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A Survey on Mining of Weakly Labeled Web Facial Images and Annotation

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Abstract: ***Now-a-days, lots of images are generated and uploaded on the internet due to the popularity of digital cameras and social media tools. Some of these facial images are tagged correctly, but most of them are not tagged correctly, so facial annotation came into the picture. There are many applications found in online photo album management, real world management system and in multimedia to correctly identify the person in the video domain. On the World Wide Web (WWW), most images are wrongly labeled so it asserts towards a strong need of a system that strongly performs mining and annotation of these weakly labeled images. Face annotation associated with face detection and recognition recently researcher's interests in mining weakly-labeled facial pictures on the net to resolve research challenges in computer vision and image understanding. This paper provides varied techniques or ways that are used for annotating facial images. One testing issue problem for search-based face annotation plan is the way to effectively perform tagging by retrieving the list of most comparative facial pictures and their weak labels that are frequently noisy and deficient. The main objective of the proposed system is to assign right name labels to a given query facial picture.***

Keywords: Annotation, Face recognition, Image mining, Ensemble learning method, Web facial images.

1. Introduction

The Large amount of images such as medical images, satellite images, multimedia images and photography in different fields are generated. Because of the vast extension of web images sharing portals and social networking sites, huge number of pictures and photographs have been divided and uploaded on the internet. Our daily routine can be easily caught, browsed, saved and split easily by social networking sites. Latterly, web users permit to impart their images with partners and people that permit different users to give their opinion about the images. Due to the considerable development of the amount of photos, there is a powerful need for automatic indexing of human images.

Social real world applications share the huge number of human web facial images yet some of these images are stamped effectively, but several facial images are not tagged correctly so we use facial annotation. Recently search base annotation is used for facial image annotation by mining the images from World Wide Web (WWW), where vast numbers of weakly labeled, web facial Images are openly accessible. Face annotations are used in the video domain to identify and distinguish specific people in the video. Auto face annotation is often useful in several real world applications. As an example, with machine face tagging techniques, on-line photo-sharing websites (e.g., Facebook) will automatically annotate users' uploaded photos to facilitate online exposure search and management. [1]

Annotation is metadata that is attached to text, image or other data. Wrong information attached to images is called weak label images. Image retrieval is a computer system for browsing, searching and retrieving images from a large database of images. It has two types text based image retrieval and content based image retrieval.

The remainder of this paper is arranged as follows: The next section reviews related survey work, and analyzes the problem with the existing annotation system. Section 3 and 4 presents the proposed system which includes correct annotation using the classifier and the conclusion of this paper.

2. Related Work

Mining of weak labeled web facial images over the internet has been studied with different methods. All these methods are performed on it such that human names are used as input query and expect to refine results based on text by attaining exist face images.

D. Wang et.al [1] proposes a model of Search-based face annotation which plays an important role in face annotation. The scheme firstly retrieves a short rundown of top-K most comparative facial pictures from a vast scale web facial image database, and then gives the name to the query facial image by mining the tags related to the top-K similar facial images. They have applied bisecting k-means clustering and divisive based clustering algorithm for enhancing the performance on large scale facial images. To take care of the issue of uncertainty between a few names and one face, a modified *k*-means clustering method was utilized in which faces are assigned to the closest group (each cluster corresponding to one name) after a number of iterations. Nearest neighbor classifier is one of the unsupervised machines learning algorithm, which cluster the objects having similar properties in one cluster and objects having different properties in different clusters. The similarity between two objects is measured using metrics the Euclidean distance and Manhattan distance. Search based face annotation takes less running time, but final annotation performance degrades.

Challenges:-

a) There is a test in proficiently recovering the top-K most comparable facial images from a huge facial image database for giving an input query facial image.
b) There is a test in viably exploit the short list of Candidate facial pictures and their weak labels for naming the human Faces automatically.

The SBFA consists of following steps.
Step 1: Facial image information collection;
Step 2: Face detection and facial feature extraction;
Step 3: High-dimensional facial feature indexing;
Step 4: Learning to refine weakly labeled data;
Step 5: Similar face recovery.
Step 6: Face annotation by greater part voting on the similar appearances with the refined labels.

