A New Approach of Tag Image Re-Ranking For Social Dataset

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Abstract-*Social image analysis and retrieval is important for helping people organize and access the increasing amount of user-tagged multimedia. Since user tagging is known to be uncontrolled, ambiguous, and overly personalized, a fundamental problem is how to interpret the relevance of a user-contributed tag with respect to the visual content the tag is describing. In this work, it proposes 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 check 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 also it count number of views has been utilized to improve the relevance performance of the image retrieval results. These selected images compose the final retrieved results. We build an identify keyword relevancy match the data is retrieved for the social image dataset to accelerate the searching process. Experimental results on social dataset show that our tag image re-ranking method is effective and efficient.*

Keywords-Social Media, Tag- based Image Retrieval, Image Search, Title Information Re-Ranking, Time-Stamp Re-Ranking..

I. INTRODUCTION

There is an explosion of community-contributed multimedia content available online, such as Youtube, Flickr, and Zooomr. Such media repositories promote users to collaboratively create, evaluate, and distribute media information. They also allow users to annotate their uploaded media data with descriptive keywords called tags, which can greatly facilitate the organization of the social media. However, performing search on large-scale social media data is not an easy task. Currently, Flickr provides two ranking options for tag-based image search. One is "most recent," which orders images based on their uploading time, and the other is "most interesting," which ranks the images by "interestingness," a measure that integrates the information of click-through or comments, for example. These two methods time-based ranking and interestingness-based ranking both rank images according to measures (interestingness or time) that are not related to relevance, many irrelevant images will be introduced among the top search results.

Nonetheless, the following challenges block the path for the development of re-ranking technologies in the tag-based image retrieval.

1) Tag mismatch. Social tagging requires all the users in the social network to label their uploaded images with their own keywords and share with others. Different from ontology based image annotation; there is no predefined ontology or taxonomy in social image tagging. Every user has own habit to tag images. Even for the same I mage, tags contributed by different users will be of great difference. Thus, the same image can be interpreted in several ways with several different tags according to the background behind the image. Thus, many seemingly irrelevant tags are introduced.

2) Query ambiguity. Users cannot precisely describe their request with single words and tag suggestion system always recommend words that are highly correlated to the existing tag set, thus add little information to a users' contribution. Besides, polysemy and synonyms are the other causes of the query ambiguity. Thus, a fundamental problem in the re-ranking of the tag-based social image retrieval is how to reliably solve these problems. As far as the "tag mismatch" problem is concerned, tag refinement, tag relevance ranking and image relevance ranking approach have been dedicated to overcome these problems. As for the "query ambiguity" problem, an effective approach is to provide diverse retrieval results that cover multiple topics underlying a query. Currently, image clustering and duplicate removal are the major approaches in settling the diversity problem. 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 [1].

Flickr as an example of study the characteristics of social tagging. Flickr is one of the earliest and most popular social media sharing web sites and it has been intensively studied in recent years, especially on tagging characteristic, tag recommendation, etc. However, the tags provided by Flickr users are highly noisy and there are only around 50% tags actually related to the image. Fig. 1 illustrates an exemplary image from Flickr and its tags. From the figure we can see that only "sky" and "cloud" correctly describe the content of the given image, and the other tags are imprecise(e.g., dog, girl, etc.) or subjective1(e.g., family, city, etc.), Meanwhile, several other tags that can be useful, such as "tree" and "grass", have not been provided. The imprecise and incomplete tagging characteristics have significantly limited the access of social media. The imprecise tags will introduce false positives into user's search result and incomplete tags will make the actually related images inaccessible. Therefore, it would be advantageous if a dedicated approach can be developed to improve the tags associated with social images such that they can better describe the content of the images. [2]

