Image Sharing Authentication

Vaishnavi Srivastava, Yoshita Sinha,Pankaj Kumar

Computer Science Department
Shri Ramswaroop Memorial College of Engineering and Management

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ABSTRACT-Image sharing is very common & popular on the different social networking sites. Millions of photos are shared on the social networking sites, some of them are shared by the person himself, sometimes by friends, family and sometimes by unknowns. Sometimes this feature of image sharing becomes very dangerous as the image shared can be used for various illegal activities like, use of photo without permission, use of personal photo for advertisement, photo morphing etc. In this paper, we are proposing a framework which detects and recognises the faces in the image shared and then notifies each recognised person that their photo has been shared.
Keywords – Face Recognition, Face Detection, Machine Learning, hog (histogram of oriented gradients), Social media

I. INTRODUCTION

With the increase in the technology and growth of the social networking sites like Instagram, Facebook etc**.** image sharing has also increased, although the purpose of these apps is to increase connectivity among people it has also lead to the problem of the use & sharing of the image without the person's concern, which could be further used for various purposes. Although these technologies have helped people in various aspect but also has put people in various terrible situation, image sharing of the person without the person concern is one of them. If an image is shared and used by the other person it may lead to an objectionable situation and there should be a technology that let the person know that his/her image is used by other.

Most of the time a person is interested in only those photos in which he himself is present. So, currently we manually browse through photos on the social sites and then identify the pictures in which the specific person is present, which is a time consuming process. So, it would be beneficial if a person knows that his/her picture has been shared & used by some other person. So, we have tried to automate this process, for this we are proposing a framework that is based on Image Processing using which are detecting and recognising each and every face in the picture and verify it by sending a notification to the user that their picture has been shared by a person.

In this module, the detected face in the image will be compared with the original picture of the person which is stored in the database using library like OpenCV, dlib, face_recognition etc. & if the face compared to the face present database is matched then further the owner of the image will be notified.

So, to detect & recognize we are using face_recognition module which firstly detect & locate the human face in the image, then the original image is turned into the HOG(Histogram of Oriented Gradients) which captures the most feature of face, then facial landmarks are marked & face is turned to centred face image & then this image is passed through neural network lastly the facial measurement of unknown person & the faces measurement present in the database is compared, if it has the closest measurement to our face that means that image is matched, & then the user is notified that his/her is shared.

II. RELATED WORK

In this section, we discuss several existing approaches used for face detection and recognition from a span of past few decades to the state of the art methods. In the past few years, various methods for face detection and identification have come into existence. All the methods for face detection can be narrowed down to four main object detection algorithms [1].

The app EUG "Euphoria Grouping" [1] is used for identifying and detecting the presence of the image of the person in the group photo. For identifying two different images convolutional neural network models i.e. Custom Built and OpenFace CNN is used. In this app the user detail and profile picture is stored in the database at the time of the registration, then this registered image is compared with the image categorised in shared

group photo by the help of the models of the convolutional neural network.

As far as face recognition is concerned Jinesh Mehta [2] has discussed the "Face Detection and Tagging" using deep learning. In this, he had tried to develop the tagging feature by the person's face. As earlier image can be classified on the basis of location so here the author classifies the group of the image on the basis of the person present in the picture. In this the author is using Deep Dense Face detector for the detection of the face that uses a single model based on deep convolutional neural networks, then the detected face is recognized using Local Binary Patterns Histograms (LBPH) method. And then the tagging feature used. It was almost 85% successful for the tagging by using a person's image.

The face detection framework [3], in this image processing is done to achieve a high detection rate. In this there are 3 main contribution – the first one is Integral image, using the ada boost learning algorithm & third is for combining the classifiers in the cascade.

The most prominent problems of computer vision system is the face recognition. The system [4] i.e. "Study of Implementing Automated Attendance System Using Face Recognition Technique" would be designed such as the algorithm saves the time when the face appears in the video for the first time in a .csv format. To come to such an outcome, we should firstly look into the following tasks: consider the methods and basic principles of face recognition and second analyse the methods followed by the libraries to solve the problem. These points are to be considered while constructing an algorithm, this is done using the libraries and the HOG method in python.

III. IMPLEMENTATION

In this paper, we will be using the concept of deep learning to solve the problem. Image processing is used for image detection and identification. To develop this framework we had used the face_recognition and dlib libraries for the image detection and recognition.

