# A SurveyofVarious Image Retrieval and Re-ranking Methods to Search Web Images

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## ABSTRACT

*Web image search has becomes an important feature of multimedia in web search engine. It plays an important role to search images as per user need in daily life. Some image search query results are satisfactory and some are unsatisfactory. The web image search mostly depends on the surrounding text of the image. It is difficult to understand the user intention only by query keywords and this leads to irrelevant image search results. In this paper the methods developed by different researchers in the area of web image search are reviewed. These methods vary from textual information search to user feedback. Also some methods are based on the visual similarities between the images. To improve the result of web image search, strategies like keyword expansion, active re-ranking is also used. This paper focuses on the methods introduced by different authors for development in the area of web image search and re-ranking.*

**Keywords**-*Keyword Expansion, Relevance Feedback, Query Difficulty Prediction, Re-ranking, Semantic signatures.*

## 1. INTRODUCTION

The aim of the image search is to retrieve the relevant image with respect to user query from a large image database. So identifying the accurate image with user intention is the most challenging task. The traditional search engine works by taking query as input, if any image contains that query keyword in its surrounding text then that image is retrieved as result. If image contains irrelevant surrounding information and if that keyword is found into that information then this image is also displayed even it is not related with user intention. e.g. if user is searching for fruit "apple" then the result of the image search contains images of "red apple", "apple mobile", "apple laptop".To improve the results of the search engine lots of work is going on. This paper focuses on different methods used in web image search. These methods include maintaining history of click prediction [7], implicit guidance of user, keyword expansion [1], Query specific semantic signatures [6], Active Re-ranking and bag based re-ranking [3].These all methods are developed by different researchers to improve effectiveness and efficiency of the web image search. Each of these methods are described in following sections. To refine the web image search and predicting a good result is the aim of each of this method.

## 2. LITERATURE SURVEY

The web image search refers to finding the accurate images related to the user query. The development in such image retrieval area is still going on. Different Researchers are working on the methods used to improve the performance of web search engine. Finding co-click history is best suited if two images are co-clicked frequently then they are more similar than third image co-clicked less often. Difficulty with only textual search is that if the external text of image is ambiguous or not related with the query then this becomes a limitation for textual search.Logs of search engine is used to refine the image search results. To make a query more descriptive keyword expansion is used.By capturing user intension active re-ranking is performed [1] to produce best result. These are the different techniques developed in the area of web image search by different research persons described in following section.

## 3. IMAGE SEARCH AND RE-RANKING METHODS

### 3.1Keyword Expansion [1]

When user enters query for image search the resulting images are displayed by extracting surrounding information of the image. But if user query is not sufficient to express the intention of the user because of lack of knowledge about giving specific word for image search then the search performance also decreases. To recover from this difficulty extra information related with the user query needs to be captured. Extra information is captured by using keyword expansion which makes query more descriptive. Existing methods of keyword expansion provides synonyms or related words which are frequently occurred with query word. e.g. Google image search provides related searches approach to find related images which are having query related keywords.

**3.2 Using Textual Information**

As like a traditional method the image search is performed using text keywords in the query. If the keywords in the query appear in the surrounding text of the image then that image is retrieved as a resulting image. There is some work related with textual information is going on which uses text including filename of the image, URL of the image and description or the caption of the image as a surrounding text parameter. If the text is found in these surrounding parameters of the image then that image is displayed as a result image. The textual search is used as a input for visual similarity based search by grouping the images which is having same textual tag.But some difficulty with textual search is that if the external text is ambiguous or not related with the image then this becomes a limitation for textual search. e.g. if user wants to search for the image "sky" and if there is one image of sky but having caption as a "blue" then this image will not be retrieved in the result even it contains the visual scene which user wants. If the surrounding text is ambiguous then also results generated may be poor.

**3.3Using Co-Click History [2]**

When the user initiates an image search by typing the URL of a search engine a session is started and when user leaves or don't perform any activity long time the session is ended. By recording co-click images the decision is made whether two images are similar or not. When session starts with image search usually retrieve lots of images user may click one or more images. By recording click activities of users helps in image search. If image A and image B are both clicked by user then it is said that they are co-clicked. If two images are co-clicked frequently then they are more similar than third image co-clicked less often.When session starts the users have some image in their mind what they are looking for. So user may compare retrieved image with the target image in their mind. The images similar to target images are only clicked and remaining is ignored. But sometimes user is interested in viewing the images generated by search query which is not related with the target image. In such cases also using co-click history is best suited because if two images are co-clicked frequently then they are more similar than third image co-clicked less often. Finding frequently co-clicked images the search is refined.