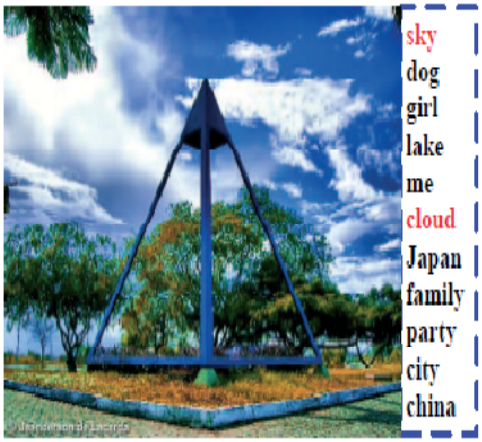

Figure 1.1: an exemplar image from Flickr and its associated tags.

II. EXISTING SYSTEM

Lee and Neve proposed to learn the relevance of tags by visually weighted neighbor voting, a variant of the popular baseline neighbor voting algorithm. Agrawal and Chaudhary proposed a relevance tag ranking algorithm, which can automatically rank tags according to their relevance with the image content. A modified probabilistic relevance estimation method is proposed by taking the size factor of objects into account and random walk based refinement is utilized. Li et al presented a tag fusion method for tag relevance estimation to solve the limitations of a single measurement on tag relevance. Besides, early and late fusion schemes for a neighbor voting based tag relevance estimator are conducted. Zhu et al proposed an adaptive teleportation random walk model on the voting graph which is constructed based on the images relationship to estimate the tag relevance. Sun et al, proposed a tag clarity score measurement approach to evaluate the correctness of a tag in describing the visual content of its annotated images.

➢ Limitations of Existing System

1. Tag mismatch social tagging requires all the users are the social network to label their uploaded images with their own keywords and share with others.
2. Different from ontology based image annotation, there is no predefined ontology or taxonomy in social image, tags contributed by different users will be of great difference. Thus, the same image can be interpreted in several ways with several different tags according to the background behind the image. Thus, many seemingly irrelevant tags are introduced.
3. Query ambiguity, Users cannot precisely describe their request with single words and tag suggestion system always recommend words that are highly correlated to the existing tag set, thus add little information to a users contribution. Besides, polysemy and synonyms are the other causes of the query ambiguity.

III. AIM & OBJECTIVE

3.1 Aim

The aim of the system is to re-rank images according to their title information, time information and offline dataset information. 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 and proposed system also solve the problem of tag mismatch and query ambiguity.

3.2 Objective

1. To reduce time to search images according to image tag.
2. To Solve the Query mismatch and Query ambiguity problem.
3. To rank the images by considering their uploaded time of image and no. of view of image.
4. To maintain relevancy and accuracy of the system i.e. Tag Based image search.

IV. LITERATURE REVIEW

The existing image search engines, including Yahoo, Google, and Bing, recovers and rank images mostly based on the textual information associated with an image in the arranged web pages, such as the name of image and the a rounding text. Social image websites such as Flickr 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. However, the weakly relevant tags, noisy tags and duplicated information make the search result unsatisfactory.

According to Xueming Qian et.al. in paper "Tag Based Image Search by Social Re-ranking"[1], a social re-ranking system for tag-based image retrieval with the consideration of an image's relevance and diversity to re-ranking images according to their visual information, semantic information, and social clues it includes images contributed by different social users. Usually each user contributes several images. First 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. This social re-ranking method is effective and efficient. However, in the inter-user ranking process only user's contribution is considered and the similarity among users is ignored and also more information in Flickr dataset are still ignored, such as title information, time stamp and so on.

According to J. Yu et. al. in paper "Learning to Rank Using User Clicks and Visual Features for Image Retrieval"[3], a novel ranking model based on the learning to rank framework. Visual features and click features are simultaneously utilized to obtain the ranking model. Specifically, this approach is based on large margin structured output learning and the visual consistency is integrated with the click features through a hypergraph regularizer term. In accordance with the fast alternating linearization method, we design a novel algorithm to optimize the objective function. This algorithm alternately minimizes two different approximations of the original objective function by keeping one function unchanged and linearizing the other. It conduct experiments on a large-scale dataset collected from the Microsoft Bing image search engine, and the results demonstrate that the proposed learning to rank models based on visual features and user clicks outperforms state-of-the-art algorithms.

