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A novel approach for face annotation using multilabel correlation graph for web image search

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Abstract : *Social media is growing up as a new way of interacting around the various media. As the digital images are increasing rapidly it is the biggest challenge to classify them. Also the large number of web and personal images requires an effective search and browsing mechanism in either a content or keyword based type. This paper is focused on different image mining applications i.e. human age estimator, web and personal image annotation, face annotation, hypergraph learning and biomedical and health informatics. To improve the image search result on large scale for user queries image annotation approach is implemented using, face annotation and the correlation graph is proposed. Image mining using face annotation graph can perform well in image mining result matching the query keyword exactly achieving the appropriate result. The proposed method can achieve satisfactory result.*

Keywords - *Age estimation, face annotation, influencer mining, and web image annotation.*

I. INTRODUCTION

Data mining contains an extended branch called as image mining, which is used as the process of knowledge discovery related with digital images. Image mining is an attempt that draws upon expertise in different fields like computer vision, image retrieval, and matching and pattern recognition. For image annotation a new inductive algorithm for image annotation by integrating label correlation mining and visual similarity mining into a joint framework is proposed.

A graph model according to image visual features is first constructed. A multilabel classifier is then trained by simultaneously uncovering the shared structure common to different labels and the visual graph embedded label prediction matrix for image annotation. A self-organizing map to analyze word frequency data derived from user's forum posts is used This paper discusses various application such as human age estimator, web and personal image annotation, face annotation, hypergraph learning, and biomedical and health informatics which consist of different methods like multi-instance regression with noisy labels, search based face annotation algorithm, label correlation mining with relaxed graph embedding, Topic-sensitive Influence Ranking, clustering-based approximation algorithm. To improve the search performance of the standard image mining methods the proposed method effectively integrates multiple modalities to boost mining performance.

II. BACKGROUND

The study on image mining discusses the different application developed in recent years.

In Human Age Estimator application, a large size human aging image database was taken via a set of popular age-related queries. After this parallel detection and noise removal was done because of this, clean database containing face instances is obtained. Lastly, a robust multiple instance regressor learning method was developed which handles both noisy images and labels, which led to a strong universal age estimator, which is applicable to all ethnic groups and various image qualities. [1]

A direct method of image annotation is to decompose the problem into multiple independent single-label problems. But this leads to ignorance of underlying correlations among different labels. A graph model is constructed according to image visual features. Then, a multilabel classifier is trained by simultaneously uncovering the shared structure which is common to different labels and the visual graph embedded label prediction matrix for image annotation. [2]

Search-based face annotation scheme has the problem that have to effectively perform annotation by exploiting the list of most similar facial images and their weak labels that is often noisy and incomplete. To solve this problem, an effective unsupervised label refinement (ULR) approach is developed for refining the labels of web facial images using machine learning techniques. After this a clustering-based approximation algorithm is developed which can improve the scalability. [3]

Topic-sensitive influencer mining (TSIM) in Flickr is developed to find the influential nodes in the networks. In this a unified hypergraph is developed to model users, images, and various types of relations. The influence estimation is then determined with the hypergraph learning approach [4].

A two-step analysis framework is proposed that focuses on positive as well as negative sentiment, and also the side effects of treatment, in users' forum posts. It is then identifies user communities and influential users for the purpose of ascertaining user opinion of cancer treatment. A self organizing map is then developed which is used to analyze word frequency data that is derived from users' forum posts. Finally a novel network-based approach is introduced for modeling users' forum interactions and employed a network partitioning method.[5]

This paper introduces 5 applications of image mining i.e. Human Age Estimator, Web and Personal Image Annotation, Face Annotation, Hypergraph Learning and Biomedical and Health Informatics and these are organized as follows. **Section I** Introduction. **Section II** discusses Background. **Section III** discusses previous work. **Section IV** discusses existing methodologies. **Section V** discusses attributes and parameters and how these are affected on images. **Section VI** proposed method and outcome result possible. Finally **section VII** Conclude this review paper.