S. Satoh et.al [2] developed a Name-It, a system that knowledge source, the system is given news and videos which include image grouping and transcripts got from sound tracks or closed caption texts. The framework can then either surmise the name of a given face or yield the name candidates, or can find the countenances in news videos by a name. To fulfill this task, the framework extracts face from image sequences and names from transcripts, each of which could correspond to important persons in news topics. The projected framework takes full benefit of advanced image and natural language process. The image processing contributes to the mining of face sequences which provide rich information for face name coordination. The processing helps to pick the best frontal view of a human face in a face sequence to boost the face identification that is required for the processing. It is more time consuming and more costly to gather a large amount of human labeled training facial images. Here, using the video caption the face detected and extract names from transcripts. It achieves good face association, but annotation performance is poor.

D. Wang, S.C.H. Hoi, Y. He. And J. Zhu et.al [3] proposed WLRLCC algorithm which is used as a part of mining gigantic web facial images for automatic human face annotation. It has two difficulties first is the mean by which adequately retrieve most of comparative facial images while second test is how to effectively perform the annotation approach to images. Weak label regularized local coordinate coding (WLRLCC) is optimization algorithm. This algorithm boosts the performance of face annotation on huge scale web facial pictures. This algorithm uses with a neural network, which boosts the performance of face annotation on huge scale web facial pictures. It gives better performance as well as improves retrieval accuracy.

Y. He et.al [4] introduced a framework by consolidating both transductive and inductive learning methods to mine web facial images for face annotation. They have proposed Weak label Laplacian support vector machine (WL-LapSVM) algorithm by receiving WLRLCC algorithm that helps the execution of annotation. Support vector machine is a supervised learning method that analyzes data and recognizes patterns for classification. Given a set of training, each marked as belonging to one of class, SVM build model from training data and assigns the new example into one class or another. SVM performs both linear and non-linear classification. In non-linear classification, SVM uses kernel trick. Support Vector Machine work very well in a practice, giving a good result for classification, but gives the problem of over fitting and has a high semantic gap. The user must choose the kernel function and its parameters, but the rest is automatic. Kernel trick helps to boost the performance.

L. Zhang et.al [5] presented a learning system to automate the face annotation in family photo collection. Firstly, methodologies of image retrieval based on contents and face recognition area are consistently coordinated to accomplish automated annotation. Secondly, face annotation is developed in a Bayesian structure, in which the face likeness measure is characterized because the greatest a posteriori (MAP) estimation. Thirdly, to manage with the missing feature options, marginal probability is employed in order that samples which have missing values are compared with those having the complete feature set to validate a non-biased decision. The experimental calculation has been conducted among a family Photoshop's of few thousands of photographs and also the results show that the proposed methodology is successfully and advanced in automated face annotation in family album management. They have done effective and efficient face recognition on the basis of content based image retrieval. For final annotation Naïve-Bayes classifier has used which is simple using names and faces.

Mensink et.al [6] were intrigued to discover images of peoples on the web sites and more plainly named the new facial images. Starting result focused around the text, but they are not perfect because execution is focused around pre-assumption. To enhance over poor performance, query expansion strategy is utilized. They have connected this thought right on early proposed method on which filter the initial result set. They have given a straight forward preprocessing step without utilizing sophisticated techniques. Mensink et.ai [6] proposed modified k means clustering methodology for cleaning up the noisy websites facial images. Their aims to correct noisy web facial images for face recognition. They have got good results, but take more computation time.

Tamara L. Berg et al. [7] shows great face association is possible for a dataset of mistakenly and vaguely labeled face images. Their dataset is 44,773 face images, got by applying a face discoverer to approximately half a million subtitled news images. This dataset is more practical than usual face recognition datasets, as a result of it contains faces captured "in the wild" in a variety of configurations with related to the photo camera, taking a variety of features, and under the light of widely varied color. Every face image is connected with a group of names, automatically terminated from the associated caption. However, not all sets contain the correct name. They bunch face images in appropriate discriminant coordinates. They utilize a clustering procedure to break ambiguities in naming and identify incorrectly labeled faces. A merging procedure then identifies variation of annotation that refers to the same individual. The subsequent representation can be used to mark faces in news images or to arrange news pictures of individual persons. They report results for (a) the

original dataset (b) the datasets resulting from our clustering, merging and cleaning process, without using cluster information (c) the datasets resulting from our clustering, merging and cleaning process, including their cluster structure.