According to Y. Yang et. al. in paper "Image Tagging with Social Assistance"[4], Image annotation and image conception detection, has been extensively studied. However, most existing approaches can hardly achieve satisfactory performance owing to the deficiency and unreliability of the manually-labelled training data. A new image tagging scheme, termed Social Assisted Media Tagging which leverages the abundant user-generated images and the associated tags as the social assistance to learn the classifiers. The major challenges, (a) the noisy tags associated to the web images and (b) the desirable robustness of the tagging model. It presents a joint image tagging framework which simultaneously corrects the erroneous tags of the web images as well as learns the reliable image classifiers. In particular, we devise a novel tag refinement module for eliminating and identifying the noisy tags by substantially exploring and preserving the low-rank nature of the tag matrix and the structured sparse property of the tag errors. It develops a robust image tagging module based on the $\ell 2$, p-norm for learning the reliable image classifiers. The correlation of the two modules is well explored within the joint framework to make advance each other.

According to L. Chen et. al. in paper "Image retrieval via improved relevance ranking"[5], a relevance-quality ranking method 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. However the existing methods frequently return results that are noisy or irrelevant with low-quality. It is argued that the relevance and quality are two important measures for a user friendly explaining the returned images.

According to D. Wu et. al. in paper "A Two-Step Similarity Ranking Scheme for Image Retrieval" [6], a two-step similarity ranking scheme that aims to preserve both visual and semantic resemblance in the similarity ranking. Concretely, in the first step it derives an initial visual-based similarity rank through self-tuning MR solutions that focuses on visual based similarity ranking and then develops a semantic oriented similarity re-ranking method to address the dislocation problem. In particular, the Gaussian kernel used in our scheme is refined by using a point-wise bandwidth. In the second step, the rank of each database image is further adjusted to achieve semantic consistency by mining the query log.

According to A. Ksibi et.al. in paper "Adaptive diversification for tag-based social image retrieval" [7], the great popularity of social photos sharing websites, a

tremendous volume of digital images is hosted together with their associated tags. Thus extensive research efforts have been dedicated to tag-based social image search which allow users to formulate their queries using tags. However, tag queries are often typically short and ambiguous. Diversifying search results is a solution in the absence of further knowledge about the users intention. Such approach aims to retrieve relevant images covering as much of the diverse meanings the query may have. However not all queries are uniformly ambiguous and hence various diversification strategies might be suggested. In such a context, two new processes are jointly investigated at query post-processing and pre-processing levels. On the one hand, proposed a multi-view concept-based query expansion process, using a predefined list of semantic concepts, which focus to weight concepts from different views or contexts, aggregate the obtained weights and select the most representative ones using a dynamic threshold. On the other hand, propose a new ranking process method called "adaptive diverse relevance ranking" which automatically predicts an effective trade-off between relevance scores and diversity scores according to the query ambiguity level.

Most of the literatures regarding the re-ranking of the tag-based image retrieval focus on tag processing, image relevance ranking and diversity enhancement of the retrieval results. The following parts present the existing works related to the below three aspects respectively.

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 X. Li et. al. in [8] proposed to learn the relevance of tags by visually weighted neighbor voting, a variant of the popular baseline neighbor voting algorithm. Author G. Agrawal et. al in [9] 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 R. Jin et. al. in [10] 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 Liu et. al. in [11] 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. Author D. Wu et. al. in [6] proposed an image ranking method which represent images by sets of regions and apply these representations to the multiple-instance learning based on the max margin framework.

C. Diversity Enhancement

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 B. Wang et. al. in [12] 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.

