FEATURE EXTRACTION FOR FACE RECOGNITION

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ABSTRACT

Image processing is a way of doing certain tasks in an image to get useful information from it. There is nothing but a type of signal processing where the input is an image and output either in the form of an image or it can be features / features that go with the image. Image processing is one of the fastest growing technologies and three common categories that all types of data must use while using Digital Image Processing for pre-processing, development and presentation. It allows a wide range of algorithms to be applied to the image and can avoid problems such as sound formation and disturbances during operation and as a reason can provide complex functionality. This work is done using Python language and Anaconda Navigator (Spyder) is used as a tool to get a clear image result, distribution includes data science packages suitable for Windows, Linux, and MacOS. OpenCV has been an important part of software development.

Key Words: OpenCV, Image processing, NumPy, Eigenfaces, Eigenvectors, Dimensionality Reduction

I.   INTRODUCTION

Digital Image Processing (DIP) is the use of digital data with the help of computer hardware and software to produce digital maps where specific information is extracted and highlighted. It has a wide range of techniques and methods, in the form of various algorithms. It is widely used in various real programs. There are many digital photo editing programs that can include a variety of locations. It is also used for the conversion of signals from image sensor to digital images. A number of algorithms are used to process the image. It provides a platform for performing various tasks such as image enlargement, analog and digital signal processing, image signals, voice signals etc.

Illustration provides a way to create some kind of application in input images. The output is based on enhanced images, or other details you want, or other required features. Because of the smooth flow of work, it is important to take pictures and process them afterwards. Image processing techniques apply to digital photographs with computing algorithms. Different steps and stages are required to work on the images.

There are two types of image processing methods, namely analogue and digital image processing. Image import with image capture tools. Image analysis and management. The result of which an image or report based on the analysis of that image can be changed.

II. LITERATURE REVIEW

Paper 1: This paper discusses a face recognition system that automatically identifies a person from a digital photo from a source. Face recognition includes: Face detection, feature removal and matching images. The face recognition system removes the various face-to-face features identified in these extracted features and ultimately the system produces results in terms of identified and unknown individuals. The image is then converted into a principle component and can now compare the Eigen (latent) value of the image with the Eigen (latent) value of the image data. The effect is mainly affected by variations in light intensity. The complexity increases with the increase in the number of reference images.

Paper 2: This paper provides an overview of how the Key Features can help build a facial firmness system when adjusted or otherwise used. The algorithm has a level of flexibility that allows it to be used with different techniques. Three experiments were performed to test traditional PCA with a combined PCA for DT (Delaunay Triangulation). In each test, a different amount of training and image testing is used. Results can be continuously improved if appropriate landmarks are used in combination as seen in the above results.

Paper 3: Since PCA works better than LDA when the number of samples in each class is small and the size of the face image is large. However, LDA performance is better when the database is very large and has separate phase databases. To benefit both of these approaches, PCA is integrated. This paper introduces a new face recognition system, a PCA reduction process followed by the LDA and a division by City Block Distance Calculation. Recognition values are compared with various PCA features and LDA features. It can be concluded that when the number of face images for each subject is smaller the PCA is better, but for larger training face images and different training data, its combination with LDA shows better results than pure PCA.

Paper 4: Here they discussed face processing, including major features such as face detection, tracking, alignment and removal of features, and highlighting the technical challenges of building a face recognition system. discriminant image filters, precise sample matrix and outstanding patterns are all learned in pictures. The general advantages of these methods are compact, highly discriminatory and easy to extract from a reading-based explanation. These methods are discriminatory and strong in light and tone of voice.

Paper 5: Linear Discrimination Analysis (LDA) is one representative way to learn the basics of non-discrimination. Unfortunately, it cannot be applied directly to small sample size (SSS) problems, because the dispersion matrix within a single phase. The MMDA (various discriminatory analysis) works well and surpasses other contradictory approaches, the MMDA is based on the embedded reading of the graph and falls under Fisher's discriminatory analysis framework.

PROPOSED WORK

In this project we have a data set for the face of each sample, colored images and is read as a gray image and the images are used for further analysis. This task goes through a few steps to get the final result.

