MTF for image search in PSW

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ABSTRACT:

Increasingly developed social sharing websites, like Flickr and YouTube, allow users to create, share, annotate and comment Medias. The large-scale user generated meta-data not only facilitate users in sharing and organizing multimedia content, but provide useful information to improve media retrieval and management. Personalized search serves as one of such examples where the web search experience is improved by generating the returned list according to the modified user search intents. In this paper, the social annotations are exploited and a novel framework is proposed simultaneously considering the user and query relevance to learn to personalized image search. The basic premise is to embed the user preference and query-related search intent into user-specific topic spaces. Since the users' original annotation is too sparse for topic modeling, we need to enrich users' annotation pool before user specific topic spaces construction.

INTRODUCTION

Keyword-based search has been the most popular search paradigm in today's search market. Despite simplicity and efficiency, the performance of keyword-based search is far from satisfying. Investigation has indicated its poor user experience - on Google search, for 52% of 20,000 queries, searchers did not find any relevant results. This is due to two reasons. 1) Queries are in general short and nonspecific, e.g., the query of "IR" has the interpretation of both information retrieval and infra-red. 2) Users may have different intentions for the same query, e.g., searching for "jaguar" by a car fan has a completely different meaning from searching by an animal specialist.

One solution to address these problems is *personalized search*, where user-specific information is considered to distinguish the exact intentions of the user queries and re-rank the list results. Given the large and growing importance of search engines, personalized search has the potential to significantly improve searching experience. Compared with non-personalized search, in personalized search, the rank of a document (web page, image, video, etc.) in the result list is decided not only by the query, but by the preference of user. The non-personalized search returned results only based on the query relevance. While personalized search consider both query relevance and user preference. This provides a natural two-step solution scheme. Most of the existing work follow this scheme and decompose personalized search into two steps: computing the non-personalized relevance score between the query and the document, and computing the personalized score by estimating the user's preference over the document. After that, a merge operation is conducted to generate a final ranked list. While this two-step scheme is extensively utilized, it suffers from two problems. 1) The interpretation is less straight and not so convinced. The intuition of personalized search is to rank the returned documents by estimating the user's preference over documents under certain queries. Instead of directly analyzing the user-query-document correlation, the existing scheme approximates it by separately computing a query-document relevance score and a user-document relevance score. 2) How to determine the merge strategy is not trivial.1 In this paper, the user and query dependence are simultaneously considered and a novel framework is presented to tackle the personalized image search problem.To investigate on user preference and perform user modeling, the popular social activity of tagging is considered. Collaborative tagging has become an increasingly popular means for sharing and organizing resources, leading to a huge amount of user-generated annotations. Online photo sharing websites, such as Flickr, Picasa, Zooomr and Pinterest allow users as owners, taggers, or commenters for their contributed contents to interact and collaborate with each other in a social media dialogue. Various researchers have investigated the applicability of social annotations to improve web search. Recently, social annotations are employed for automatic evaluation of personalized search. A fundamental assumption

is that, *the users' tagging actions reflect their personal relevance judgement*. For example, if a user tagged "festival" to an image, it is probable that the user will consider this image as relevant if he/she issues "festival" as a query. Illustrated by this, the intuition of this paper is that if the users' annotations to the images are available, it is possible to directly estimate the users' preference under certain queries. The fact is that the original annotations available are not enough for user preference mining. Therefore, the problem of personalized image search to users' annotation prediction have been transferred. Moreover, as queries and tags do not follow simple one-to-one relationship, user-specific topic spaces are build to exploit the relations between queries and tags.

1.1 PERSONALIZED SEARCH

In the research community of personalized search, evaluation is not an easy task since relevance judgment can only be evaluated by the searchers themselves. The most widely accepted approach is user study, where participants are asked to judge the search results. Obviously this approach is very costly. In addition, a common problem for user study is that the results are likely to be biased as the participants know that they are being tested.

Another extensively used approach is by user query logs or click through history. However, this needs large-scale real search logs, which is not available for most of the researchers.Social sharing websites provide rich resources that can be exploited for personalized search evaluation. User's social activities, such as rating, tagging and commenting, indicate the user's interest and preference in a specific document. Recently, two types of such user feedback are utilized for personalized search evaluation. The first approach is to use social annotations. The main assumption behind is that the documents tagged by user *u* with tag *t* will be considered relevant for the personalized query (*u; t*). Another evaluation approach is proposed for personalized image search on Flickr, where the images marked *Favorite* by the user *u* are treated as relevant when *u* issues queries. The two evaluation approaches have their pros and cons and supplement for each other. Both approaches are used in this experiments and list the results in the following.