The steps to implement the framework is as follows:
Store image of the user in the database along with other details.
a) Detect the faces in the post shared.
b) Get the faces stored in the database.
 i. Find the position of the faces. The objective of this step is that all the images will be turned such that it was directly taken facing the camera, this is the input for our framework.
a) Identifying the unique facial features and storing them as numerical values.

b) Identifying the person by comparing the received data from the input with the data stored in the database. If the data is similar, then a notification will be send to the recognized person.
ii. Send notification to the users, whose face has been detected, that his/her photo has been shared by that person.
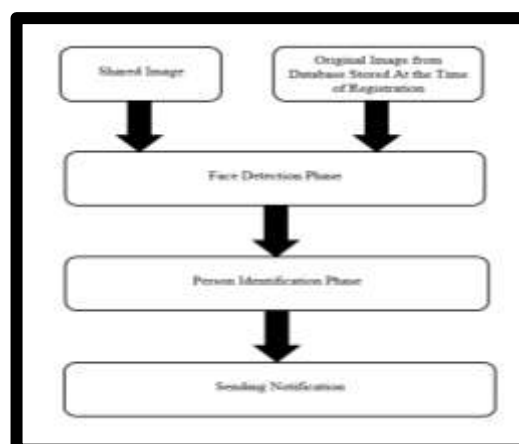

Figure 1: Module diagram showing steps involved in the framework.

In this paper, we will build a pipeline for each step of face recognition, such that the output of one step will become the input for the next step.
Step 1: In this step we will detect all the faces in the image. For this, we will use one of the most reliable method, i.e., Histogram of Oriented Gradients (HOG). To apply this method, we will convert the image in black and white, and then we will look at every pixel one at a time. Foe each pixel, we will also look for surrounding pixel. This is done to find out how dark the current pixel is compared to the directly surrounding pixels.

Figure 2: The pixel is getting darker toward upper right

This step is repeated for every pixel in the picture. The arrows are called gradient, they show the flow from light to dark across the image.
To see the basic pattern of the image, we'll break it into small squares of 16x16 pixels. In each square, we will count how many gradients are pointing in each direction, and then the squares will be replaced by the strongest arrows. The result will be the HOG representation of the given image.
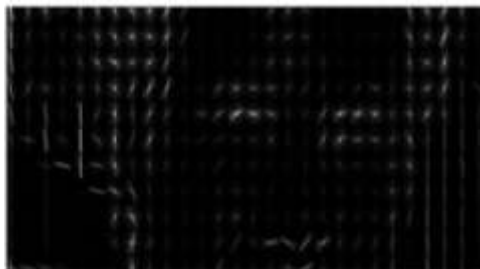
Figure 3 HOG representation of an image

This HOG version of our image can further be compared with the HOG face patterns generated from the images stored in the training dataset.

Step 2: It is not necessary that a person may face the camera during the photo shoot. This may create problem for the computer to detect all the features of the face and then recognize the person correctly. To avoid this problem, we will use the face landmark estimation algorithm, invented by Vahid Kazemi and Josephine Sullivan.

The idea behind this is that, we will locate 68 specific points (called landmarks) on the face and then we will train the machine to locate all these points on any face detected.

Figure 4: 68 specific points (landmarks) of a face

After the machine is able to locate all these landmarks, it will become easy to identify the eyes, nose and mouth of a person, irrespective of the position of the face in the image.

Step 3: In this step we will extract basic measurements from the faces, and then determine the closeness of the input face and the faces stored in the training dataset. These measurements of the features are termed as encodings of the faces. These features can be ears, eyes, nose etc. For this step we will train the machine to generate 128 measurements for each face.
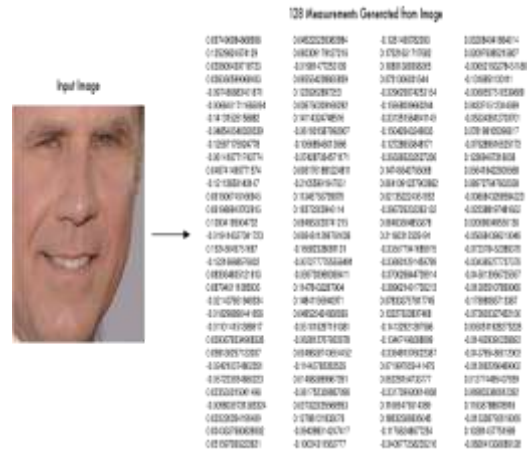

Figure 5: 128 features of a face

There can be many faces in the database, so we will compare the encoding of the input face with the encoding of the faces stored in the database. Lesser the difference between the encodings, similar the face is.

Step 4: This is the easiest step in the process. After we have found the matched face using the previous step, the framework will invoke the process of sending notification to the identified user.

IV.   RESULT

In our research we have used face_recognition and dlib libraries to detect and recognize the faces in an image. We have taken a training dataset having some pictures of the actors Courtney Cox and Matt LeBlanc. After training the model, we have given pictures of both the actors as the test image. The result of our research is shown in Figure 5.

Figure 6: Identified face (2)

Figure 7: Identified face (2)

This framework has to be implemented in a social media application so that the recognized person can be notified about the shared photo.

V. CONCLUSION

This paper conclude that the framework which we proposed that detects and recognises the faces in the image shared and then notifies each recognised person that their photo has been shared is made with the combination of various algorithm and is working fine in almost 80% of the cases . For developing this framework we explored different approach of the face detection & recognition like haar cascade classifier but we found that the hog (histogram of oriented gradients) was more suitable & helpful for us.

This framework of face recognition & further sending notification can not only be used for social sites but also in various other purpose of authentication & security.

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