III. PREVIOUS WORK DONE

In research literature, to improve noisy images, efficiency is increased using recent techniques [1][2][3][4][5] . Bingbing Ni *et al.* [1] (2011) states that Human age classification method that is based on cranio-facial development theory and skin wrinkle analysis, where the human faces are classified into three groups, such as babies, young, and senior adults. Human age estimation is divided into two main types according to whether the age estimation task is considered as a regression problem or a multi-class classification problem [1]. Yi Yang et al. [2] (2012) shows image annotation is usually considered as a classification problem. In the field of multimedia and computer vision, a variety of machine learning and data mining algorithms for automatic image annotation have been proposed. The images and tags which are automatically acquired are essentially noisy and incomplete [2]. Dayong Wang *et al.* [3] (2014) shows that a search-based annotation for facial image annotation by mining the World Wide Web is used, where a large number of weakly labeled facial images are freely available. Rather than training explicit classification models by the regular model-based face annotation method, the search-based face annotation paradigm aims to tackle the automated face annotation task by exploiting content-based image retrieval techniques [3]. Quan Fang *et al.* [4] (2014) proposed visual memes for tracking and monitoring real-world events on YouTube. Topic-level influence mining is carried out by utilizing textual information and link information. Textual and visual features are combined to learn the latent topic representation in a principled way, and then social interactions are used to identify influential nodes in the networks [4]. Altug Akay *et al.* [5] (2015) provide that a socio matrix is used to construct representations of a social network structure. Network density, node degree and other large-scale parameters can derive information about the certain entities within the network which are clusters or modules [5].

IV. EXISTING METHODOLOGIES

Many image mining application containing different methods have been implemented over the last several decades, such as Human Age Estimator, Web and Personal Image Annotation, Face Annotation, Hypergraph Learning and Biomedical and Health Informatics. There are different methodologies that are implemented for image mining application i.e. multi-instance regression with noisy labels, search based face annotation algorithm, label correlation mining with relaxed graph embedding, hypergraph regularized topic model, Topic-sensitive Influence Ranking, clustering-based approximation algorithm.

Method 1- Multi-instance learning method [1] has at least one face instance with the given age. Its feature vector representation is denoted as $\mathbf{x}_j \in \mathbb{R}^d$, where *d* is the feature dimension. Each face pair cropped from the video clip are denoted as $\mathbf{x}_j^p$ and $\mathbf{x}_j^y$, where $j = 1, 2, \cdots, N_p$.

Method 2- In Label correlation mining with relaxed graph embedding following algorithm is performed:

1) Perform principal component analysis to reduce the dimension of X, in which all the eigenvectors corresponding to the nonzero eigenvalues of the covariance matrix is preserved.
2) Compute C.
3) Compute D.
4) Compute the optimal Θ*.
5) Compute W.

Method 3- In search based face annotation algorithm following steps are used :

1. Facial image data collection
2. Face detection and facial feature extraction
3. high-dimensional facial feature indexing

4. Learning to refine weakly labeled data
5. Similar face retrieval and
6. Face annotation by majority voting on the similar faces with the refined labels.

Method 4-In Topic-sensitive Influence Ranking following methods are performed :

1) Topic Learning by Hypergraph Regularized
   Probabilistic Topic Model
2) Model Fitting with Generalized EM:
3) Topic Distribution Propagation via Collaborative
   Representation

Method 5-In network based modelling we used the self-organizing maps techniques it have following steps

A. Initial Data Search and Collection
B. Initial Text Mining and Preprocessing
C. Cataloging and Tagging Text Data
D. Consumer Sentiment Using a SOM
E. Modelling Forum Postings Using Network Analysis
F. Identifying Sub graphs
G. Module Average Opinion and User Average Opinion
H. Information Brokers within the Information Modules

V. ANALYSIS AND DISCUSSION

In various search engines the irrelevant images are mined at random irrespective of the positions. Most existing image mining methods use a tool known as CAViz which is an interactive graphical tool. Self-Organizing Maps (SOM) and NTLK toolboxes are used. As well as a different kind of datasets such as NUS-WIDE and MSRA-MM 2.0 are used. Based on the visual similarity each image is annoted by extracting five different visual features from dataset including: "Gist," "Edge," "Color," and "Gabor", "LBP". Table 1 shows comparative analysis of various techniques.

