

Human Face Sketch Recognition System by 2D Discrete Haar Wavelet Transformation by Artificial Neural Network

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Abstract

Human face recognition plays an important role in computer vision and security surveillance system and biometrics. Recognition of the face image is a common process as many techniques are available to recognize the human face image. The sketch of the human face is image drawn by the expert person in imaginary of the targeted human based on the eye witness or another person or himself. None of the emerging recognition system is sketch recognition and is making its way in field of law enforcement. Hence we propose face sketch recognition process using PCA, 2D discrete haar wavelet transformation, artificial neural network. The experiment has been conducted database consisting of 80 clearly demonstrative and efficacy of algorithm.

Keywords: PCA, 2D DHT, Recognition

I. INTRODUCTION

The recognition of face has been a major issue for over many years. The face is considered to be unique identification of any human being which allow us to recognize his and authenticate. The face recognition technique such as camera based artificial intelligence base has been provided solutions for recognition of face. In general, all the face recognition techniques are using similar properties like extraction of human face such as eyes, nose and mouth part. The extraction of these parts has been a popular and reliable method over the period of time for human face recognition.

In recent years, in criminal investigation the suspect of any crime has been reported by the eyewitness based on the person's facial components like eye, nose, mouth skin colour or any physical properties. By oral explanation of eyewitness, the sketch of suspect can be drawn by the expert, sketch withdraw the drawn image of suspect will be as similar to the original human face.

There are many techniques proposed for recognition of human face but rarely technique is available for recognition of sketch image. Hence we propose human sketch recognition by adopting principal component analysis, descerte Haar wavelet to recognize human sketch images by pre-stored available in the data base.

II. REVIEW OF LITERATURE SURVEY

- 1) The author has addressed that sketch drawn by artist to be automatically matched to the set of photos present in police database. Facial features are being located in sketch and set of photograph. For better comparison of sketch with photo, the sketch should be photo metrically standardized and photos should be geometrical standardized. At last matching is done by using Eigen analysis. Finally using real police sketch and arrest photos are presented
- 2) The author had report on forensic investigation task by using algorithm called neural face recognition algorithm. For comparing facial line drawing with gray-level images, author use the software tool known as PHANTOMAS (phantom automatic search). Along with action of textual database search this software tool allows picture to picture search. Author had given result on this task by evaluating benchmark. To give correct match with certain drawing depends on ranking quality given by PHANTOMAS is average within the higher 2.7% of database(N-103). using the same given data material comparison is done with the human performance. To search online in large database computation time helps to do so. By using the same algorithm author had try to classify some of the complex characteristics that are present in face
- 3) Database present within the police mug shot consist of important information about criminal and can also be important for law enforcement agencies because automatic retrieving of suspect face sketch image is top priority. Hence it can save the time of investigators to identify the suspect in crime. But in many cases the database of police may not contain information about the criminal. The solution to this problem is people who saw the crime can give the description of suspect and sketch is drawn by artist by recollecting important facial features with help of eye witness. Author had aim to generate system, which can automatically retrieve the photo image when input is given that is sketch. Difference between the photo and sketch can be reduced by transforming a photo into sketch image, so by this matching can be very good.

- 4) Here author proposes that face photo images can be retrieved from the database by using the sketch drawing. So to do this first we have to lower the difference that are found in the face photo images and sketch photo images by doing this, the process of matching can be done in very effective manner. The face photo contains many information compared to sketch such as shape, texture and colour but, in case of sketch it is not the same. Then transformation is conducted on the face such as shape and texture which generated good results. Bayesian Classifier is used to identify sketch from synthesized pseudo-sketches.
- 5) As in much recognition system, it is particular about recognizing photo depending on the face. Author is showing interest on recognizing the face ground when the input to system is face sketch. The system which is proposed contains couple of basis such as pseudo-sketch synthesis and sketch recognition. The above two methods tells that generation of pseudo-sketch process is build on local linear maintaining geometry between photo and sketch images is motivated by the conception of locally linear embedding. To identify inquisition sketch from symphonize pseudo-sketches is done by using nonlinear discriminate.

III. IMPLEMENTATION

The proposed system consists of modules:

A. Image Pre-Processing:

In this process basic operation is performed on the images like resizing, colour space transformation, reshaping etc are performed. This pre-processed image will be helpful for the next stages as image is converted to lab image.