V. PROPOSED SYSTEM

Tag based image search system which aims at re-ranking images according to their annotations and synonyms. 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 check 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 also it count number of views has been utilized to improve the relevance performance of the image retrieval results. These selected images compose the final retrieved results. We build an identify keyword relevancy match the data is retrieved for the social image dataset to accelerate the searching process.

The proposed re-ranking system for tag based images in social dataset. 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 re-ranking 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. A regularization framework is proposed to determine the relevance level of each image by fusing the visual, semantic, time stamp information and views information into a unified system. Then we sequentially select the most relevant image in each ranked user's image set. Figure 5.1 Architecture of proposed system shows First system takes initial query as input. Proposed system then parse that query by removing stop words or by applying stemming on the query and pass the words to next step. System search for synonyms, annotations of each word in semantic dictionary and match each keyword in offline as well as online dataset as shown in above fig. If match is found then system selects all the visual information, semantic information from the dataset and integrates as intermediate result. On the intermediate result system re-rank the images by using proposed methods such as inter-user re-ranking, title & time stamp re-ranking and no. of view re-ranking. In the inter-user re-ranking, system re-ranks the images in descending order according to contribution of each user to the given query. The larger the contribution of user, the higher the corresponding user ranks. In next step system sort the images in descending order according to an uploaded date of the image. Then system sorts the images according to no. of view count of the image. Finally system rank images.

The architecture shows steps to use tag based image search on social dataset. The main objective of the research is to develop a tag based image search on social dataset which helps to image search on their relevance; it will help for user to get specific images according to their related keyword matching synonyms.

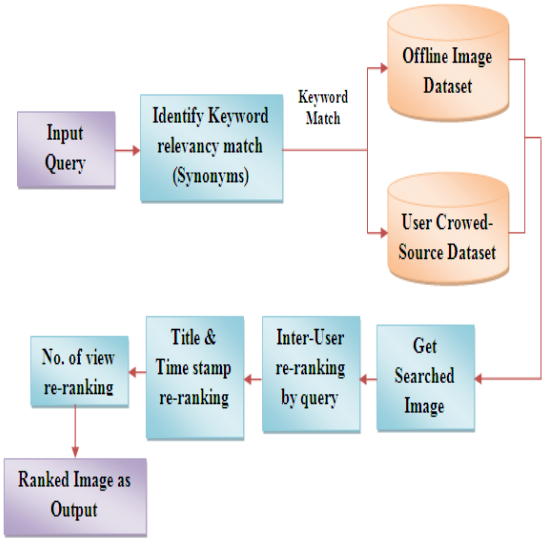

Figure 5.1: Architecture of proposed system

5.1 Proposed method

5.1.1 Mathematical Model

Let X is the whole system consist of
X= {Q, T, A, S, O}
Q - Input query
T - Set of all tags images
A - Annotations of tags
Step 1 - Remove stop words from Q and apply stemming on removing words.
Step 2 - for each Q € T
do
Retrieve all images that match with Q;
Store the result in set S1;
end
Step 3 - for each Q € A
do
Retrieve all Tags T1 that matches with Q;
end
for each T1 € T
do
Retrieve all images that match with T1;
Store the result in S2;
end
Step 4 - S=S1+S2;
Step 5 - Sort S according to view count of images and upload date of images.
Step 6 – Output

In order to demonstrate the effectiveness of the Title and Time Stamp Re-ranking (denoted by TTR) approach, we conduct experiments on our crawled Flickr images. Title and time stamp re-ranking sorts the image according to their title and time stamp information means rank the images according to their date & time of upload.

5.1.2 Methodology Used

A. Keyword Matching

Keyword matching is done to take the synonyms or identify the synonyms of given query, with the help of keyword matching and identify keyword relevancy match the data is retrieved.

B. Inter-user Re-ranking

Inter user ranking is applied to rank the corresponding users with the consideration of their contributions to the given query. 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.

C. Title and Time Stamp Ranking

After inter-user re-ranking the proposed system sorts the images according to their title and time stamp information means rank the images according to their date & time of upload.

