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RELABELING OF WRONGLY LABELED FACIAL IMAGES USING FEATURE BASED ANNOTATION APPROACH

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ABSTRACT

Face annotation related to face detection and recognition. Automatic Image Tagging seeks to assign relevant words to images that describe the actual content found in the images without intermediate manual labeling. Recently researches interests in labeling with appropriate name in place of wrongly labeled facial images on the internet to resolve research challenge in computer vision and image understanding. This paper deals with a new approach for relabeling images with appropriate labels automatically. In this work, we focuses automatic relabeling of images with correct names which is mined from large set of database using an efficient feature affinity based approach. Image detection rate is also examined in these work based on these approaches and make a performance evaluation.

Keywords*: *Content-Based Image Retrieval, Face Annotation, Search Based Face Annotation, Weak Label, Web Facial Images.

I. INTRODUCTION

Day by day the digital media devices are increasing so the different social media tools used for sharing photos. The large number of human facial images shared over the different social real world application some of this images are tagged properly but many of images are not tagged properly so the facial annotation are came. The model base 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 of relevant person [1]. This technique is more beneficial to different real world application for (e.g. face book) which annotates photos uploaded by the users for managing online album and searches the photos. Recently search base annotation are used for facial image annotation by mining the World Wide Web (WWW), where large number of weakly labeled facial Images are freely available. The search-based face annotation paradigm aims to tackle the automated face annotation task by exploiting content-based image

retrieval (CBIR) techniques [2], [3] in mining number of weakly labeled facial images on the web. The main objective of search-based face annotation is to assign correct name labels to a given query facial image.

II. RELATED WORKS

In many real-world applications, the data is naturally multi-model, in the sense that they are represented by multiple sets of features. Different studies are perform on face annotation in mining weakly labeled facial images which are present over internet in this human name are treated as input query and aim is to refine the text-based search results by achieving consist facial Images. Hui Wang [4] specified that initially image retrieval researches are moving from keyword to low level feature and to semantic feature. Unlike keywords-based system, visual features for content based system are extracted from the image itself. All images undergo the low level feature extraction process before being added to the image database. This paper attempts to discuss the evolution of the retrieval approaches focusing on development, challenges and future direction of the image retrieval S.Gao, D.H.Wang and C.H.Lee [5], [6] propose a new framework for automatic image annotation through multi-topic text categorization. Given a test image, it is first converted into a text document using a visual codebook learnt from a collection of training images. Latent semantic analysis is then performed on the tokenized document to extract a feature vector based on a visual lexicon with its vocabulary items defined as either a codeword or a co-occurrence of multiple code words. The high-dimension feature vector is finally compared with a set of topic models, one for each concept to be annotated, to decide on the top concepts related to the test image. These topic classifiers are discriminatively trained from images with multiple associations, including spatial, syntactic, or semantic relationship, between images and concepts.

Berg et al.[7] presents the combination of a possibility model with a clustering algorithm for image annotation. This helps to find the relationship between the facial image and the captions for the images and detect names in the document. In this work, first take large collection of news images and captions as semi-supervised input and produce fully supervised dataset of faces labeled with names. Face detector is used to identify potential faces and named entity recognizer to identify names. Use generative model for face annotation. Semantic gap problem is minimized in this method. This method works on a particular data set.

Ozkan and Duygulu [8] proposed a graph based model for face annotation. By finding the similar subset of possible set of faces with query person name is the objective. Implementation is based on SIFT descriptors. These methods ignore some set of information. First step is Integration on names and faces and then making a graph based on the similarity of faces. Final step is to find densest component and extract group of faces corresponding to the person. IP points are to be retrieved with the help of geometrical and unique match constraints. Guillemin et al [9] introduced a novel graph based approach. It solves both single person retrieval and multi person retrieval problem. Propose lower level methods for constructing graphs. Made a comparative study between generative and graph based model.

