions). Most of the time, investigation method works pretty well but it is time consuming and can be unsuccessful if the person (missing) has been shifted/moved to different location (city/country).

In such cases, the ideal approach is to go through CCTV footages and evidences. Again, this can be very time consuming and given the number of people that go missing every day, it can be a challenge to keep up with it.

In India about 7 Lakh people are reported missing every year, we with this project intend to help police and their family to find those missing people with at most ease and efficiency, and indirectly work for some social cause. As FindServ is completely free it gives power to those people who wants to make some change in the society, The database updates itself every time a new case is added, one case will remain in dormant state for three years then will get updated with a new photo.

Issues and Challenges:

Racial bias due to testing inaccuracies

Racial bias is still one of the main problems with facial recognition technologies. Although facial recognition systems guarantee above 90% classification accuracy, these outcomes are not always the case.

Age Factor

Age-related declines in visual sensitivity may have an effect on facial recognition. However, it is unclear how ageing affects basic visual processing and the sensory and cognitive processes that underlie face identification.

Less Facial Features in Infants

Numerous research has been done on how early on in life a baby learns to recognize facial emotions. But there are still a lot of unanswered questions and no definitive findings.

Illumination

Light fluctuations are referred to as illumination. The results of automatic facial recognition can be significantly impacted by the little change in lighting conditions, which is a considerable challenge.

Related Work:

In order to create a system that can perform more tasks than the previous system, the application of face identification using the PCA (Principal Component Analysis) method of feature extraction and KNN as a classification has been done before. The journal article "Multi-Faces Recognition Process Using Haar Cascades and Eigenfaces Methods" describes one of the experiments that has been done. The hybrid Haar Cascades and Eigenface approach is used in the proposed facial recognition procedure, and it is capable of detecting 55 faces in one detection step. Training data, grayscale conversion, and preprocessing with Haar Cascade are the different stages of the picture pre-processing process. [2]

Other research examples are listed in the journal entitled "Handwriting Recognition using Eccentricity and Metric Feature Extraction based on K-Nearest Neighbors". This journal proposed a recognition process that consists of several stages such as thresholding, noise removal, and cropping before feature extraction and classification. The dataset will be divided into training data and testing data. The feature extraction method used is eccentricity and metrics. Eccentricity is obtained between the value determining between the small elliptical focal distance and the main focus of the ellipse of an object. While the metric is the ratio between the area and circumference of the object. For the classification used the KNN method is used to classify objects based on training data with the distance nearest to the object, where the formula for calculating the distance used in this paper is the Euclidean distance formula. Based on the results of the testing obtained accuracy of 85.38% for the Handwriting Recognition using Eccentricity and Metric Feature Extraction based on K-Nearest Neighbors [6]. Examples of other studies are listed in the title "Voice Recognition using K Nearest Neighbor and Double Distance Method". This journal developed a new method to improve the accuracy of using data outliers, namely double distance method. This doubled distance method will be combined with the KNN method with $k=1$ as the center of the voice recognition. Frame work consist two stages are training and testing process. The training process is feature extraction using Mel Frequency Cepstrum Coefficients (MFCC). While the testing process through the introduction stage using the KNN method. Testing process is divided into two parts, the first part used the KNN method and the second used the doubled distance method.[7]

Proposed Model:

This project's goal is to make it easier for the police and higher-ups to find missing people promptly. Investigation is typically used to search down a person, and it takes time and expertise (to ask right questions). The investigative process generally yields positive results, although it takes a lot of time and may fail if the missing individual has been relocated to a new place (city/country).

Examining CCTV footage and other supporting documentation is the best course of action in such situations. Again, this can take a lot of time, and considering how many individuals go missing every day, it can be difficult to keep up with.

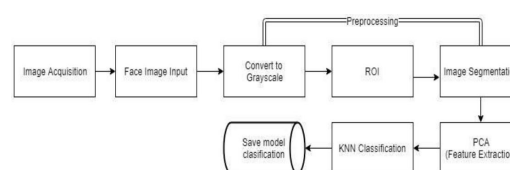


Figure 1. Training Phase of Face identification

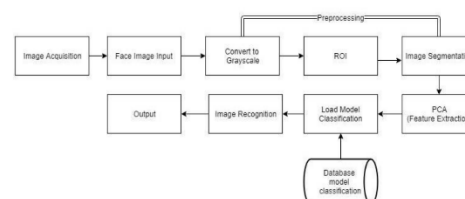


Figure 2. Testing Phase of Face Identification

Variations in Facial Images

One of the most challenging issues in the field of image recognition research is face recognition. A human face is a non-rigid body in addition to being a 3-D entity. Additionally, photographs of the face are frequently taken in a natural setting. This means that both the visual background and the lighting situation could be extremely complex. This image, which has a complicated background and image segmentation, is an example.

The various facial variants could be divided into the following categories:

Complex background, complicated lighting, translation, rotation, scaling, and occlusion, facial emotion, camera noise, and make-up and hairstyle.

