International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 5 Issue: 7 753 – 758

TAG ME: An Accurate Name Tagging System for Web Facial Images using Search-Based Face Annotation

Mr. Ansari Mohammed Abdul Qadir Ataullah
Department of Computer Engineering
MET'S Institute of Engineering, Bhujbal Knowledge City
Adgaon Nashik, University of Pune, Maharashtra, India
abdul11q@gmail.com

Prof. R.P.Dahake
Department of Computer Engineering
MET'S Institute of Engineering, Bhujbal Knowledge City
Adgaon Nashik, University of Pune, Maharashtra, India
dahakeranjana@gmail.com

Abstract— Now a day the demand of social media is increases rapidly and most of the part of social media is made up of multimedia content cognate as images, audio, video. Hence for taking this as a motivation we have proffer a framework for Name tagging or labeling For Web Facial Images, which are easily obtainable on the internet. TAG ME system does that name tagging by utilizing search-based face annotation (SBFA). Here we are going to select an image from a database which are weakly labeled on the internet and the "TAG ME" assign a correct and accurate names or tags to that facial image, for doing this a few challenges have to be faced the One exigent difficulty for search-based face annotation strategy is how to effectually conduct annotation by utilizing the list of nearly all identical face images and its labels which is weak that are habitually rowdy and deficient. In TAGME we have resolve this problem by utilizing an effectual semi supervised label refinement (SSLR) method for purify the labels of web and nonweb facial images with the help of machine learning techniques. Secondly we used convex optimization techniques to resolve learning problem and used effectual optimization algorithms to resolve the learning task which is based on the large scale integration productively. For additionally quicken the given system, finally TAGME system proposed clustering-based approximation algorithm which boost the scalability considerably.

Keywords—*Face annotation, SBFA, machine learning, semi supervised label refinement, web and nonweb facial images, weak label*

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I. INTRODUCTION

As we know now a day a rapid growth of social media increases day by day Due to that photo sharing and tagging is very popular. As we see on every social media Most of the content is established on images and images act as a one of the big entertainment Part of social media. Everybody wants to share their photos, images with each other on Social media sites and on World Wide Web. Contemporary years have witnessed a detonation of the Number of digital photos taken and keep by consumers. An extra piece of photos Shared by users online on social media are face images of human. Few of these face images are tagged properly with proper names, but numerous of them are improperly tagged. This notion motivated the study of auto face annotation, which is a dominant technique that point to annotate facial images automatically [14].

All of the facts discuss above we can say that a "TAG ME" system is advantageous to numerous actuality applications, For example, by utilizing auto face annotation techniques, online social networking sites which supports sharing of photos (e.g., Facebook, twitter etc.) can self-acting annotate user's uploaded photos to make easier online photo search and administration. Apart from this skill can be used in news domain and in video domain to notice main persons become visible in the videos to make easier the retrieval and characterization task from news video. Classical methods of annotation of face image are continually act towards an enlarge face recognition problem. Nevertheless, the Model based face annotation techniques are few within several facets. First, it is habitually time consuming and costly to gather a huge amount of training images of human faces which is a labeled images. Second, habitually it is hard to generalize the models when new data which is trained or new persons are added, in which a thorough process is normally required. Lastly, the recognition/annotation performance habitually plate badly when the number of classes/persons is very large. Currently, a few appearing studies have try to traverse a encouraging search-based annotation concept for the annotation of face images by mining online ,offline and realtime facial images where a large number of facial images which is weakly labeled are freely obtainable. As a substitute of training external classification models by the frequent model based annotation of face approach, the search-based face annotation (SBFA) model point to tackle the automated annotation of face work by utilizing CBIR i.e (content based image retrieval) scheme within mining gigantic face images which are weakly labeled online. The SBFA approach is data-driven and model-free, which too little size is inspired by the search based image annotation techniques for collective image annotations [16].

II. RELATED WORK

This System is closely homologous to several categories of research work and divided into five categories; now let us see these categories one after another in details:

The first category of alike task is basically focus on the concept of recognition and verification of faces, and it is old research issues of pattern recognition and computer vision and it studied from several years it is discuss in [03], [04]. Now currently it is notice that a few appearing touchstone studies of the detection and verification of face techniques on face images are collected from various sources, cognate as the LFW standard studies [05], [06], [07].

