Study and Analysis of Search based Face Annotation using Vision Cascade Object Detector

Pankaj J. Kokane
M.B.E.S. College of
Engineering Ambajogai

B. M. Patil
M.B.E.S. College of
Engineering Ambajogai

ABSTRACT
Face recognition presents a various challenges in the field of image analysis and computer vision, and large amount of work has been done over the last few years because of its applications in various domains. Mining web facial images on the internet has evolved as a promising model towards auto face annotation. Content-based image retrieval (CBIR) systems needs users to give low-level visual content images as query and then retrieve similar top matching images from database. The technique also aims to investigates framework of search-based face annotation (SBFA) by mining weakly labeled facial images that are freely available on the World Wide Web (WWW). This work presents automated face annotation that aims to automatically detect human faces from a photo and further annotate the faces with the corresponding human names.

Keywords
Face annotation, Content based image retrieval(CBIR),Web facial images, Weak label, Unique key generation**.**

1. INTRODUCTION
Wide usage of technology such as online photo sharing using social media tools or sites in our daily life can be easily browsed and shared. Also, due to the great success of social network and social web sites recently, web users have been motivated to share their images with friends and public that allows other users to tag and comment on their image collections which provides explosion of the number of digital photos captured and stored by consumers. These images are sometimes weakly labeled which becomes problematic to identify the name of a person. The model based annotation has much limitation such as time - consuming and expensive to collect large amount of human labeled training facial images. It is more difficult to generalize the models when new person added in database which affect on annotation performance. This leads to study of auto face annotation.[1]

Auto face annotation is used for automatic facial image annotation without any human interaction. Facial annotation is also beneficial for videos such as news videos to recognize the person appears in a video. In auto face annotation the extra facial images in the retrieval database are definitely harmful to the nearest retrieved facial result for each query image. A similar result could also been observed in where the mean average precision became smaller for a larger retrieval database. In auto face annotation there is some classical approaches to collection of an facial images with proper labeling.[2]This technique referred as model-based face annotation. In this technique there are some drawbacks like time consuming and generalization of models. This technique is data- driven and model-free technique. Search Based Face Annotation (SBFA) technique assigns correct name, label to given query facial images which is more beneficial to different real world application of SBFA. There are several group of search work, research is carried for facial image reorganization, feature extraction, unique key generation, annotation etc.

2. LITERATURE SURVEY
These are some research problems in computer vision and pattern recognition and have been studied from many years. G.B. Huang et al. [3] designed Labeled Faces in the Wild. Z. Cao et al. [4] presented a novel to address the representation and the matching issue about face recognition. In proposed work they firstly worked on approach that encodes the facial structures by a new learning-based encoding technique. They used unsupervised learning schemes to learn an encoder from the training facial image data sets. In next step they applied PCA technique to get a compact face descriptor. The obtained results show that the study done by them concludes that the discriminative ability of the descriptor can be improved with the help of a simple normalization mechanism after PCA.

Z. Wu et al. mainly addressed the face retrieval problem by making use of a local as well as global features, the study proposed an effective image representation. A supervised learning algorithm improves the Visual word vocabulary for face by designing. They proposed highly scalable system, and they planned it by making use of a computer cluster to apply on a web-scale image database. Retrieval-Based Annotation Approach, Shows that they are applied using distance metric learning and various different techniques are implemented with these retrieval based or search based face annotation [3].

Margarita Osadchy, Benny Pinks [4] - This study introduces SCiFI system; this system acquires face images of individuals in public places by camera which is called client machine. It runs face recognition algorithm in secure way so that it does not reveals privacy and confidentiality and compares faces with database of registered faces weather the acquired images matches one of the suspect which are stored in server, if not then it does not reveals information to any party. In specific applications of SCiFI decreases privacy of camera based surveillance.

RaikotiSharanabasappa and Sanjaypande M. B [5] – This proposes “a unique security architecture” where face features and its corresponding templates are used as the key for document security. A framework requires users to register their face instances to the system. Those instances stored in system are used for training purpose. In encryption phase for encryption of message when user selects folder all files within this are encrypted with previously stored templates of the user face instances. In decryption phase it requires verification ofuser through face instance and template generated here is used for decryption of encrypted files.

M. Zhao et al. [7] proposed a system that can recognize and learn faces by combining signals from large scale weakly labeled text, image, and video. First, consistency learning is

proposed which creates face models for popular persons. It uses the text-image co-occurrence on the web as a weak signal of relevance and further learns the set of consistent face models from the available large and noisy training set. It recognizes the people present in videos and at the same time they applied face detection and tracking to extract faces from various videos. And then, key faces are selected for each track for fast and robust recognition.