T. Mensink and J.J. Verbeek [10], Z.Wu et.al[11] using ideas from query expansion the performance of name-based scheme can be further improved. In this paper they are interested to finding images of people on the web and more clearly labeled the new images. The text base initial results are not perfect. The performances are depending on the assumptions. D. Wang, S.C.H. Hoi, Y. He. And J. Zhu [12] the WLRLCC algorithm is focused on learning more features for the top retrieved facial images for each query. By weak label regularized local coordinate coding. Retrieval based face annotation is used in mining massive web facial images for

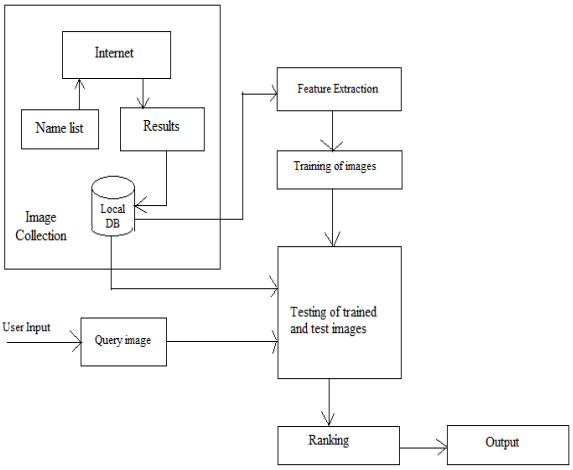
automatic face annotation .there are two challenges first is how effectively retrieve most of similar facial images. Second is how to effectively perform annotation. They proposed weak label regularised local coordinate coding (WLRLCC) technique. They also proposed the optimization algorithm i.e.WLRLCC algorithm This algorithm boosts the performance of the retrieval based face annotation approach on a large scale web facial image D. Wang, S.C.H. Hoi, and Y. He et al. [13] this proposed system investigated a unifying learning scheme by combining both transductive and inductive learning technique to mine web facial images for face annotation. They proposed Weak label Laplacian support vector machine (WL-LapSVM) algorithm by adopting WLRLCC algorithm. Dayong Wang, Steven C.H. Hoi et al. [14] propose an effective unsupervised label refinement for refining the web facial images. For improving the performance they also propose optimization algorithm to solve large-scale learning effectively i.e. clustering based approximation the propose system improve the performance of search based face annotation scheme. The work are different form all previous work by two things. To solve general content based face annotation problem using search based where face image as query image. They used unsupervised label refinement algorithm which enhanced new label matrix. This work also related recent work of the WLRLCC method [12]. Dayong Wang, Steven C.H. Hoi et al [15] introduce another approach calles learning to name face.

III .SYSTEM DESIGN

3.1 Preliminaries

Face recognition is a very challenging area in computer vision and pattern recognition due to variations in facial expressions, poses, illumination. In this work, we proposes face annotation task with a novel approach. In order to perform face annotation task, this consists of the following steps:

1. Facial image data collection and feature extraction
2. Training of images
3. Categorization of images and indexing
4. Similar face retrieval
5. Face annotation



.Fig 1. System Architecture

In the SBFA framework, the name (label) of the query face is predicted based on its nearest facial images. Assume the top-n retrieval results of the query image qi are $\{(d_{ij}, y_{ij})|j = 1, 2, ..., n\}$, where d_{ij} is the j-th similar