Noise and camera distortion are common variations of picture recognition issues. To improve the signal-to-noise ratio, several techniques have been created by earlier researchers. The recognizer needs a good face detector to separate the actual faces from other portions of the image in order to deal with complex image backgrounds. A common contributing component to the inhibition of the identification process is illumination. [5]

K- Nearest Neighbour

KNN is a well-known classification technique. Each class is taken to be a cluster, and each data point is taken to be a part of a cluster. Next, it is necessary to identify the cluster centres and the data points that are associated with each cluster. KNN needs to independently locate the centres of each cluster since it performs an unsupervised classification

It is possible to find K cluster centres to minimise $\sum_{n=1}^N \sum_{k=1}^K z_{nk} \|x_n - \mu_j\|^2$, given N data points (x_1, x_2, \dots, x_N), where z_{nk} equals 1 if point n belongs to cluster k and 0 otherwise. Then, until the label of z_{nk} can be located that retains the same value as the previous round, this process is repeated. [10] [11]

Principal Component Analysis

In order to represent each face image as a smaller size in lower dimensional face space using the eigenvectors that correlate to higher eigenvalues, PCA is used in face recognition to identify the principal components of a given batch of photos. Although the PCA image is considerably smaller than the original, the primary components are still present. Additionally, it might massively speed up recognition. [9]

Random Forest

Leo Breiman and Adele Cutler are the creators of the widely used machine learning technique known as random forest, which mixes the output of various decision trees to produce a single outcome. Its widespread use is motivated by its adaptability and usability because it can solve classification and regression issues. [3] [9]

Decision trees

It might be beneficial to begin by briefly outlining the decision tree algorithm because the random forest model is made up of numerous decision trees. Should I surf? is a common starter question for decision trees. A sequence of queries, such as "Is it a long period swell?" and "Is the wind blowing offshore?," can then be used to arrive at an answer. These inquiries serve as the decision nodes in the tree, which divide the data. Each query aids a person in coming to a conclusion, which is indicated by the leaf node. The "Yes" branch will be followed by observations that meet the requirements, while the opposite path will be taken by observations that don't. [3]

Result:

Test Case Description	Expected Output	Actual Output	Features Similarity Match	Test Status (P/F)
Images with Front profile	Face Recognised	Face Recognised	<90%	P
Images with Side profile	Face Recognised	Face Recognised	<75%	P
Images with Illumination Difference	Face Recognised	Face Recognised	<65%	P
Images with Various background	Face Recognised	Face Recognised	<60%	P
Images with age difference	Face Recognised	Face Recognised	<45%	P
Images with accessories	Face Recognised	Face Recognised	<65%	P

Table 1: Result of proposed model on the basis of features.

*Some values are approximation.

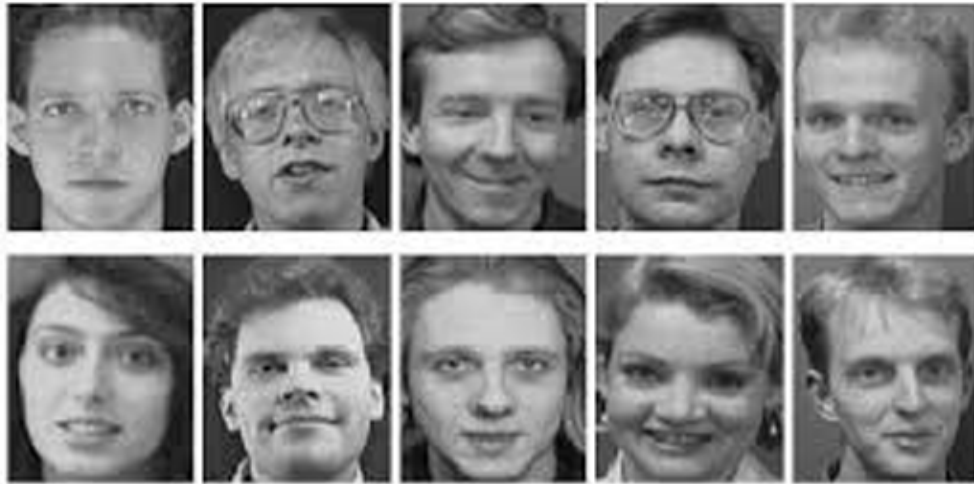


Image 1: Sample Image



Image 2: Sample Image

Conclusion

The recognition technique of facial recognition is challenging but crucial. The facial recognition method has one significant advantage over all other biometric technologies. Ease of use (discreet). proposed a KNN and PCA-based framework for enhanced human face recognition. A training data set with discriminative patterns based on correlations between the first training images was helped by KNN and PCA. The recently acquired Tabular dataset enabled KNN to converge more quickly and accurately. This was accomplished by integrating different distance algorithms, each of which performs better than the others in terms of improving the system as a whole.

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