3. SYSTEM DESIGN

In this section briefly introduce the Proposed framework. This illustrates in fig 1 and consists of five major steps:

1. Publically available database named "Aleix Face Database".
2. Image Processing and facial Feature Extraction by Detecting Face.
3. Facial Unique Key Generation.
4. Retrival of Top K Similar facial Images From Database.
5. Annotation of Query Image

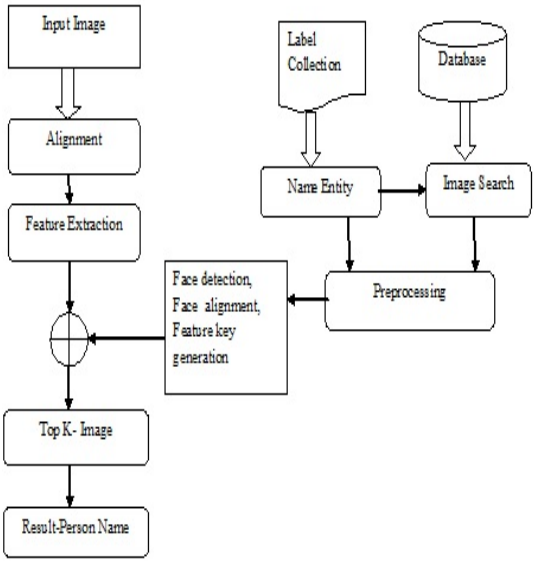


Fig 1: System Architecture

The first step is facial image data collection which is freely available on world wide web by using Google search engine but in this system we are using publically available database named "Aleix face database", which contains total of 4000 face images of 126 peoples with different facial expressions. These images are gray scale images and stored in JPEG format .

The second step belongs to image processing and feature generation. In this images from the databases are resized according to the requirement and unwanted part of it is removed. The use of the preprocessing is to reduce variations in face of person So that the performance of the system improves in order to recognize them and the feature extraction module using "Vision.CascadeObjectDetector" method facial points on face regions like eyes, nose and lips are to be located and 4 other boundary points also located. Totally it locates 13 landmark points on face image. From the located points it constructs fully connected graph which contains edge from each point to each point and calculate distance between each two points using Euclidian distance formula.

Euclidean distance between two points X(x1, y1) and Y(x2, y2) is calculated by using following formula. Where (x1, y1) and (x2, y2) are co-ordinates of points X and Y respectively.

$$d = sqrt((x_1 - x_2) \wedge 2 + (y_1 - y_2) \wedge 2).$$

Calculated values using Euclidean distance formula are stored in form of adjacency matrix of size 13*13.And finally 13 Eigen values from adjacency matrix is obtained; those obtained values are used as feature vector in feature extraction module.

The third step belongs to key generation by using feature extraction module generated by feature vector is used to generate 64-bit key. These values are extracted from those 13 Eigen values for generation of Eigen vector value and that Eigen vector value can be converted in to binary 64-bit number that is nothing but 64-bit binary key.

The Fourth step belongs to image retrieval from database when an input query image is given to the system that image can be aligned with facial points feature generation of that image can be stored in that 64-bit unique binary key after that key can be compared with already stored key from database and similar images of query image can be retrieved from database.

The Fifth and final step belongs to the face annotation in this similar images are retrieved from database after matching that images can be annotated with the name of matched image.

4. ALGORITHM

Feature Extraction Algorithm:

Step 1: Vision CascadeObject Detector method is used to find regions on the face like (eyes, nose, mouth).

Step 2: By using those regions points are located.

Step 3: Adjacency matrix is obtained from those points.

Step 4: Eigen value (Key) is obtained from Eigen vector of adjacency matrix.

5. RESULT ANALYSIS

Table 1 Shows that details of repeatable key generation are written in following table. It contains number of persons; number of tested images, number of images generates same key and lastly its accuracy in percentage as follows.

Table 1: Details of repeatable key generation

No. Of Person	No. Of Tested Images	No. Of Images Generates Repeatable Key	Percentage of Accuracy
Person 1	10	9	90%
Person 2	10	8	80%
Person 3	10	10	100%
Person 4	10	9	90%
Person 5	10	7	70%
Person 6	10	8	80%
Person 7	10	8	80%
Person 8	10	8	80%

Figure 2 shows the performance of system has been tasted for face images of different persons of different facial images. this can be applied for frontal facial images are taking boundary points. Here totally 80 images of 8 different persons are used for testing purpose. In this each person have 10 different images in one folder as per the requirement of the system. among all 67 images are correctly matched with the query image and other images are generating similar key.