image in the retrieval result and $d_{ij} \in \{0, 1\}^m$ is its corresponding label vector. We denote by $Y_i = [y_{i1}, y_{i2}, \ldots, y_{in}] \in R^{m \times n}$ the label matrix for the i-th query q_i. For each query-neighbor pair (q_i, d_{ij}), we can create one query neighbor similarity based feature vector: $x_{ij} = \Omega(q_i, d_{ij}) = [\varphi_k(q_i, d_{ij})]$ from k=1 to N_f, where $\varphi_k(\cdot, \cdot)$ represents the k-th query-neighbor similarity function and N_f is the number of the query-neighbor similarity functions. To estimate the similarity more accurately by exploring more information, we can leverage multiple diverse query-neighbor similarity functions. The first two steps are usually conducted before the test phase of a face annotation task, while the last three are conducted during the test phase of a face annotation task, which usually should be done very efficiently. In our work, the first step is the data collection of facial images, in which we crawled a collection of facial images from the WWW by an existing web search engine (i.e., Google) according to a name list that contains the names of persons to be collected. The second step is to preprocess web facial images to extract face-related information, including face detection and alignment, facial region extraction, and facial feature representation. For facial feature extraction Face SDK is used. It extracts more facial features more efficiently. Based on these values, more images are trained and automatic relabeling is performed.

3.2 Problem Formulation

We denote by $X \in IR^{n \times d}$ the extracted facial image features, where n and d represent the number of facial images and the number of feature dimensions, respectively. Further we denote by $\sum = \{n_1, n_2, n_3 \ldots\ldots n_p\}$ the list of human names for annotation, where p is the total number of human names. First step is training each images. For that, find center of each image by taking proper x, y values with equation $(x_2\text{-}x_1/w, y_2\text{-}y_1/h)$ where w and h denotes the width and height of the loading image. Based on these values, further operations are performed. For each d number of features find minimum x, y values and maximum x, y values. For training each images form a database with m number of clusters. Each of the cluster or group contain n images with different poses. Fig 2 specifies image training phase.

Let $G_1, G_2, \ldots\ldots G_m$ be the groups contains n images with different poses.
for i=1 to m
for j=1 to n
Retrieve all the feature coordinates (x_k, y_k) of
each image
Select Max(x_k, y_k) and Min(x_k, y_k) of each I_j for
each features from those similar images.
Generate the feature matrix M_k with the feature
Co-ordinate value with attribute Max(x_k), Max(y_k), Min(x_k), Min(y_k).
end for
end for
Assign all the images into corresponding list of groups
with appropriate values

Fig 2.Steps for training images

3.3 Feature Affinity Based Clustering Approach

In this work, there are two key challenging tasks for the search-based face annotation framework: (i) how to efficiently retrieve the top-n most similar facial images from a large facial image database (ii) how to effectively exploit the short list of candidate facial images and their weak labels for naming the faces automatically given a query facial image. These challenges are to be faced in this work. After the training phase, next step for relabeling wrongly annotated facial image is annotation procedure. For annotation procedure we develop a new clustering approach based on feature affinity. In this approach, upload a query image and compare the feature co-ordinates values with the initialized attribute values after proper face alignment and feature extraction. Based on this value the correct labeling name should be identified. For performing such operation first initialize a feature affinity matrix. During the comparison operation feature affinity matrix value is incremented for each feature co-ordinates values based on each image. At end of the operation related image feature affinity matrix had the highest value. Assign highest value image into the corresponding group and label with corresponding name. Working flow model is given in fig3.

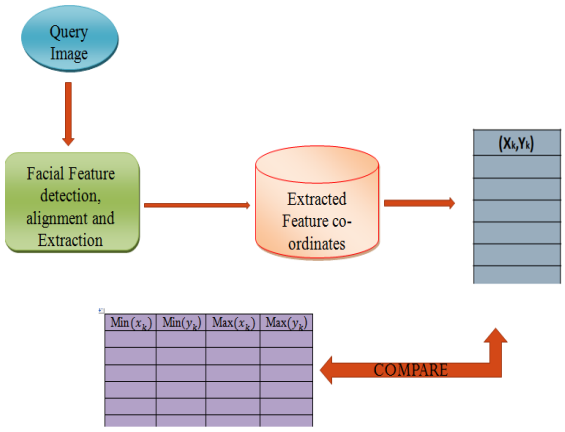


Fig 3 Working Flow Model

Algorithm 2 defines feature affinity based clustering technique. Algorithm specifies how the annotation operation is to be performed. It is based on the group feature affinity. For finding the correct annotation value, rank the affinity value in the decreasing order and annotate with correct value.

