Tag based Image Search by Social Re-ranking

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Abstract-Social media sharing websites like Flickr allow users to annotate images with free tags, which significantly contribute to the development of the web image retrieval and organization. Tag-based image search is an important method to find images contributed by social users in such social websites. However, how to make the top ranked result relevant and with diversity is challenging. In this paper, we propose a social re-ranking system for tag-based image retrieval with the consideration of image's relevance and diversity. We aim at re-ranking images according to their visual information, semantic information and social clues. The initial results include images contributed by different social users. Usually each user contributes several images. First we sort these images by inter-user re-ranking. Users that have higher contribution to the given query rank higher. Then we sequentially implement intra-user re-ranking on the ranked user's image set, and only the most relevant image from each user's image set is selected. These selected images compose the final retrieved results. We build an inverted index structure for the social image dataset to accelerate the searching process. Experimental results on Flickr dataset show that our social re-ranking method is effective and efficient.

I. INTRODUCTION

Instead of having to make a binary decision for each tag, our approach ranks tags in the descending order of their relevance to the given image, significantly simplifying the problem. We address this limitation by developing a novel approach that combines the strength of tag ranking with the power of matrix recovery.

Main concepts used is

1. Ranking of tags
2. Low-rank
3. Annotation of image

A. Ranking of tags

Tag ranking aims to learn a ranking function that puts relevant tags in front of the irrelevant ones. In the simplest form, it learns a scoring function that assigns larger values to the relevant tags than to those irrelevant ones. In the authors develop a classification framework for tag ranking that computes tag scores for a test image based on the neighbour voting. It was extended in to the case where each image is represented by multiple sets of visual features. Liuet al. Utilizes the Kernel Density Estimation (KDE) to calculate relevance scores for different tags, and performs a random walk to further improve the performance of tag ranking by exploring the correlation between tags. Similarly, Tang et al. Proposed a two-stage graph-based relevance propagation approach. In a two-view tag weighting method is proposed to effectively exploit both the correlation among tags and the dependence between visual features and tags. In a max-margin riffled independence model is developed for tag ranking. As mentioned in the introduction section, most of the existing algorithms for tag ranking tend to perform poorly when the tag space is large and the number of training images is limited.

B. Low-rank

In mathematics, low-rank approximation is a minimization problem, in which the cost function measures the fit between a given matrix (the data) and an approximating matrix (the optimization variable), subject to a constraint that the approximating matrix has reduced rank. The problem is used for mathematical modelling and data compression. The rank constraint is related to a constraint on the complexity of a model that fits the data. In applications, often there are other constraints on the approximating matrix apart from the rank constraint, e.g., non-negativity and Hankel structure.We study the rank, trace-norm and max-norm as complexity measures of matrices, focusing on the problem of fitting a matrix with matrices having low complexity. We present generalization error bounds for predicting unobserved entries that are based on these measures. We also consider the possible relations between these measures. We show gaps between them, and bounds on the extent of such gaps.relations between these measures.

C. Annotation of image

Image annotation aims to find a subset of keywords/ tags that describes the visual content of an image. It plays an important role in bridging the semantic gap between low-level features and high-level semantic content of images. Most automatic image annotation algorithms can be

classified into three categories generative models that model the joint distribution between tags and visual features, discriminative models that view image annotation as a classification problem, and search based approaches. Both mixture models and topic models, two well known approaches in generative model, have been successfully applied to automatic image annotation. In a Gaussian mixture model is used to model the dependence between keywords and visual features. In kernel density estimation is applied to model the distribution of visual features and to estimate the conditional probability of keyword assignments given the visual features. Topic models annotate images as samples from a specific mixture of topics, which each topic is a joint distribution between image features and annotation keywords. Since a large number of training examples are needed for estimating the joint probability distribution over both features and keywords, the generative models are unable to handle the challenge of large tag space with limited number of training images. Discriminative models, views image annotation as a multi-class classification problem, and learn one binary classification model for either one or multiple tags. A structured max-margin algorithm is developed in to exploit the dependence among tags. One problem with discriminative approaches for image annotation is imbalanced data distribution because each binary classifier is designed to distinguish image of one class from images of the other classes. It becomes more severe when the number of classes/tags is large.