**3.4Query Specific Semantic Signatures [6]**

Xiaogang Wang and Xiaoou Tang introduced a large scale benchmark database. Which includes 120000 images retrieved by the Bing image search using 120 keywords. Experiments on this database shows 25-40% improvement on re-ranking precision with 70 times speedup compared with state of the art methods. A user once find candidate image of target image the re-ranking function is used by choosing that candidate image as a query image. One of the approach described by xiao gang and xiaoou Tang [6] which has offline and online parts as follows.

*1) The offline stage has following steps:*

i. Set of related keywords with query keyword using keyword expansions are generated automatically. e.g. if query keyword is "apple" then expansion is "red apple", "apple i-watch".

ii. These expansions are used as a reference classes for query keyword. The training tuples are automatically obtained using keyword expansion. Obtained training examples of a reference class and to retrieve images by search engine based on textual information again.

iii. Images retrieved by keyword expansion are more correct than those retrieved by original keyword "apple".

iv. The outlier images are removed automatically and top images are used as training examples of the reference class.

v. By calculating similarities between images and reference classes the semantic signature of an image is fetched using trained multiclass classifier.

vi. To extract one semantic signature for an image the features like shape, texture, color are grouped to train single classifier.

*2) The online stage has following steps:*

vii. With reference to query keyword the images are retrieved.

viii. The images retrieved are associated with query keyword reference to the word image index file. The word-image index file contains image associated with many query keywords.

ix. When user chooses a query, image semantic signatures are used for finding image similarities for re-ranking.

**3.5 Relevance Feedback**

To refine an image search "logs" of search engine are used. These logs are used as a relevance feedback signals to refine image distance function. This approach is taken by Schultz [11], which is similar to soft margin SVM trained with relative comparison of the images. e.g. if $X_i$ is more similar to $X_j$ than $X_i$ to $X_k$. Then only one method is learned and used to compare with all images in database in these strategies.There are two ways to increase the learning approaches. One is permit related text queries to share the learned distance function to improve query specific distance function and second is increase the

ranking accuracy in some query groups more than others using query specific distance function which is able to which automatically picks up query group that is suitable and beneficial.

**3.6Active Re-ranking [12]**

When the query term is unambiguous the method re-ranking is also fail to predict user search. To make prediction correctly about the user's query image intention the sample selection strategy is used to decrease the clients labelling efforts. The only text based search is however problematic. If user wants to search for "apple" and if any image contains name apple within its surrounding text then this image is also displayed even if it is irrelevant to the user's query image.To display result of correct images to the user "active re-ranking" is used. In this method the user intention is captured and used for re-ranking the images. To improve the performance of search, labelling information is collected from user and new method is proposed to actively select more informative query images through structural information. Few images are labelled by user in active re-ranking.Author proposed active re-ranking in which user first puts query e.g. "panda". Panda is an animal but there are some persons having name panda. The images having text panda into their surrounding are displayed. So the images retrieved are animals or persons. The user needs to label those images. After knowing the user intention by labeling information and discriminative submanifold the re-ranking process is conducted.There are two methods through which the user intention is captured i.e. active sample selection strategy and the dimension reduction algorithms.