1) Grayscale conversion
2) Image resizing
3) Image reshaping
4) Extracting eigen face using PCA
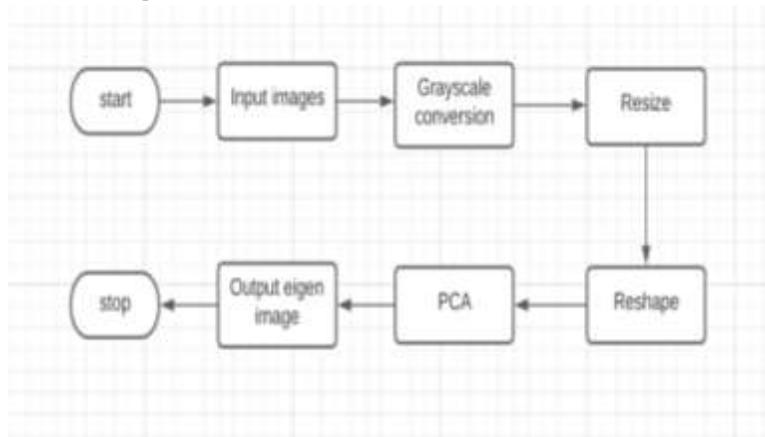
III.   IMPLEMENTATION

ENVIRONMENTAL SETUP:

To develop this project, we have used Python programming language. Anaconda Navigator (Spyder) has been used as a tool to get a specific image effect, the distribution includes science-compatible packages for Windows, Linux, and MacOS. Anaconda Navigator is a desktop user interface (GUI) embedded in Anaconda® distribution that allows you to launch applications and easily manage conda packages, locations, and channels without using command line commands.

- After successful installation, open a new python file.
- Import necessary packages like cv2, NumPy.
- Upload the data set path in the python file and run.
- Resultant output of eigen face will be saved in the same path as the python file.

IMPLEMENTATION STEPS

- Get a face photo database: We need a collection of faces that contain different types of faces. In this post, we used about 10 images from folders 1 and 2.
- Align and resize images: Next we need to align and enlarge images so that the center of the eye is aligned with all images. This can be done by first detecting facial landmarks. In

this post, we used the corresponding images provided in the folders. At this point, all images in the database must be the same size.

- Create a data matrix: Create a data matrix containing all images as a line vector. If all the images in the database are 100 x 100 in size and there are 20 images, we will have a matric data size 30k x 20.

- Calculate Mean Vector [Optional]: Before performing PCA on data, we need to extract the mean vector. In our case, the vector used will be a 30k x 1 week line calculated by measuring all the matrix lines of the data. The reason for calculating this vector means that it is not necessary to use the OpenCV PCA section is because OpenCV calculates exactly what is said to us if the vector is not provided. This may not be the case for some specific algebra packages.

- Calculate Principal Components: The main components of this data matrix are calculated by finding the Eigenvectors of the covariance matrix. Fortunately, the PCA section on OpenCV handles this calculation. We just need to bring in a data matrix, and then come out a matrix containing Eigenvectors.

- Reshape Eigenvectors to obtain Eigenfaces: Eigenvectors obtained thus will be 30k in length if our data contains images of 100 x 100 x 3. We can reshape these Eigenvectors into images to obtain Eigenfaces.

1-Input images

2-Input images

pca_face_brunda

pca_face_kushi

3.Output

RESULTS AND DISCUSSION:

In this project we took a picture and used a set of pre-processing steps to use the image for further analysis. These steps help the image to better perform other functions in it. These results are available using Python program language and are performed on Anaconda navigator with features not only for python programming but also for various other options. The result shows that the system successfully removes the required eigen face that can be used for recognition in the latest stages of processing. Available eigen faces have different features extracted from relevant databases. This can also be extended to more data sets and the results can be enhanced by increasing the number of input images for each database.

IV.   CONCLUSION

In our proposed project, we conducted a detailed study of the various ways to remove the feature and the need to convert a color image to a gray image. A color image is converted to a gray image as working with such a type of image is usually very useful and not too complicated. This image was then reconstructed and enlarged according to our needs and after the application of the PCA, eigen surface was detected. These processes obtained by the image showed good results for the

image. This can also be extended to more data sets and the results can be enhanced by increasing the number of input images for each database.

V.   REFERENCES

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