II. LITERATURE REVIEW & RELATED WORK

Our key idea is to learn the relevance of a tag with respect to an image from tagging behaviours of visual neighbours of that image. In particular, our algorithm estimates tag relevance by counting neighbour votes on tags and the tag refinement technique is able to improve the effectiveness of image tag recommendation for non-tagged images. The major approaches in settling the diversity problem. However, the essence of social images is ignored. The social images uploaded and tagged by users are user-oriented. These user-oriented images which share the same user and tagged with same query are always taken in a fixed time interval at a specific spot. It is well-known that, images taken in the same time interval and fixed spot are fairly similar. To diversify the top ranked search results, it's better to re-rank the results by removing the duplicate images from the same user. The propose is a relevance-quality rankingmethod considering both image relevance and image quality. First, a relevance-based ranking scheme is utilized to automatically rank images according to their relevance to the query tag, which reckons the relevance scores based on both the visual similarity of images and the semantic consistency of associated tags. Then, quality scores are added to the candidate ranking list to accomplish the relevance-quality based ranking. The proposed a two-step similarity ranking solution for interactive image retrieval. It first propose a self-tune MR solution that focuses on the visual-based similarity ranking, and then develop a semantic-oriented similarity re-ranking method to address the dislocation problem. Social image websites allow users to annotate their images with a set of descriptors such as tags. Thus, the tag-based image search can be easily accomplished by using the tags as query terms. Different from traditional web imagewebsites, social media websites allow users to annotate socialimages with tags for tag being the effective approach for social image search. Most of the literatures regarding there-ranking of the tag-based image retrieval focus on tagprocessing, image relevance ranking and diversityenhancement of the retrieval results. The following partspresent the existing works related to the above three aspectsrespectively.

A. Tag Processing Strategy

It has been long acknowledged that tag ranking and refinement play an important role in the re-ranking of tag-based image retrieval, for they lay a firm foundation on the development of re-ranking in tag based image retrieval (TBIR). Author in proposed to learn the relevance of tags by visually weighted neighbour voting, a variant of the popular baseline neighbour voting algorithm. Author in proposed a relevance tag ranking algorithm, which can automatically rank tags according to their relevance with the image content and presented a tag fusion method for tag relevance estimation to solve the limitations of a single measurement on tag relevance. Author in raised a tag completion algorithm to fill in the missing tags and correct the erroneous tags for the given image.

B. Relevance Ranking Approach

To directly rank the raw photos without undergoing any intermediate tag processing, Author in utilized an optimization framework to automatically rank images based on their relevance to a given tag. Visual consistency between images and semantic information of tags are both considered.

C. Diversity Enhancement

Many images on social media websites are actually close to each other. For example, several users used to upload continuously captured images in batch, and many of them will be visually and semantically close. When these images appear simultaneously in the top results, users will get only limited information. Therefore, a ranking scheme that can simultaneously generate relevant and diverse results is highly desired. The relevance based image retrieval approaches can boost the relevance performance; however the diversity performance of searching are often ignored. Many researchers dedicated their extensive efforts to solve this problem. Author proposed a hierarchical clustering method to cluster the search results into different semantic clusters by using visual, textual and link analysis. Author in proposed a duplicate detection algorithm to represent images with hash code, so that large image database with similar hash codes can be grouped quickly. We first get the initial results by keyword matching process. Then the inter

user and intra-user re-ranking are introduced to re-rank the initial results. Inter-user re-ranking algorithm is applied to rank users according to their contribution to the given query. After the inter-user re-ranking, we further introduce intra-user re-ranking to sequentially select the most relevant image from each image dataset of the ranked users.

III. THE OFFLINE SYSTEM

There are two main processes in the offline system: the construction of inverted index structure and the feature extraction of the image database. The details are as follows.

A. Inverted Index Structure Construction

To realize fast retrieval, an inverted index structure for the collected images is built. In our experiment, our image dataset is composed of 6,600,034 images uploaded by 7,249 users which are crawled from the public API of Flickr. Each user has uploaded several images. The organization form of original images is based on users. And the inverted index structure is based on tags and each tag corresponds to the images uploaded by different users. Let *G* denote the total number of tags in our image dataset and the corresponding tag set is denoted by { }. denotes the *i*-th tag that users have used to annotate their shared photos in social community. The inverted structure of the image dataset is described as { }. is the image collection of tag . That is to say, all images in have been tagged with,

B. Feature Extraction

In this paper we use the visual features, views and semantic features to represent the images in our image dataset.

1) Visual Feature

Color feature is one of the most widely used visual features in image retrieval, for its invariance with respect to image scaling, rotation, translation. In this paper, an image is divided into four equal sized blocks and a centralized image with equal-size. For each block, a 9-D color moment is computed, thus the dimension of color comment for each image is 45. The 9-D color moment of an image segment is utilized, which contains values of mean, standard deviation and skewness of each channel in HSV color space.

Texture feature describes the structure arrangement of surfaces and their relationship to the environment, such as fruit skin, clouds, trees, and fabric. The texture feature in our method is described by hierarchical wavelet packet descriptor (HWVP). A 170- D HWVP descriptor is utilized by setting the decomposition level to be 3 and the wavelet packet basis to be DB2. In this paper, a 215-dimensional visual vector is utilized, including a 45-dimensional color moment feature, and a 170-dimensional texture feature vector. In our experiments, we also give a comprehensive discussion on utilizing the low-level features and deep learning feature, i.e. feature learned by AlexNet

A similarity matrix whose element is introduced to measure the visual distance between the two images *i*and *j*, with their visual features.

