Novateur Publication's
International Journal of Innovation in Engineering, Research and Technology [IJIERT]
ICITDCEME'15 Conference Proceedings
ISSN No - 2394-3696

# A REVIEW ON SEARCH BASED FACE ANNOTATION USING WEAKLY LABELED FACIAL IMAGES

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**ABSTRACT**
This paper investigates framework of face annotation by mining weakly labeled facial images which are freely or easily available on World Wide Web (WWW). The challenging part of search based face annotation task is management of most similar facial images and their weak labels. To tackle this problem, we propose an unsupervised label refinement (ULR) technic for refining the labels of web facial images using machine learning techniques. Auto face annotation can be beneficial to many real world applications like Facebook. The main aim of image annotation process is to automatically assign associate label to images, so image retrieving users are able to query images by labels and automatically detect human faces from a photo image and further name the faces with the corresponding human names.

**KEYWORDS:** Face annotation, content-based image retrieval, machine learning, label refinement, web facial images, and weak label.



## INTRODUCTION

Day by day the digital accessories for capturing images are increasing and the large number of human facial images shared over the different social media tools/sites are also increasing rapidly. Some of these facial images are tagged with names, but many of them are not tagged properly. Images shared by person are not given any labels or incomplete labels so it becomes problematic in understanding name of person from image if any random person sees it.Tagging facial images are known as face annotation and now a day many techniques are introducing for annotation. Auto face annotation is used for automatic face image annotation without any human intervention. So Auto Face Annotation motivates to us or refining the labels of facial images and annotates them automatically [1][4]. Auto face annotation can be beneficial to many real world applications. For example, with auto face annotation techniques, online photo-sharing sites (e.g., Facebook) can automatically annotate user's uploaded photos. Facial annotation is also applying for videos, such as annotation of facial images from news video is done and then it showed on television so that peoples can recognize person in TV [3][4].
The model base face annotation has more limitations i.e. it is more time consuming and more costly to collect large amount of human labeled training facial image. It is more difficult to generalize the models when new persons are added, in which retraining process is required and last the annotation performance is become poor when the number of persons is very more. To address the challenges "Auto face annotation" is important technique which

automatically gives name to relevant person images. Search base annotation is used for facial image annotation by mining the World Wide Web (WWW), where large numbers of weakly labeled facial Images are freely available.
The main objective of search-based face annotation is to assign correct name labels to a given query facial image [1]. The Search Based Face Annotation (SBFA) framework is data driven as well as model free, which is inspired by search based image annotation methods of image annotation. The main aim of SBFA is assign correct associative name label to image provided as input to search query. The automated face annotation task is accepted as challenging aim of the search based face annotation by using content-based image retrieval (CBIR) techniques in mining number of weakly labeled facial images on the web [5, 6].
In this approach top k most similar facial images are retrieved from database, and respectively task of annotation is performed on the basis of majority voting scheme. For effective name labeling annotation task, a novel unsupervised label refinement (ULR) scheme is used which solves problem of weakly label face annotation. Clustering-based approximation (CBA) algorithms are also exploited in this work, which lead to improvement of efficiency and scalability of search based system [1].

## LITERATURE SURVEY

Various techniques are present for face annotation for mining weakly labeled facial images which are freely or easily available on internet.

### A. FACE RECOGNITION AND VERIFICATION

These are classical research problems in computer vision and pattern recognition and have been studied from many years. G.B. Huang et al. [5] designed Labeled Faces in the Wild (LFW), is designed to address the problems, although it can be used to address the others if desired. Proposed work referred to this problem as the pair matching problem. This work describes the details of the database and its acquisition; it provides specific experimental paradigms for suitable database. Their work is carried with consistent and comparable database for performing research. They have introduced a new database, Labeled Faces in the Wild, whose primary aim is to provide a large database of real world face images for the unseen pair matching problem of face recognition, and fit it neatly into the detection-alignment-recognition pipeline.
Z. Cao et al. [6] presented a novel approach to address the representation and the matching issue in face recognition. In proposed work they firstly worked on approach that encodes the micro-structures of the face by a new learning-based encoding method. They used unsupervised learning techniques to learn an encoder from the training sets. In next step they applied PCA to get a compact face descriptor. From generated result, proposed work suggested that the discriminative ability of the descriptor can be improved by a simple normalization mechanism after PCA. To handle the large pose variation in real-life scenarios, they proposed a pose-adaptive matching method that uses pose-specific classifiers to deal with various pose combinations of the matching face pair. This proposed approach is comparable with the state-of-the-art methods on the Labeled Face in Wild (LFW) benchmark. Face micro-pattern encoding is learned in this work but the pattern sampling is still manually designed. Result of these work produced compact, highly discriminative, and easy-to-extract learning-based (LE) descriptor.

### B. FACE ANNOTATION ON PERSONAL/FAMILY/SOCIAL PHOTOS

Jae young choi et al. [10] they proposed a novel collaborative framework of face recognition for improving the accuracy of face annotation. Multiple FR engines available in online social networks are used for effective FR. This paper includes two main tasks, first is the selection of expert FR engines to recognize query face images. And second is the merging of multiple FR results, generated from different FR engines, into single FR results. These works implement the viola-Jones face detection algorithm for detecting facial images in personal photos. But in practical perspective it becomes problematic depending on targeted application and associated parameter setup. To tackle this problem more advanced face detection technique can be used in face annotation framework, which provides more accurate results.