The second category is homologous with the studies of common image annotation i.e frequently used annotation. The old image annotation approaches habitually used few live object recognition techniques for training a classification models from the training images which are labeled by the human being and try to deduce the probabilities/correlation in the middle of annotated keywords and images. Giving short trained data, semi supervised methods of learning may be utilize for annotation of image [08]. This scenario is described in Wang et al. [09] and Pham et al. [10] both of them put forward the technique to purify the results based on model based annotation with a label likeliness graph which follows random walk principle. These all problems of image annotation and its different solutions are discussed in Likely, Pham et al. [10] and Russell et al. [11]. Unalike these live works of the different peoples, TAGME put forward a semi supervised label purification/refinement strategy which concentrates firstly on optimizing the label quality for face images towards the search-based face annotation task.

The third category focuses on annotation of a facial image on various kinds of photos such as family photos/personal photos and social photos. A few learning's [12],[14] have basically concentrate on the work of annotation on different photos mainly family photos which frequently include rich contextual clues, cognate as family/personal names, social media surroundings, geotags, timestamps along with others. The number of classes/persons is widespread utterly compact, creating cognate annotation tasks not so much exigent. All of these schemes widespread attain justly error free annotation results, out of this some techniques have been flourishing exploit in many applications which is commercially used, for example, Picasa by Google, Photo by Apple, EasyAlbum by Microsoft [13], and the face auto tagging solution of Face book.

The fourth category is regarding the learning's of annotation of face images in mining facial images which are weakly labeled present on internet. Few learning's consider input query as a human name, and mostly point to purify the text-based search outcomes by utilizing visual constancy of face images. For example, Ozkan and Duygulu [15] put forward a graph-based model for piercing the densest subgraph as a lot alike solution. Utilizing the graph-based scheme, Le and Satoh [16] put forward a contemporary native density score which state the significance of all choose facial images, secondly the Guillaumin et al. [17] put forward a moderation which absorb the restraint i.e a face is at most portray ever inside an image. Similarly, on the other side the productive scheme equivalent to the model called as gaussian mixture model which additionally chooses to the name-based search strategy [02] and attain proportional solution. Freshly, one of the distinguished concepts was proffer within [18] to enhance over the productive secheme. Utilizing plan from expansion of query [19], the production of name based strategy may additionally enhance with inaugurating the friends images as the name of query. Unalike these learning are of sieving the solution based on text-based retrieval, a few learning's have Endeavour to absolutely annotate all face images with the specific names comes from the caption information, Berg et al. [20] put forward a likelihood technique and also include the clustering algorithm to calculate the names of the caption and their facial images. In TAGME the task is dissimilar from the above precursory tasks in terms of two main facets. Firstly, TAGME resolve the widespread content-based face annotation problem utilizing search-based archetype, here images of face are absolutely consider as a query images and the work is to give correlating names of the images taken as a query. Only few learning's has been described on this kind of idea. A few contemporary works [21] mostly tackle the face retrieval problem, within which is an effectual image portrayal has been proffer utilizing both global besides local features. Secondly, it established on beginning labels which are weak, the proffer semi supervised label purification/refinement algorithm acquire knowledge of an amplified new label matrix having whole face images within the total name space.

The fifth category concerning the learning's of cleansing face images, which point to leverage rowdy online facial images for face recognition supplications. Habitually this kind of works have proffer as an easier preprocessing pace within the entire system without using worldly schemes. Consider the e.g., the task in [02] put in a modified k-means clustering approach for cleansing up the rowdy online face images. Zhao et al. [22] have proffer a constancy method of learning for face models training of the celebrity with the help of mining the text-image co-occurrence on the internet as a poor signal which is applicable in the direction of supervised learning task of faces from a bigger and rowdy training set. Unalike the given live tasks, the system utilize the semi supervised machine learning schemes and put forward a label purification/refinement algorithm which is graph based to enhance standards of the image label over the entire retrieval database in the SBFA task [01].

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III. PROPOSED SYSTEM

TAGME system flow architecture is shown in fig. 1 the overall system represented in three modules:

a) Facial Image Gathering.

b) Peprocessing, Learning & Indexing.

c) Retrieval and Image Annotation.

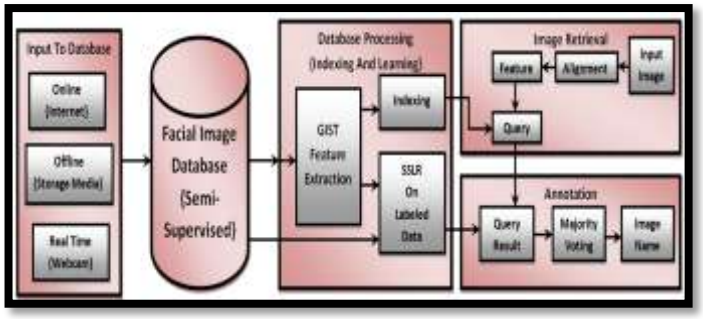

Fig. 1. TAGME System Flow Architecture

The short descriptions of these modules are as follows:

(a) Gather labeled facial images from internet by utilizing web search engines.