D. No. of view count re-ranking

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. After all above processes the system then sort the images according to their view count.

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. RESULT AND DISCUSSION

In order to demonstrate the effectiveness of the Title and Time Stamp Re-ranking (denoted by TTR) approach, we conduct experiments on our crawled Flickr images by utilizing the following 25 tags as queries: baby, tiger, cat, dog, lion, horse, bird, sea, buildings, zebra, rose, lotus, car, water, bike, cow, fox, beach, insects, honeybee, sky, ocean, blue, orange and flower. We systematically make comparisons for the TTR, VR, VUR and SR tag-based image retrieval approaches.

6.1 Performance Evaluation

The performance evaluation of our method is voted by five volunteers who are invited to assign the relevance score for the top *n* images of each query under different methods. The averaged relevance score is used to measure the correlation between the query and the retrieval results. Five volunteers are asked to give the relevance score of each image among the top n results into the following four categories: 3-perfect, 2-good, 1-so so, 0-irrelevant, according to their judgment for the compared re-ranking approaches. Then, the relevance score of the image *i* is obtained by averaging the assigned relevance values. Let rel(i) denote the relevance value of image *i*.

Criteria of performance evaluation

There are two methods used for the relevance performance evolution AP@n and NDCG@n. The NDCG (Normalized Discounted Cumulative Gain) [22], which can handle multiple levels of relevance judgments, as the performance evaluation measure. It measures the performance of a searching result of the system based on the relevance of the searching entities. For a query, the normalized discounted cumulative gain is computed as: $\mathrm{NDCG@n} = \frac{\mathrm{DCG@n}}{\mathrm{IDCG@n}}$

Where, DCG (Discounted cumulative gain) is a measure of ranking quality. In information retrieval, it is used to measure effectiveness of search engine. DCG measures the gain of an image based on its position in the result list and IDCG (Ideal Discounted cumulative gain) sorting all relevant images in the corpus by their relative relevance, producing the maximum possible DCG through position n also called Ideal DCG through that position.

$$\mathrm{DCG@n} = \sum_{i=1}^{n} \frac{\mathrm{rel(i)}}{\log_2(i+1)}$$

$$\mathrm{IDCG@n} = \sum_{i=1}^{|REL|} \frac{(2^{\mathrm{rel(i)}} - 1)}{\log_2(i+1)}$$

And |REL| represents the list of relevant documents (ordered by their relevance) in the corpus up to position n.

The AP (Average Precision), averaged over all queries and reported as a single score. MAP (Mean Average Precision) is a very popular performance measure in information retrieval. MAP is just an extension, where the mean is taken across all AP scores for many queries.

$$\mathrm{AP@n} = \frac{1}{n}\sum_{i=1}^{m}\sum_{j=1}^{i}\frac{\mathrm{rel(j)}}{i}$$

6.2 Performance Analysis

Our first experiment compares TTR approach with other alternative image searching approaches. We use TTR approach for image search on the basis of time and date. We have calculated Normalized Discounted Cumulative Gain (NDCG) for each image's tag list. After computing it, we have averaged the result to get the Average NDCG as the performance measure for the size estimation part of the modified Title and Time Stamp Ranking approach. Figure 6.1 shows our experimental result. It is observed that the time estimation can improve the ranking. So, combining this approach with the other approach proposed earlier will provide improved results.