• Topic-based: topic-based personalized search using folksonomy;
• Preference-based: personalized image search by predicting user interests-based preference.

Note that both methods follow the two-step scheme: the overall ranking is decided by separately computing query relevance and user preference. In addition, we also compared the performances of the proposed model with different settings:
• TF 0/1 LDA: TF without smoothness constraints, optimization under the *0/1 scheme*, using user-specific topic modeling;
• MTF 0/1 LDA: TF with multi-correlation smoothness constraints, optimization under the *0/1 scheme*, using user specific topic modeling;
• RMTF LDA, the proposed model: annotations predictions by RMTF, using user-specific topic modeling;
• RMTF: Directly using the RMTF-based predicted annotations for personalized rank.

1.2 .FRAMEWORK

The framework is shown in Fig.1. It contains two stages: offline model training stage and online personalized search response stage. 1 Typically a weighting parameter will be optimized to balance the two scores, or the learnt user preference is used to re-rank the query relevance-based original list. For the offline stage, three types of data including users,2 images and tags as well as their ternary interrelations and intra-relations are first collected.3 Perform users' annotation prediction. Many methods, for tag recommendation and prediction have been proposed in social bookmark sites, e.g., Bibsonomy, Del.icio.us, Last.fm, etc. Since the photo sharing websites utilize a different tagging mechanism that repetitive tags are not allowed for unique images, besides the common noisy problem, it has more severe sparsity problem than other social tagging systems.4 To alleviate the sparsity and noisy problem, a novel method named *Ranking based Multi-correlation Tensor Factorization* (RMTF) is presented to better leverage the observed tagging data for users' annotation prediction. Zhu *et. al.* has demonstrated that the semantic space spanned by image tags can be approximated by a smaller subset of salient words from the original space. Illustrated by this, a lowrank approximation is employed to extract the compact representation for image, tag and user, and at the same time reconstruct the user-image-tag ternary relations for annotation prediction. With the observed user-tag-image ternary relations as input, the reconstructed ternary relations can be viewed as users' potential annotations for the images.

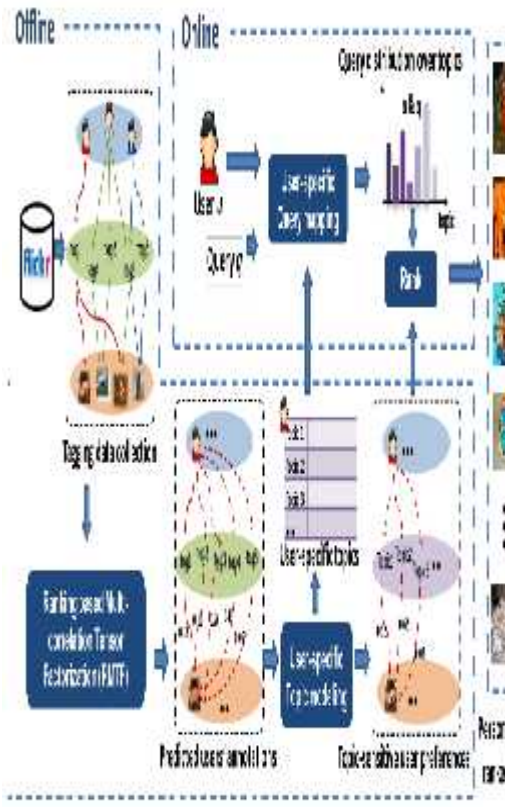

fig 1.Framework Architecture

1.3 TYPES OF SEARCH

PERSONALIZED SEARCH

In the research community of personalized search, evaluation is not an easy task since relevance judgment can only be evaluated by the searchers themselves. **The most widely accepted approach is user study, where participants are asked to judge the search results. Obviously this approach is very costly.** In addition, a common problem for user study is that the results are likely to be biased as the participants know that they are being tested. **Another extensively used approach is by user query logs or click through history. However, this needs a large-scale real search log, which is not available for most of the researchers.**

Social sharing websites provide rich resources that can be exploited for personalized search evaluation. User's social activities, such as rating, tagging and commenting, indicate the user's interest and preference in a specific document. **Recently, two types of such user feedback are utilized for personalized search evaluation. The first approach is to use social annotations. The main assumption behind is that the documents tagged by user with tag will be considered relevant for the personalized query. Another evaluation approach is proposed for personalized image search on Flickr, where the images marked *Favorite* by the user *u* are treated as relevant when *u* issues queries.**

NON-PERSONALIZED SEARCH

Compared with non-personalized search,in personalied search,the rank of a document(web page,image,video,etc.,) in the result list is not only decided by the query but by the preference of the user.