## C. FACE ANNOTATION IN MINING WEAKLY LABELED FACIAL IMAGES ON THE WEB

M. Guillaumin et al. [12] introduced a modification to incorporate the constraint that a face is only depicted once in an image. This work has two scenarios of naming persons in database for finding face of person and assigning name to all faces. The text based result is not more accurate. Graph based approach is improved by introducing the constraint, objective function generative models have previously been proposed to solve the multi-person naming task by comparing generative and graph based methods. The most significant graph based method is extended in future to multi-person naming. M. Guillaumin et al. [12] proposed a method to iteratively update the assignment based on a minimum cost matching algorithm. In their follow-up work Guillaumin et al. [13], they further uses distance metric learning technique to enhance the annotation performance to gain lots of distinguish features in low dimension space.

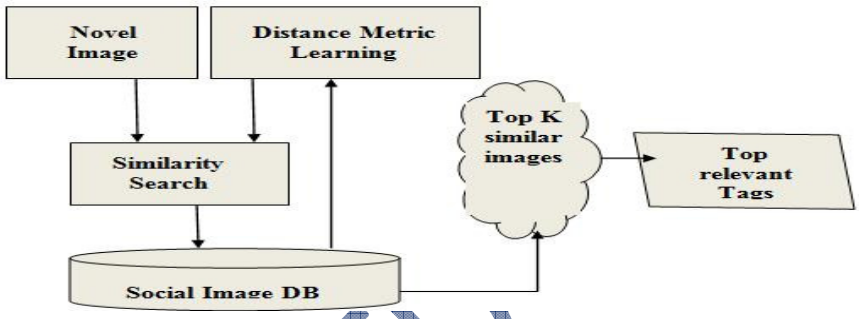


**Fig 1: Retrieval-Based Annotation Approach**

Fig 1. Shows that retrieval based approach are applied with distance metric learning also various different techniques are implemented with these retrieval based or search based face annotation. As shown in the Fig-2 a similarity search task is conducted, which is used to find a set of top-k images from a social or World Wide Web image database, and it obtains relevant images. Z. Wu et al. [13] mainly addressed the face retrieval problem, by using local and global features which propose an effective image representation. Future Work visual word vocabulary for face is improved by designing a supervised learning algorithm. This system is highly scalable, and they plan by using a computer cluster to apply on a web-scale image database. D. Wang, Steven C.H. Hoi et al. [1] proposed an effective unsupervised label refinement algorithm for refining the web facial images. Performance of the proposed system is improved using optimization algorithm which is helpful to solve large-scale learning effectively i.e. clustering based approximation algorithm is used in the propose system to improve the performance of search based face annotation scheme. The work of this paper is different from previous papers or existing systems; there are two key points that differentiate the proposed work from existing work. First key point is that it is used to solve general content based face annotation problem using search based face annotation scheme where face image is used as query image. And second key point is that unsupervised label refinement algorithm is used as suitable algorithm for enhancement of new label matrix for weakly labeled facial images. The SBFA consists of following steps as shown in fig. 2.

Step 1: Facial image data collection; Step
2: Face detection and facial feature extraction; Step
3: Facial feature indexing; Step
4: Refine weakly labeled data; Step
5: Similar face retrieval.

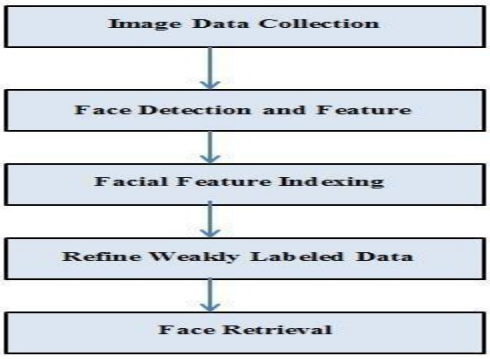


**Fig 2: Search Based Face Annotation steps**

### D. PURIFYING WEB FACIAL IMAGES

M. Zhao et al. [15] proposed a system that can learn and recognize faces by combining signals from large scale weakly labeled text, image, and video. First, consistency learning is proposed to create face models for popular persons. It uses the text-image co-occurrence on the web as a weak signal of relevance and learns the set of consistent face models from this very large and noisy training set. To recognize people in videos, face detection and tracking are applied to extract faces from videos. Then, key faces are selected for each track for fast and robust recognition. Face tracks are further clustered to get more compact and robust representation. The face tracks are further clustered to get more representative key faces and remove duplicate key faces. A combination of majority voting and probabilistic voting algorithm is used to recognize each cluster of face tracks. They showed various active learning possibilities in case of improving the recognizer to grow across age variations. Their proposed work provides another direction which would be shows that how to combine high precision face-based retrieval scheme and high-recall text-based retrieval scheme. D. Wang et al. [16] this proposed work adopted a unified framework of Unifying Transductive and Inductive Learning (UTIL) for mining web facial images to tackle the face annotation problem by combining the strengths of the two learning techniques. They worked on Weak label Laplacian support vector machine (WL-LapSVM) algorithm by adopting WLRLCC algorithm. Proposed system has an entropy-based rank level fusion algorithm, which performs and supervise regression-based fusion algorithm without any extra training efforts.

### APPLICATIONS

Face annotation can be used in various applications fields are as follows

- Criminal justice systems (forensics).
- Online photo album management.
- Social media sites like Facebook .

### CONCLUSIONS

This paper improve face recognize we focused on computer vision technique. In our application we are proposed ULR algorithm for enhancing the label quality and further improve the scalability, we also add a clustering-based approximation solution.

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