(b) Preprocess the facial images, By Implementing face detection, feature extraction and alignment for the detected faces; following that, TAGME Used indexing to extracted high-dimensional facial features and used proffer SSLR scheme to purify the labels simultaneously with the proffer clustering-based approximation algorithms for improving the scalability.

(c) Search for the query facial image to retrieve the top K alike images and use their analogous names for voting toward auto annotation.

The above paces are broadly classified as:

1. Facial image data gathering.
2. Face feature extraction and its detection.
3. High-dimensional feature indexing.
4. Indexing and learning for purification of weakly labeled data.
5. Alike face retrieval.
6. Annotation of face by percentage of matching on the alike faces with the purified labels.

The first four paces are habitually conducted before the face annotation task test phase and remaining paces face of annotation task are conducted in between the test phase, which habitually done accurately. We describe these paces one by one below.

The first pace dealing with the data gathering of facial images as seen in Figure 1, in which system gathering facial images from the Internet using a live web search engine (i.e., Google) as per the searched query given. The output of this crawling process shows the facial images of a given person and each of them is analogous with a few human names. As per the nature of web images, these facial images are continually rowdy, which do not consistently related to the correct human name. Thus, the system calls cognate category of facial images with rowdy names as weakly labeled facial image data.

The second pace is to preprocess these facial images taken from online to extract the information homologous with the human face, this preprocessing includes including detection of face, its alignment, extraction of facial region extraction and facial feature portrayal. For the detection of face and alignment, the system embraces the semi supervised face alignment technique proffer in [23]. For facial feature portrayal, the system extracts the GIST texture features to depict the extracted faces. The result of these processes is that, each face can be depicted by a d-dimensional feature vector.

The third pace is indexing the features which are extracted from the face by implementing a few efficient high-dimensional hash indexing techniques to facilitate the retrieval of similar face task. In this approach, system choose the locality sensitive hashing (LSH), a very famous and effectual hash based indexing technique. Apart from the indexing pace, an additional vital pace of TAGME is to occupy a semi supervised learning strategy to intensify label standards of facial images which is weakly labeled. This is very salient process for the whole framework of search based annotation, after all the label standards act as a judge mental factor in the final annotation performance.

Each of the above is the activities prior to the annotation of a query facial image. Next, now the system reports the activity of annotation of face throughout the test phase. In specific, considering a query facial image for annotation, the system firstly supervised alike retrieval of face process for finding a subset of most alike faces (generally top K alike faces) from the precursory dataset consist of facial images which is indexed using hash indexing. Along the set of top K alike faces which is retrieved from the dataset, the pace is the face annotation with a label by utilizing a percentage of matching approach that merge the labels analogous with these top matching alike faces. In this topic, the system focuses our attention on one key pace of the above framework, i.e., the semi supervised process of learning to purify labels of the labeled facial images.

A. Algorithms

1) *Multistep Gradient Algorithm Utilizing SSLR*

The optimization tasks belong to exactly quadratic programming (QP) problems. It appears to be feasible to resolve them absolutely by applying generic QP resolvers. Nevertheless, this would be computationally extremely thorough after all matrix F can be probably huge, for example, for a big 400-person dataset of entirely 40,000 face images, F is a 40,000* 400 matrix that resides of 16 million variables, which is almost infeasible to be resolved by any live generic QP resolver. So we first select multistep gradient algorithm to resolve the problem, as shown in algorithm.

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Parameters	Meaning
$Q \in R^{(n.m)x(n.m)}$	Vectorizing Matrix
x^*	Optimal Solution
K	No. of Iteration
$Z^{(k)}$	Search Point for Label Refinement
t	Lipshitz Constant
α_0	Regularization Parameter, consistently $\alpha>0$.

Table 1. Parameters Used in Algorithm.