B. Feature Extraction:

Principal components analysis is a method for distinguishing a small number of variables that are not correlated called "principal components", from the database. The principal components analysis describe the more variance with the few number of principal components.

Principal component analysis (PCA) is a statistical method which take us of orthogonal transformation to change a group of observations of possible correlated variables into a set of values of linearly uncorrelated variables called principal components. The principal values obtained may be less than or equal to the original values. the transformation is characterized in such a way that the first principal component has the largest possible variance (that is, accounts for as much of the variability in the data as possible), and each succeeding component in turn has the highest variance possible under the constraint that it is orthogonal to the preceding components. The resulting vectors are an uncorrelated orthogonal basis set. The principal components are orthogonal because they are the eigen vector of the matrix, which is symmetric.

C. 2D Discerte Haar Wavlet Transformation:

The images are considered to be in 2 dimensions they have x and y coordinates images are decomposed along the x axis y axis and along the diagonal corresponding coefficients are obtained. The Haar function is odd rectangular pulse pair and is orthogonal normal wavelet with compact support. From the haar scaling function and wavelet orthogonal wavelet system is generated. To perform the 2D transformation following steps are followed:

Consider the image matrix or array of m components

- 1) Calculate the average of each pair of components. (m/2 averages)
- 2) Find the difference between each average and the elements it was calculated from. (m/2 differences)
- 3) Take the first half of the array with averages
- 4) Consider the second half of the array with differences.
- 5) Repeat the process on the first half of the array.

While doing this the array size should be power of two.

And same process can be applied to the remaining rows in the array or matrix. From the obtained approximation of each row transformation is arranged in the form of the columns. Again by applying DHT to column matrix we find resultant matrix at 1st level we get the approximation, horizontal, vertical and diagonal coefficients.

D. Artificial neural network:

Using artificial neural network the learning system are built of very huge interconnected neurons. artificial neural network are built out of interconnected set of simple inputs and generate a single output or it may become input to the other many other layers.

Artificial neural network is applied to problems in which the training data can be noisy, complex sensor data such as input from the cameras. the target output to be learned is defined by vectors of predefined features such as pixel values. Network training can typically require long times ranging from few second to hours which depends on factors such as weights in the network.

IV. METHODOLOGY

The various steps are followed to implement the proposed system

- 1) Step 1: Preprocessing such as cropping the image and removing the noise.
- 2) Step 2: Features extracted from the face in form of vectors.
- 3) Step 3: Applying the 2DHT vertical, horizontal, diagonal coefficients.
- 4) Step 4: Values obtained are used to train the classifier.
- 5) Step 5: The neural network training approach takes following important information
 - a data set.
 - a satisfactorily measured information set to both train and test the network.
 - Data set for the decision making and analysis of data. The set generated which can be Training dataset or Testing dataset can be classified in multiple levels by using the functional unit.
 - Processing of the dataset is done use the required power for the classification by the power consumption modelling in neural networks.

The face sketch recognition system consists of training and testing phase. In training phase the sketch images need to collect. Here we had used random database sketch images of about 80. In training phase the images are collected and is converted to gray scale, principal components features are extracted and image is decomposed along the vertical, horizontal, diagonal and coefficient values are extracted using haar wavelet transformation.

In training phase each images from training dataset are passed to the system one by one at time each of these images are initially processed transformed and features are extracted using methods like PCA initially and 2D DHT later. These features are then transformed into a dataset known as training image diffuse dataset. This dataset can be used for the classification by using neural network classifier.

For recognition, after extracting the features from the training images and testing images separately the trained diffuse dataset and test diffuse dataset are now passed into artificial neural network recognition tool where coefficient values generated are trained within maximum iteration of 200. The classifier searches the test dataset training dataset with the lowest difference finally matching image pattern is displayed to the user.

V. CONCLUSION

By the proposed method of human sketch face recognition by 2dht and neural network for classification method has given a new trend for the recognition of suspects thief's criminal or any person based on the sketch drawn by the experts .in the proposed work we have created dynamic dataset for training before the testing process begins. This will allow the user to enhance the data size and check the availability by displaying the position obtained from the database we have obtained more than 90% of accuracy which is satisfactory as the proposed work is the beginning of face sketch recognition

The future work includes use of altered face sketch images to recognize the dataset by using obstacle proof methods.

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