Input: Query image

Output: Annotated image

Initialize number of features and groups

For each query image Q_i,

Retrieve all the feature coordinates (q_{xi},q_{xj}) *of* Q_i

Generate the feature matrix $QM(q_{xi},q_{yi})$

For each facial feature

For j=1 to m

Intialize the Affinity_matrix $A_n[m,1]$ *with all value zero, where each row corresponds to the feature matrix*

Compare (q_{xi},q_{yi}) *with* $Max(x_k,y_k)$ *and* $Min(x_k,y_k)$ *of*

M_j

if (q_{xi},q_{yi}) *value lies between* $Max(x_k,y_k)$ *and* $Min(x_k,y_k)$

then $A_n[j,1] = A_n[j,1]+1$

end for

end for

Find $Max(A_n[m,1]$, *which corresponds to* M_q *where* $q \leq m$

If Q_i *has maximum similarity with cluster* G_q

then label the query image with correct label

Fig 4. Feature Affinity Based Clustering Algorithm

This work also investigates the number of similar images of same person. The details of images are to be specified in the output given in fig5. Fig specifies the number of images of the same celebrity.

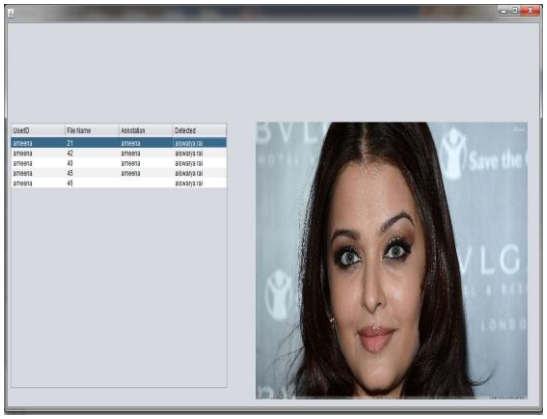


Fig 5. Number of Files in Database of Same Celebrity

Fig 6 gives the final result of face annotation based on feature affinity. Even though, we given a wrong label to the uploaded image, this work gives the correct label which is stored in the database.

Fig 6. Final Result of Face Annotation

IV. EXPERIMENTAL RESULTS

Some web facial image databases are available on the WWW, which are used In our work. Although the number of persons in databases is large, the number of images for each person is quite small. For each downloaded image, we crop the face image out according the provided face position rectangle and resize all the face images into the same size and create certain set of group with images of same person. To construct the training set, we randomly collect images in the same way from the retrieval database. And then each of the operations are to be done orderly. To evaluate the each framework on weakly labeled web facial images, we celebrity database. The resulting graph is specified in fig 6. In graph, x axis denotes number of human face samples we collect and y axis denotes the detection rate.

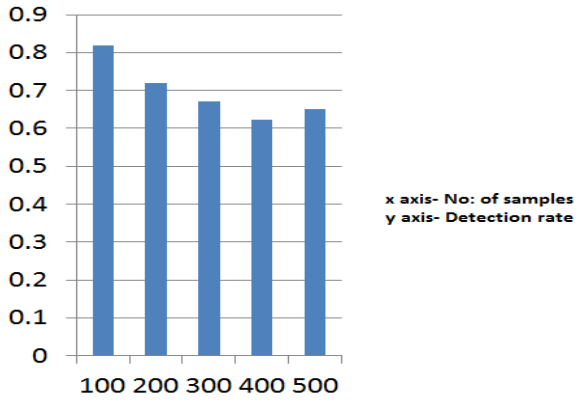


Fig 7. Evaluation Results

In this experiment, we evaluate the annotation performance under varied number of training query images. From the results, it is obvious that the face naming performances are varying based on the samples. Our result indicates that the refined label matrix can boost the performance. Previous studies give 60.2% correct results. Feature affinity based algorithm can achieve a good performance which remains much better than the L2NF scheme and SBFA scheme.