2) Views Feature

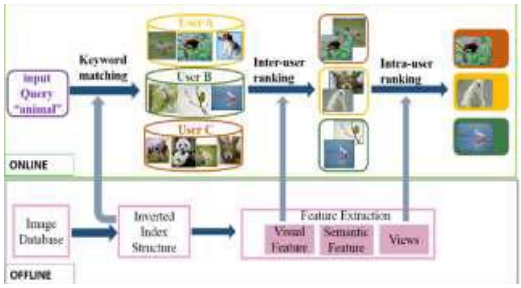
The view of an image in social media community is an important feature which indicates the click count of this image. The number of click count has been utilized to improve the relevance performance of the image retrieval results. Besides, clicks have also been used to estimate the documents relevance. For images in Flickr, the number of click count on Flickr has been regarded as an indicator of image popularity. For each image in Flickr, we can discover the associated <views> information of images from Fig.2. The number demonstrates that this image has been clicked 989 times after sharing. To a given query, the higher views, the more popular and relevant the image will be. Let *e* represents the view times of the image *i*, its normalized form vt_i can be described as follows.

$$Vt_i = view_i - view_{min} / viewmax - view_{min}$$

Where$view_{max}$ and$view_{min}$ are the maximum and minimum views of the images which share the same user with image *i*in our Flickr dataset.

IV.SYSTEM OVERVIEW

Our social re-ranking system includes two main Sections: online and offline. The offline section contains two parts:



The system framework of tag-based image retrieval with social re-ranking

1) Inverted index structure construction for image dataset. An inverted index structure is built to accelerate the retrieval speed.

2) Feature extraction. In this paper, we extract the visual feature, semantic feature and views for the images dataset. Semantic feature refers to the co-occurrence word set of query tags and the tags of the images.

Our online parts consist of the following three steps:

1) Keyword matching. For an input query, our system will return the initial retrieval results by keyword matching. And In tag-based image search we can used the different approaches are as follows:

a) VR: View-based re-ranking, a measure that rank the initial results by views in a descending order.

b) VUR: View and user based re-ranking. This approach is based on VR, and the final re-ranked results are obtained by removing the images which share the same user. That is to say, we only keep the image with the largest views for a user in the top ranked results.

c) SR: Social re-ranking promotes the relevance and diversity performance of our results. User information is

utilized to boost the diversity performance. A regularization framework which fuses the semantic, visual and views information is introduced to improve the relevance performance.

d) TTSR: Our proposed method Title and time stamp information to search tag based images by considering the title information and time stamp information, so that time consumption in searching the result will be reduced and desired output will be obtain.

V. PROPSED WORK

The proposed re-ranking system for tag based images in social dataset. The contributions can be summarized as follows:

- We propose a tag based images search for social dataset. First it takes the input query from user a particular meaningful keyword for example like "animal" then it will match the keyword.
- Our social re-ranking system includes two main sections: online and offline. In offline section tag image dataset is used. All the keyword matching and image reranking are done through offline mode. Another section i.e online section uses the tag image dataset in offline mode and also user crowd source data which tags the untagged images in the online mode.
- After this identifies keyword relevancy matching is done i.e to take the synonyms or identify the synonyms of given query i.e for example synonyms of animals.
- With the help of keyword matching and identify keyword relevancy match the data is retrieved.
- The data which is retrieved is gone through three steps:

1) *Inter-User Ranking by Query* – Inter user ranking is applied to rank users images according to query given. With this ranking the system achieve the good trade-off between the diversity and relevance performance which also effectively eliminate the similar images from the same user in a ranked result.

2) *Title and Time Stamp Ranking* – After inter user ranking the result obtained is gone through title and time stamp ranking in which the desired output will get on the basis of title information and the recent Time stamp which enhance the diversity Performance of image ranking system.

3) *Views Ranking* - The views of an image in social Media community is an important feature which indicates the click count of this image. The number of click count has been utilized to improve the relevance performance of the image retrieval results. After all these process the desired image is obtained by the ranking system. Experimental result this dataset show that social re-ranking method is effective and efficient.

VI.CONCLUSIONS

In this paper, we prpose a social re-ranking method for tag-based image retrieval. It is a new approach of tag image re-ranking for social dataset. It can be used for retrieving images on the basis of tagging. This approach for Social image analysis and retrieval is important for helping people organize and access theincreasing amount of user-tagged multimedia. Tag based image search is an important method to find images contributed by social users in social websites. Content based visual search is better than random sampling; it produces a good tag relevance measurement for both image ranking and tag ranking. This system is used for accurate and easy tag based image retrieval using social re-ranking. This system reduced the duplication of tag and tag mismatching also develop the appropriate content retrieval system. It reduces time for query based search by considering title information and time stamp ranking which is effective and efficient. This system enhances the diversity performance of image ranking system.

VII. REFRENCES

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