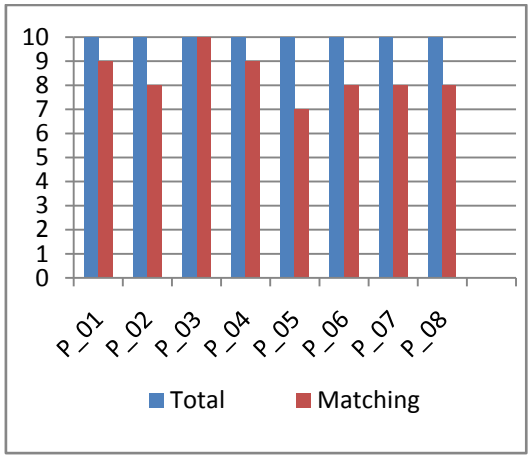
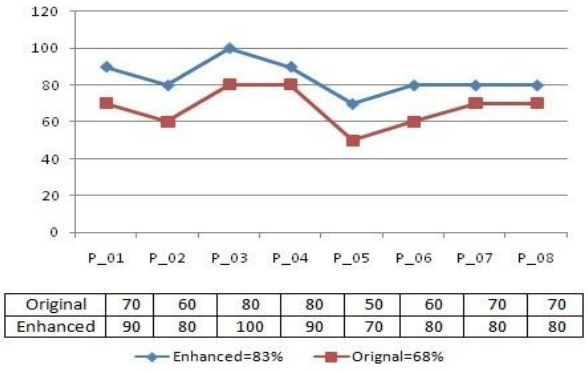


Fig 2: Comparision Of Perecentage Matching

Figure 3 shows evaluation of accuracy between original images from "Aleix Face Database" and enhanced image after processing it red line shows accuracy of an image matching before processing it. It is nearer to 56 % and after processing several images from test set and after applying the "Vision.CascadeObjectDetector" method to that images accuracy goes to the next level nearer to 83% .



Original	70	60	80	80	50	60	70	70
Enhanced	90	80	100	90	70	80	80	80

Fig 3:Evaluation Of Accuracy Between Original And Enhanced Image

6. CONCLUSION

It investigate a new search based face annotation framework in which enhancing the label enhancement by using this system. This Proposed system archived results by using "Vision Cascade Object Detector" method under the variety of facial images. These results also indicate the proposed system significantly to further improve the scalability, Future work can also proposed by using clustering-based approximation solution, which successfully accelerated the optimization task without introducing much performance and it can be based on the similar or duplicate names of different facial images label quality.

7. REFERENCES

[1] IEEE Transactions On Knowledge And Data Engineering, VOL. 26, NO.1, JANUARY 2014 on Mining Weakly Labeled Web Facial Images for Search-Based Face Annotation.

[2] International Journal of Computer Science Engineering and Technology(IJCSET) | October 2014 | VOL.4, Issue 10,253-255 Survey on Unsupervised Mining Weakly Labeled Web Facial Images for Search-Based Face Annotation.

[3] G. B. Huang M, Ramesh, T. Berge abd E. Lerned-Miller. "Labeled Faces in the wild: A Database for studying Face Recognisation in Untrested Environment. 2007

[4] Margarita Osadchy, Benny Pinkas University of Haifa "SCiFI – A System for Secure Face Identification"

[5] International Journal of Advanced Science and Technology Vol. 50, January, 2013 Raikoti Sharanabasappa1 and Sanjaypande M. B. " A Unique Document Security Technique using Face Biometric Template"

[6] IEEE Transactions On Knowledge And Data Engineering, VOL. 25, NO. 3, MARCH 2013 Annotating Search Results from Web Databases.

[7] M. Zhao, J. Yagnik, H. Adam, and D. Bau, "Large Scale Learning and Recognition of Faces in Web Videos," Proc. IEEE Eighth Intl Conf. Automatic Face and Gesture Recognition (FG), pp. 1-7, 2008.

[8] International ACM SIGIR Conf. Research and Development in Information Retrieval (SIGIR), pp. 111-118, 2007 J. Fan, Y. Gao, and H. Luo, "Hierarchical Classification for Automatic Image Annotation," Proc. 30th Ann.

[9] International ACM SIGIR Conf. Research and Development in Information Retrieval (SIGIR), pp. 1097-1098,2011Z.Lin,G.Ding,andJ.Wang,"Image Annotation Based on Recommendation Model," Proc. 34th.

[10] IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 29, no. 3, pp. 394-410, Mar. 2007 Carneiro, A.B. Chan, P. Moreno, and N. Vasconcelos, "Supervised Learning of Semantic Classes for Image Annotation and Retrieval".