NDCG@n / Re-Ranking Methods	n=1	n=5	n=10	n=15	n=20	n=25
TTR	0.89	0.86	0.93	0.9	0.95	0.92
VUR	0.79	0.73	0.78	0.8	0.82	0.87
SR	0.73	0.8	0.89	0.72	0.85	0.82
VR	0.71	0.7	0.73	0.71	0.69	0.83

Table 6.1: The calculated NDCG for all four Ranking methods

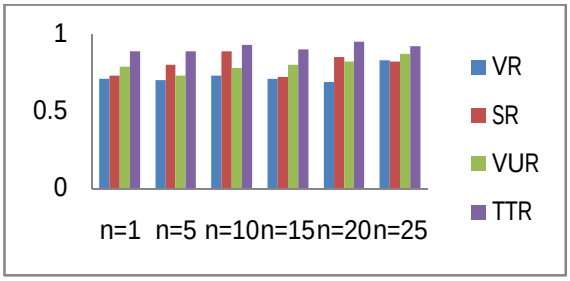

Fig 5.1 The NDCG of all four Ranking methods under different depths

AP@n / Re-Ranking Methods	n=1	n=5	n=10	n=15	n=20	n=25
TTR	3.79	3.1	3.5	3.4	3.7	3.9
VUR	3.63	2.86	3.27	3	3.5	3.6
SR	2.64	2.9	3.1	2.75	3.3	3.4
VR	2.1	2.7	3	2.9	3.2	3.1

Table 5.2: The calculated AP for all four Ranking methods

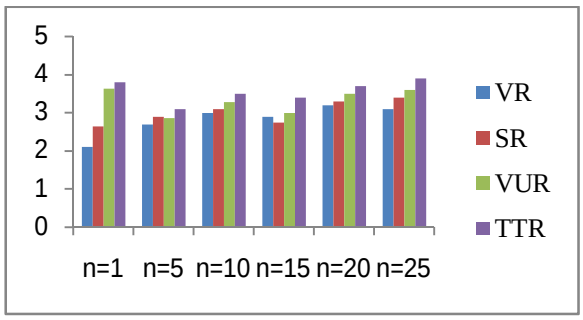

Fig 5.2 The AP of all four Ranking methods under different depths

NDCG calculated for each approach shows the relevancy of images and AP shows the exactness of the approach. Let MAP@n denote the mean values of AP@n for all the 25 query tags. The NDCG@n and MAP@n with n=1, 5, 10, 15, 20 and 25 are shown in Fig.5.1 and Fig.5.2 respectively. For example, the MAP@25 of TTR, SR, VR and VUR are 3.5, 3.01, 2.8 and 3.31 respectively.

Fig 6.1 and Fig 6.2 shows that TTR achieves a little higher NDCG and AP than other image searching approaches. Besides VR has a little lower NDCG and AP value than SR approach. For the SR approach takes the all tags of images into consideration while VUR only consider user uploaded tag. Time is the other key role in the image retrieval system except the performance. So, the TTR is more suitable for the retrieval of the large database.

VII. CONCLUSION AND FUTURE SCOPE

7.1 Conclusion

Our experimental study proves that our TTR approach offers significant improvements over current approaches to image searching.

Tags related to the images in social media sharing websites like Flickr are order less and sometimes irrelevant to the image. The approach which is now proposed is nothing but the title and time stamp approach or searching method which is new for the image searching. In the earlier method, time factor for the image retrieval are not used. By using TTR approach, the time factor problem is solved.

The NDCG and MAP calculated in performance analysis for proposed method is effective and time saving. The system reduces duplication of tag and tag mismatching is corrected for the appropriate image retrieval. In proposed approach ranking is provided by considering their uploaded time and no of views to the images. Also system maintains relevancy and accuracy of the system. With the new TTR approach the system is efficient and performance effective.

7.2 Future scope

We have propose a title and time stamp re-ranking approach for image search that help users to search the images according to time and date. The TTR approach provides synonyms of search related tag to solve the problem of query ambiguity. We also effectively solve the problem of tag mismatch.

In future, we plan to explore tag quality improvement problem in a more general scenario, ranking and also improve the scalability of the proposed framework to handle big multimedia data. Also we can invest additional refinements to our image-based ranking, including better tag and image classification strategies, allowing users to get image search on specific aspect. Also focus on the design and analysis of specialized tag refinement techniques that are able to operate along other dimensions.

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