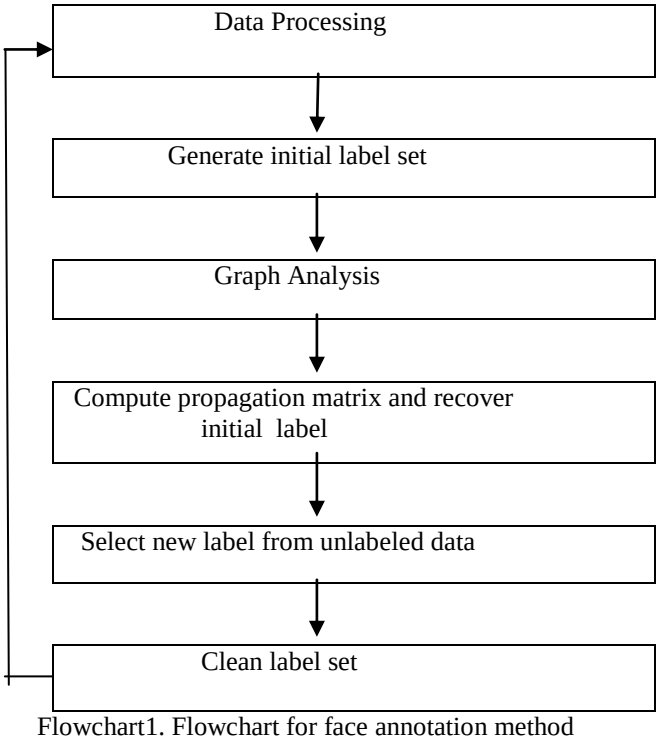
Image Mining Techniques	Advantages	Disadvantages
Multi-instance regression with noisy labels	Non-face images related to the age key -words, are easily filtered out.	This algorithm does not consider the noisy label issue, and therefore, the algorithmic robustness can not be guaranteed.
Label correlation mining with relaxed graph embedding	Image annotation provides benefits in image retrieval, like high efficiency and accuracy.	It does not consider correlations among different class labels.
Unsupervised label refinement	It enhances label quality.	The result of the optimization is dense.
Topic-sensitive Influence Ranking	It improve performance significantly in the applications of friend suggestion	It is not trivial to effectively exploit the rich social media Information to learn the topic distribution.
Self-organizing map	It identifies potential side effects consistently discussed by groups of users.	Space size decreases but information, and Identification schema of the clusters remained the same.

Table 1- Various image mining techniques with advantages and disadvantages

VI. PROPOSED METHODOLOGY

Various image annotation techniques have been discovered using label correlation mining, unsupervised label refinement (ULR) approach but have some limitations that visual features are not capable enough to represent the image semantics and also enlarging the number of facial images per person in general leads to the increase of computational costs, including time and space costs for indexing and retrieval as well as the ULR learning costs. Thus the face annotation by using a multilabel correlation graph method is proposed. In

this it contains more than one label to describe one image in real application and multiple labels usually interact with each other in semantics way. The effectiveness of the proposed face annotation by using a multilabel correlation graph method lies in the effective labeling of the images annoted having accurate matches between the highly ranked images or videos.



Flowchart1. Flowchart for face annotation method

The face annotation by using a multilabel correlation graph method will be implemented to ensure both type of data images as well as videos and continuously updated in each iterations till all the images are annoted according to significance values.

VII. OUTCOME AND POSSIBLE RESULT

The robustness of the extracted features can be used in a face annotation by using a multilabel correlation graph method propagation which aims at labeling the accurate search considering the query keyword. The proposed method will successfully increase the web based search result annotation relevant to the images and videos at top while unlabeled images are avoided to be annoted in the search webpage to reduce the complexion.

VIII. CONCLUSION

This paper is focused on the analysis of various images mining application i.e. Human Age Estimator, Web and Personal Image Annotation, Face Annotation, Hypergraph Learning and Biomedical and Health Informatics. Different image mining methods such as multi-instance regression with noisy labels, search based face annotation algorithm, label correlation mining with relaxed graph embedding, Topic-sensitive Influence Ranking, clustering-based approximation algorithm are used in these image mining application. However, the outcomes of these methods can be regressed with complex query keyword. Thus, the proposed Face annotation by multilabel correlation graph method improves the efficiency of the images, reduces the time and the cost.

FUTURE SCOPE

From observation, the scope is planned to be studied in future work, the proposed method is more suitable for mining the images in web based search also it will focus investigation concerning the growing cyber crimes in terms of the social networking application programs, which is known as Social Networking Service.

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