V. APPLICATIONS

Face annotation finds its application in the field of:

1) Face annotation at macro scale and micro scale
2) Wild landmark face annotation
3) Online photo album management

VI. CONCLUSION

This paper presents an extensive survey on face annotation techniques for web facial images. Currently, many new approaches are proposed in the field of Auto Face Annotation. Many research issues have been highlighted and direction for future work has been suggested. Many open issues have been highlighted by the researchers such as dealing with auto face annotation.

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REFERENCES

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

[2] A.W.M. Smeulders, M. Worring, S. Santini, A. Gupta, and R. Jain,"Content-Based Image Retrieval at the End of the Early Years,"IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 22, no. 12,pp. 1349-1380, Dec. 2000.

[3] T.L. Berg, A.C. Berg, J. Edwards, M. Maire, R. White, Y.W. Teh, E.G. Learned-Miller, and D.A. Forsyth, "Names and Faces in the News," Proc. IEEE CS Conf. Computer Vision and Pattern Recognition (CVPR), pp. 848-854, 2004.

[4]. Hui Hui Wang,Dzulkifli Mohammad, N.A.Ismali, "Approaches, Challenges and Future Direction of Image retreival"Journal of Computing,Volume 2,Issue 6,June 2010,ISSN 2151-9617.

[5] S.C.H. Hoi, R. Jin, J. Zhu, and M.R. Lyu, "Semi-Supervised SVM Batch Mode Active Learning with Applications to Image Retrieval," ACM Trans. Information Systems, vol. 27, pp. 1-29, 2009.

[6] S.Gao, D.H.Wang and C.H.Lee," Automatic face annotation through multi topic text categorization", Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing, volume 2,May 2006.

[7] T.L. Berg, A.C. Berg, J. Edwards, and D. Forsyth, "Who's in the Picture," Proc. Neural Information Processing Systems Conf.(NIPS),2005.

[8] D. Ozkan and P. Duygulu, "A Graph Based Approach for Naming Faces in News Photos," Proc. IEEE CS Conf. Computer.

[9] M. Guillaumin, T. Mensink, J. Verbeek, and C. Schmid, "Face Recognition from Caption-Based Supervision," Int'l J. Computer Vision, vol. 96, pp. 64-82, 2011.

[10] T. Mensink and J.J. Verbeek, "Improving People Search Using Query Expansions," Proc. 10th European Conf. Computer Vision (ECCV), vol. 2, pp. 86-99, 2008.

[11] Z. Wu, Q. Ke, J. Sun, and H.-Y. Shum, "Scalable Face Image Retrieval with Identity-Based Quantization and Multi-Reference Re-Ranking," Proc. IEEE Conf. Computer Vision and Pattern Recognition (CVPR), pp. 3469-3476, 2010.

[12] D. Wang, S.C.H. Hoi, Y. He, and J. Zhu, "Retrieval-Based Face Annotation by Weak Label Regularized Local Coordinate Coding," Proc. 19th ACM Int'l Conf. Multimedia (Multimedia), pp. 353-362, 2011.

[13] D. Wang, S.C.H. Hoi, and Y. He, "A Unified Learning Framework for Auto Face Annotation by Mining Web Facial Images," Proc. 21st ACM Int'l Conf. Information and Knowledge Management (CIKM), pp. 1392-1401, 2012.

[14] Dayong Wang, Steven C.H. Hoi, Ying He, and Jianke Zhu, "Mining Weakly Labeled Web Facial Images for Search-Based Face Annotation" IEEE Transactions on Knowledge and Data Engineering, vol. 26, no. 1, January 2011.

[15] Dayong Wang, Steven C.H. Hoi, Ying He, and Jianke Zhu," Learning to Name Faces: A Multimodal Learning Scheme for Search-Based Face Annotation" SIGIR'13, July 28–August 1, 2013, Dublin, Ireland.