Algorithm :

Input : Vectorizing Matrix $Q \in R^{(n.m)x(n.m)}$

Output : X* i.e Optimal Solution

Start

Step 1 : Initialize Parameters:

1. Regularization Parameter (α_0) Initially Set to One
2. No. of Iteration (k) Initialize to One
3. Search Point ($Z^{(k)}$) is Initially Set to Zero
4. Optimal Solution at Start (X^0) is Set to Zero
5. Optimal Solution Minus One (X^{-1}) is Set to Zero

Step 2 : Repeat Following Steps Until Convergence

1. Used Soft Regularization Formulation to Attain Approximate Solution (X^k)
2. Used Convex Constrain Formulation to Achieve Approximate Solution (X^k)
3. Calculate Regularization Parameter(α_k)
4. Process the ($Z^{(k)}$) for Combining Two Previous Approximate Solution (X^k) and (X^{k-1})
5. Increase the Value of Interation i.e K = K+1

Stop

B. Mathematical Model

Let the TAGME system is described by S,

S = (IC, FD, FI, LD, FR, FA)
Q = (q1,q2,.qn)
Ω = (n1,n2,n3.....)
T = (t1,t2,t3.....)
R = Dataset
X^* = Optimal Solution

Where

S : Depicts TAGME System.
Q : Set of Input Query Images.
R : Dataset.
Ω : Human Names List for Annotation.
T : No. of Iterations to find Enhanced Image.
IC : Gathered the data of facial images
FD: Detected Face and Extracted Features.
FI : Indexing of Features of Face.
LD: Data Learning and Purification of Labels.
FR: Retrieval of Facial Images
FA: Annotation of Face Using Percentage of Matching
X^*: Annotated Image.

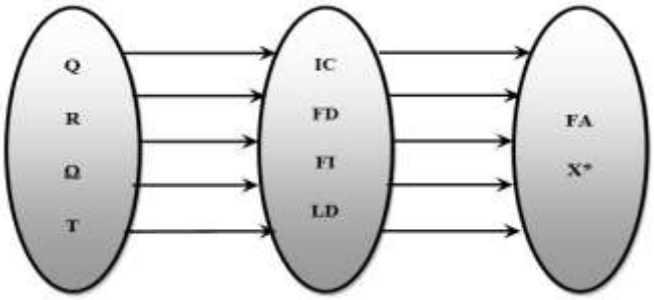

Fig. 2. Vein Diagram of TAGME

IV. Implementation And Results

A. Performance Evaluation of Face Detection.

In this experiment we have calculated the face detection performance on a celebrity images which is used in TAGME system database, the details of this operation is as shown in table 2.

Sr. No.	Celebrity Name & Its Dataset Name	Total Images Taken	Detected Images	Recognized Images
Offline Images				
1	Image_set1	15	13	10
2	Imageset2	15	10	08
3	Image_set3	15	10	09
4	Image_set4	15	14	12
5	Image_set5	15	11	08
6	Image_set6	15	13	10
7	Image_set7	15	14	13
8	Image_set8	15	14	12
9	Image_set9	15	13	11
10	Image_set10	15	13	12
Online Images				
1	Image_set11	16	10	08
2	Image_set12	14	08	05
3	Image_set13	14	09	07
4	Image_set14	13	08	07
5	Image_set15	16	10	08
6	Image_set16	12	07	05
7	Image_set17	14	08	07
8	Image_set18	13	08	06
9	Image_set19	16	09	07
10	Image_set20	15	08	05
Realtime Images				
1	Image_set21	10	06	03
2	Image_set22	07	04	02
3	Image_set23	12	06	04

Table 2. Face Detection Performance

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Table 2 is depicted utilizing graph as shown in fig.3, here we consider the part of the overall dataset and represented as Image_set of different celebrities, out of the total images which is taken from the Image_set we have find the detected faces and recognized faces.