1.4 OBJECTIVE OF THE EXPERIMENT

A novel personalized image search framework is proposed by simultaneously considering user and query information.The user's preferences over images under certain query are estimated by how probable he/she assigns the query-related tags to the images.

- A ranking based tensor factorization model named RMTF is proposed to predict users' annotations to the images.
- To better represent the query-tag relationship ,user-specific topics are constructed to map the queries as well as the users' preferences onto the learned topic spaces.

2. FEASIBILITY STUDY:

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

2.1 ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

2.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

2.3 SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

3.MODULE DESCRIPTION

The system contains the following modules are

- **User-Specific Topic Modeling**
- **Personalized Image Search**
- **Ranking – Multi Correlation based**

3.1. USER-SPECIFIC TOPIC MODELING

Users may have different intentions for the same query, e.g., searching for “jaguar” by a car fan has a completely different meaning from searching by an animal specialist. One solution to address these problems is personalized search, where user-specific information is considered to distinguish the exact intentions of the user queries and re-rank the list results. Given the large and growing importance of search engines, personalized search has the potential to significantly improve searching experience.

3.2. PERSONALIZED IMAGE SEARCH

In the research community of personalized search, evaluation is not an easy task since relevance judgment can only be evaluated by the searchers themselves. The most widely accepted approach is user study, where participants are asked to judge the search results. Obviously this approach is very costly. In addition, a common problem for user study is that the results are likely to be biased as the participants know that they are being tested. Another extensively used approach is by user query logs or click through history. However, this needs a large-scale real search log, which is not available for most of the researchers.Social sharing websites provide rich resources that can be exploited for personalized search evaluation. User’s social activities, such as rating, tagging and commenting, indicate the user’s interest and preference in a specific document. Recently, two types of such Zuser feedback are utilized for personalized search evaluation. The first approach is to use social annotations. The main assumption behind is that the documents tagged by user with tag will be considered relevant for the personalized query. Another evaluation approach is proposed for personalized image search on Flickr, where the images marked *Favorite* by the user u are treated as relevant when u issues queries.The two evaluation approaches have their pros and cons and supplement for each other.

3.3. RANKING – MULTI CORRELATION BASED

Photo sharing websites differentiate from other social tagging systems by its characteristic of self-tagging: most images are only tagged by their owners. The #tagger statistics for Flickr and the webpage tagging system Del.icio.us. We can see that in Flickr, 90% images have no more than 4 taggers and the average number of tagger for each image is about 1.9. However, the average tagger for each webpage in Del.icio.us is 6.1. The severe sparsity problem calls for external resources to enable information propagation. In addition to the ternary interrelations, multiple intra-relations among users, images and tags are also collected. It is assumed that two items with high affinities should be mapped close to each other in the learnt

factor subspaces..To serve the ranking based optimization scheme, the tag affinity graph is constructed based on the tag semantic relevance and context relevance. The context relevance of tag is simply encoded by their weighted co-occurrence in the image collection.

4.CONCLUSION

How to effectively utilize the rich user metadata in the social sharing websites for personalized search is challenging as well as significant. In this paper, a novel framework is proposed to exploit the users' social activities for personalized image search, such as annotations and the participation of interest groups. The query relevance and user preference are simultaneously integrated into the final rank list. Experiments on a large-scale Flickr dataset show that the proposed framework greatly outperforms the baseline. In this paper, the simple case of one word-based queries are considered . Actually, the construction of topic space provides a possible solution to handle the complex multiple words-based queries.

5.FUTURE WORK

In the future, the current work is improved along four directions. 1) In this paper, only the simple case of one word-based queries are considered. Actually, the construction of topic space provides a possible solution to handle the complex multiple words-based queries. 2) During the user-specific topic modeling process, the obtained user-specific topics represent the user's Distribution on the topic space and can be considered as user's interest profile. Therefore, this framework can be extended to any applications based on interest profiles. 3) For batch of new data (new users or new images), directly restart the RMTF and user-specific topic modeling process. While, for a small amount of new data, designing the appropriate update rule is another future direction. 4) Utilizing large tensors. brings challenges to the computation cost. It is planned to turn to parallelization (e.g. parallel MATLAB) to speedup the RMTF converge process. Moreover, the distributed storing mechanism of parallelization will provide a convenient way to store very large matrices and further reduce the storage cost.