Tamara L. Berg et al. [8] Developed the graph based strategy in which a graph is formed by considering faces as nodes, and the weights of edges connected between nodes are the comparability of faces, is very closely related to their problem. They developed the method to discover the similarities subset with a possible similar set of faces with query person names where SIFT describers speak to the likeness in the picture. They have found that content based image retrieval performance is improved for face recognition. In text based approach first image were annotated with content and further search using this approach from the user database management system. This methodology is used to managing images. Through text and content description, images can be organized by semantic or topical hierarchies which provide facility to easily explore and browse base on standard Boolean queries.

Peter N. Belhumeur et al. [9] built up face recognition algorithm techniques which is harsh to extensive variety in lighting direction and facial expression. Taking an example of pattern classification approach, they have considered every pixel in an image as a direction in a high-dimensional space. They have exploited an advantage of the perception that the picture of a selected face, under varying illumination, however fixed expression; lie in a 3Dimention linear subspace of the high dimensional picture space if the face is a Lambertian surface expect shadowing. On the other hand, since faces are not really Lambertian surfaces and do so turn out self-shadowing; pictures will veer off from this linear subspace. Instead of explicitly modeling this deviation, we sequentially project the picture in a way which subspace in a manner which discounts those areas of the human face with expansive deviation. Our projection system is predicated on Fisher's Linear Discriminant and creates well distinguished classes in a low-dimensional subspace, even in the extreme variety of lighting and facial expressions.

Jun Yang et al. [10] approaches problem of Naming Every Individual in News Video Monologues with a statistical learning method. Naming each distinct individual showing up in broadcast videos with names detected from the news video caption leads to best access of the news video content. Two classes of data separated from multiple video modalities have been investigated, namely features, which helps to recognize the right name of each and every individual, as well as constraints, which reveal the connection between the names of diverse persons. The individual naming issue is planned into a learning framework which calculates the most probably name for each individual based on the expression and refines the predictions using the constraints. Demonstrations performed on ABC World New Tonight and CNN Headline News videos exhibit that this methodology outperforms a non-learning option by a large amount. They have described a machine learning model for naming every individual person in broadcast news videos. Trained based on some manually named people, this model predicts the most likely name of each individual who is giving a monologue speech based on features extracted from multiple modalities including speech, overlaid text, transcript, etc. Equivalence constraints relating the names of different persons are used to refine the predictions. Experiments have shown that this approach significantly outperforms a non-learning alternative in terms of the accuracy of the names assigned, particularly when the constraints are applied.

Timo Ahonen et.al. [11] Studied face recognition with local binary patterns**.** In this work, they introduced a new approach for face identification, which considers both shape and texture data to represent the facial pictures. Rather than the EBGM approach, a clear extraction of the face feature vector (histogram) is received in their calculation. The face picture is initially divided into little regions from that the Local Binary Pattern (LBP) components are separated and concatenated into a one feature histogram efficiently representing the face picture. The surfaces of the facial areas are generally encoded by the LBP patterns whereas the complete dimensions of the face are recovered by the development of the face feature histogram. The idea behind utilizing the LBP options is that the face images can be seen as composed of micro-patterns which are invariant with regard to monotonic gray scale transformations. In their methodology, a face picture is initially divided into many pieces (facial regions) from that we extract local binary patterns and build a global feature histogram that speaks both the statistics of the facial micro-patterns and their spatial abstraction. Then, face identification is performed using a nearest neighbor (k-means) classifier in the computed feature space with $\chi 2$ as a difference measure. The proposed face representation can be easily mined in a single scan through the human image, without doing any complex analysis as in the EBGM calculation. Face pictures can be seen as a composition of micro-patterns which can be well described by LBP. They exploited this observation and proposed a simple and efficient presentation for face recognition. In their approach, a face image is firstly divided into several regions (facial regions) from which authors extract local binary patterns and construct a global component histogram that represents both the measurements of the facial micro-patterns and their spatial areas.