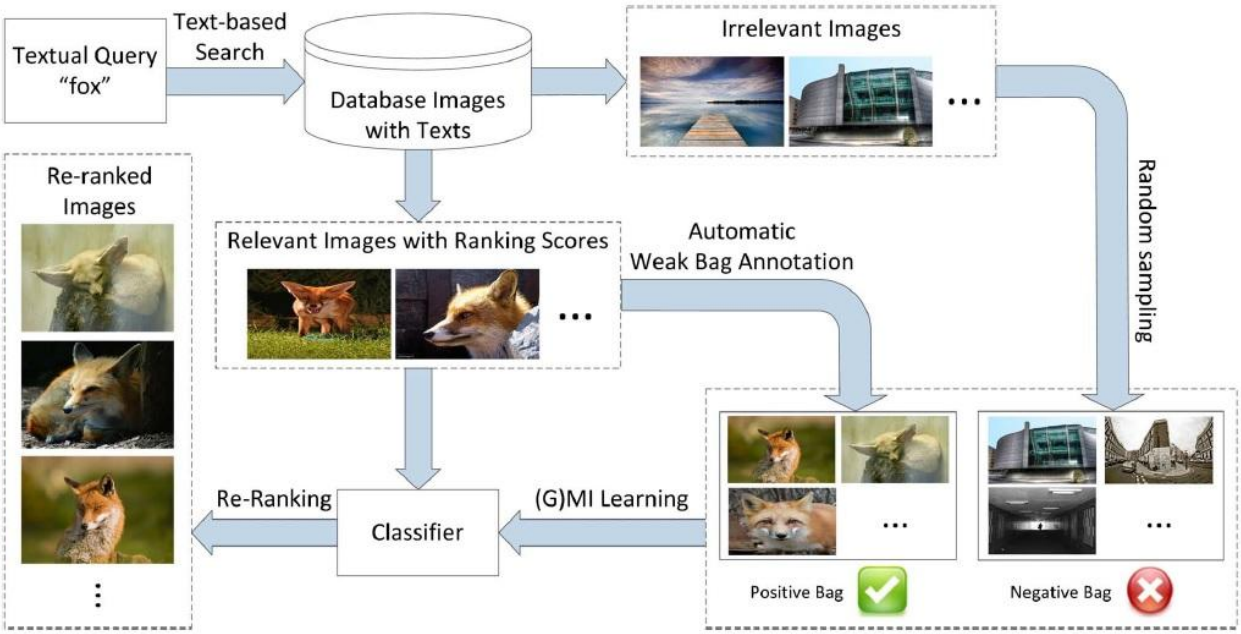


Fig.1 Bag-based image re-ranking framework for large-scale TBIR

**3.7. Bag based reranking [3]**

To improve the retrieval performance, in this it introduce a new framework, referred to as the bag-based imagereranking framework [3], for large-scale TBIR. It first partitionthe relevant images into clusters by using visual and textual features.Inspired by multi-instance (MI) learning methods ittreat each cluster of images as a "bag" andthe images inside the cluster as "instances." Then, existing MIlearning methods (e.g., mi-SVM ) can be readily adopted inthis framework.In traditional MI learning methods, if a bag contains at leastone relevant instance, this bag is labeled as positive; if the instancesin a bag are all irrelevant, this bag is labeled as negative.To facilitate (G)MI learning in this framework, conducta so-called weak bag annotation process to automatically findpositive and negative bags for training classifiers. First, it introducedan instance ranking score defined by the similarity betweenthe textual query and each relevant image. Then, they obtaina bag ranking score for each bag by averaging the instanceranking scores of the instances in this bag. Finally, they rank allbags with the bag ranking score. In automatic bag annotationmethod, the top ranked bags are used as the pseudopositivebags, and pseudonegative bags are obtained by randomly samplinga few irrelevant images that are not associated with thetextual query. After that, these bags are used to train a classifierthat is then used to rerank the database images. Fig. 1 showsthe overall flowchart of bag-based framework forthe TBIR. The experimental result shows that this frameworkwith the automatic bag annotation method performs much betterthan the existing image reranking methods.

The main advantages of bag based reranking is as follows.

• It present a novel bag-based framework that enables toformulate the image reranking problem as an MI learningproblem and improve TBIR performance by using MIlearning methods.

• It further reformulate the problem as a GMI learningproblem that relaxes the constraints in the traditionalMI learning problem. To address the ambiguities on theinstance labels in both positive and negative bags, it describe GMI-SVM, which outperforms other traditionalMI learning methods for image retrieval.

• It develop an automatic weak bag annotation methodto effectively find positive and negative bags for (G)MIlearning methods.

## 4. CONCLUSION

Image search and reranking as per user intention are using different methods. Web image search plays an important role in the area of multimedia. This paper focused on the methods developed by different researcher. The methods described are from oldest text based keyword search to the earlier semantic signature based image re-ranking. To remove unreliability and to increase the performance of web search engine these methods are applied. e.g. To refine query entered by user keyword expansion is used, for re-ranking the images actively user labeling is used. The development in the area of image search is still going on. But the methods described by different researches are very successful for faster and accurate results of the image search. The future work for image search is improved in the area of re-ranking using duplicate image detection and removal. Using the combination of textual and visual features search is explored.

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