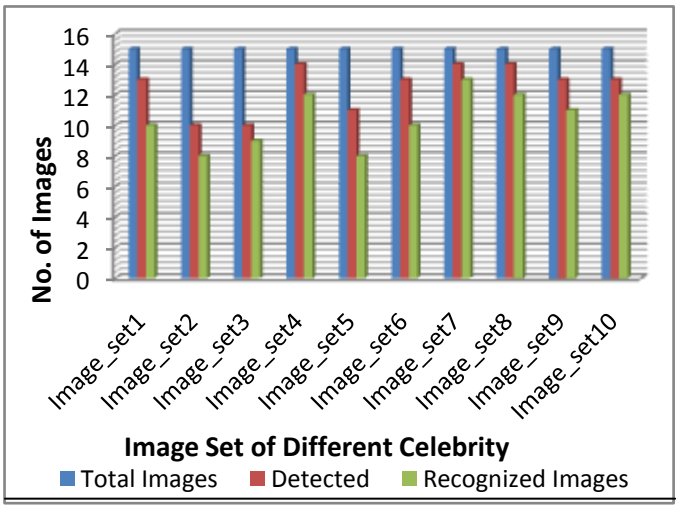

Fig. 3. Face Detection Performance Graph of Offline Images

B. Evaluation of Image Clustering

In this experiment we shows overall procedure of image clustering in this process firstly dissimilar clusters of a identical image are formed as per the percentage of matching, for example if we give shahrukh khan image for retrieval then all the shahrukh khan images from the database are shown in fig. 4, following that we perform clustering on that image and then shows clustering results according to the percentage of matching, means exact alike image shows 100% alike and remaining images are display as per their matching percentage, this is possible by creating a dissimilar clusters of a identical image and match that cluster with the input image cluster. The process of clustering is depicted as follows, here C1,C2,C3…..C7 depict the dissimilar cluster of a identical person according to the percentage of matching. Hence utilizing clustering we calculate the annotation performance of TAGME system.

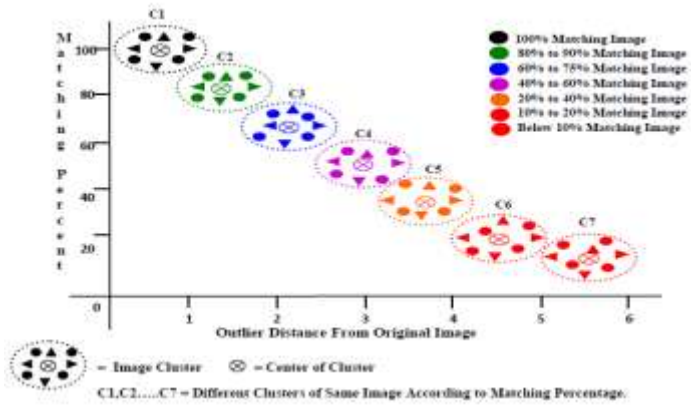

Fig. 4. Evaluation of Image Clustering

C. Evaluation of Annotation

This experiment points to examine the automatic annotation of face established using the search based face annotation. In TAGME the annotation is done by utilizing percentage of matching with the images in the database, we evaluate this on a database consists of 3000 images. Figure 5 shows the annotation count with respect to the number of images of a celebrity present in a database, here we consider total images of different celebrities from a database and shows match annotation from the database of that celebrity in percentage form.

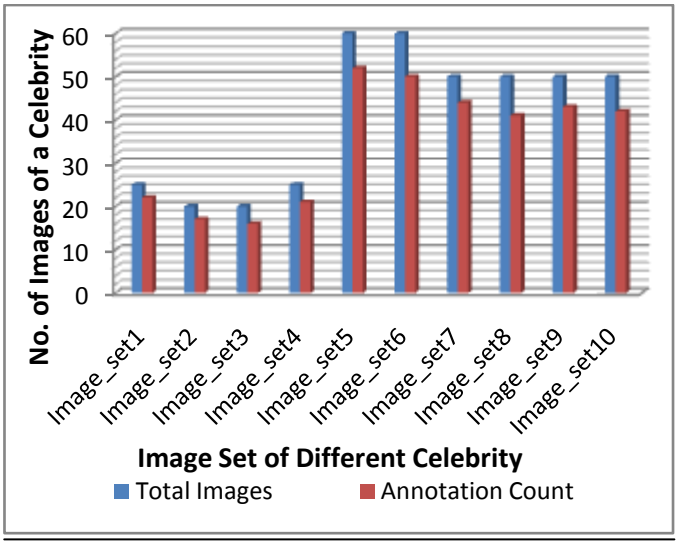

Fig. 5. Evaluation of Annotation

V. APPLICATIONS

1) Over Internet For Accurate Name Tagging Of Facial Images.
2) Over Social Media Sites.
3) Over Intranet Of an Organization.
4) In a Biometric Security System For Giving Name to the Facial Image.

VI. CONCLUSION

"TAG ME" mostly focused real life problem of name tagging over social media, over the internet and additionally on tackle the sever problem to enhanced the label standards, Secondly this system could be used for upgrade in the scalability and for successful acceleration of the task optimization without any degradation of performance. Here we additionally introduced performance annotation analysis, real-time images as an input, work on group images also the annotation criteria is set as per the percentage of matching and we also consider variable image sizes. Hence, we can say that the problems of existing system w.r.to name tagging over internet is remove here, and the ability of searching the correct image according to the input label or name is increasing in TAG ME and it is also pertinent for large scale database.

ACKNOWLEDGEMENT

We are very much thankful to all the authors of the papers which we have referred and glad to express my sentiments of gratitude to all of them who rendered their valuable contribution and help to make this work successful.

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