3. Proposed Work

Face recognition is a system by detecting the face in an image, with the effect of estimating and normalizing for translation, scale and in-plane rotation. Given a normalized image, the features, either global or local, are extracted and consolidated in a compact face representation which can then be put in a database and compared with face representations derived at later times. Before face annotation, we have to go through face recognition.

The Mining of facial images framework is data-driven and model-free, that to some degree is motivated by the search-based image annotation system for generic image annotations. The fundamental target of the system is to assign right name labels to a given question facial image. Especially, given a unique facial image for annotation, there

is a tendency to initial retrieve a brief list of prime K most similar facial pictures from a frail labeled facial image information, then annotate the facial image by performing pick on the labels related to the highest K similar facial pictures.

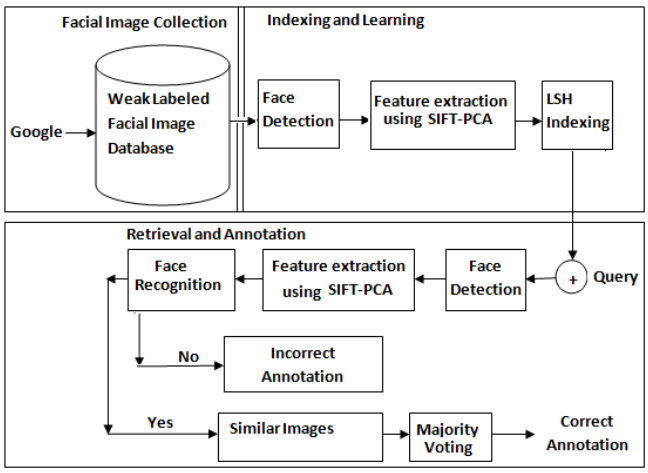

Figure 1: Architecture of weakly labeled web facial images annotation

The proposed system consists of following modules:
1. Collection of facial images.
2. Face detection and feature extraction.
3. Face Recognition.
4. Majority voting.

3.1. Collection of facial images

The first step is the collection of facial images as shown in figure-1, in which images are collected from the web by an existing website engine (i.e., Google) according to the names of persons. These facial images, each of images is associated with some annotation. Given the nature of web images, these facial images are often noisy, which do not always correspond to the right human annotation [1].Thus, we said such kind of websites facial images with noisy names as weakly labeled facial images.

3.2. Face detection and feature extraction

We have an input image of a particular person on that system will detect face first by converting the RGB into YcBcR. After face detection we have to apply SIFT-PCA algorithm for feature extraction. The Scale invariant feature transform assign and build the key points by calculating the difference of Gaussian extreme. PCA calculates eigen-values and eigen-vectors from the set of key points. Dimension reduction occurs by ignoring the directions in which the covariance is small. SIFT is a scale invariant feature transform which is used for Invariant to scale change, Invariant to rotation change, Invariant to illumination change, Robust to the addition of noise, Robust to a substantial range of fine transformation, Robust to 3D viewpoint, Highly distinctive for discrimination. Principle component analysis (PCA) is a multivariate technique that analyzes a face data in which observation are described by several inter-correlated dependent variables.

3.3. Mining of Images

"Random forest classifier" is applied to classify the images based on Sift features. In a randomized tree, the split at each node happens by using only a randomly selected subset of all features. By using "Random Forest classifier", the face can be recognized and mining of images can be done.

3.4. Majority Voting

Every Image will vote for a label. After voting on all images, the one with a maximum vote will be considered as a winner and the image will be annotated with the label of winner.

4. Conclusion

This paper provides a survey on mining of facial images and annotation. In this paper, weakly labeled web facial images annotation technique is proposed to handle the computerized face annotation task by exploring content-based image retrieval (CBIR) strategies in mining massive weakly labeled facial pictures on the web. Given a normalized image, the features, either global or local, are extracted. By giving a novel facial image for annotation, it first retrieves a short list of top K most comparable facial pictures from a weakly labeled facial image database, and after that annotate the facial image by performing voting on the names associated with the top K similar facial images.

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