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AN EFFICIENT TECHNIQUE FOR WEB-BASED IMAGE RE-RANKING

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Abstract - *The Web-Based Image search refers to finding the precise images related to the user inquiry. Image re-ranking is an efficient way for web-based image search. In image re-ranking, users' intention is captured by one-click on the query image. This assists in providing better search results to the users. In this paper, we assess the method in which a query keyword selected by the user, is first used to retrieve a collection of images. Image re-ranking framework automatically finds different semantic spaces offline for different query keywords. To search out semantic signatures for images, their visual features are projected into their related semantic spaces. Images are re-ranked at the online phase, by comparing their semantic signatures achieved from the semantic space denoted by the query keyword. The query-specific semantic signatures extensively improve both the accuracy and efficiency of the image re-ranking process. Hence, it is proved to be a better method than the traditional web-based image search systems.*

Key Words : *Web-Image Search, Image Re-ranking, Query Image, Semantic Signature, Keyword Expansion.*

1. INTRODUCTION

In the past few years, internet has been spread widely all over the world and because of it image database on the internet has become huge. Searching the right image from such a huge database is a very difficult task. Mainly there are two approaches used by internet scale search engines. First is text-based image search. Many commercial internet scale image search engines use this approach. They use only keywords as queries. Users type query keywords in the hope of finding a certain type of images. The text-based search result is confusing. Because keywords provided by the users lean to be short and they cannot describe the actual visual content of target images just by using keywords. The text-based search results are noisy and consist of images with quite different semantic meanings. For example, if "apple" is entered by the user to a search engine as a query keyword, the search results may belong to different categories such as "green apple," "red apple," "apple logo," "apple laptop" and "apple iphone" because of the ambiguity of the word "apple".

Why image Re-Ranking: There are two main reasons for using the image re-ranking:

1. To capitalize on relevancy of image result
2. To get diversity of image result

2. RELATED WORK

The development in web based image retrieval area is still going on. Different Researchers are working on the methods used to improve the performance of web search engine.

Cui et al. [1] did classification of query images into eight pre-identified intention classes and different types of query images are given different feature weighs. But the huge variety of all the web images was difficult to cover up by the eight weighting schemes. In this, a query image was to be categorized to a wrong class.Cai et al.[2] recommended matching the images in semantic spaces and re-ranking them with attributes or reference classes which were manually defined and learned from training examples which were manually labeled. Still it is tough and inefficient to learn a universal visual semantic space to express highly varied images from the web

Image retrieval has become an significant necessity for internet users. A number of image retrieval systems have been developed over the past decades.

Image Retrieval Techniques:

1. Text-Based Image Retrieval[3]
2. Content-Based Image Retrieval[4]
3. User's Relevance Feedback[5]
4. Query-Specific Semantic Signatures[6]
5.

3. BACKGROUND

Image retrieval has been used commonly by admired search engines One way is text-based keyword expansion, making the textual description of the query

more detailed. Existing linguistically-related methods find either synonyms or other linguistic-related words from thesaurus, or find words frequently co occurring with the query keywords.

3.1 Traditional Re-ranking Framework

In such retrieval, the user has to input a keyword as a textual query to the retrieval system. Then the system returns the images ranked in the order of surrounding texts containing the given query keyword Given a query keyword input by user a pool of images related to query keyword is retrieved. The word-image index file and visual features of images are pre-computed offline and stored.

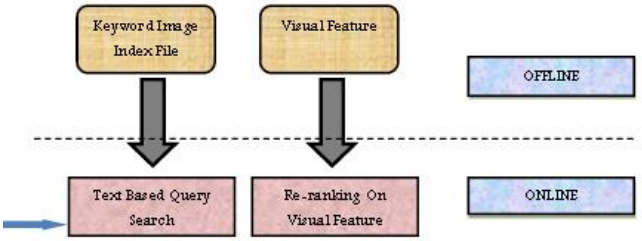

Fig -1 : Traditional Image Re-ranking

3.2 An Example

Google image search provides the related Searches feature to suggest likely keyword expansions. However, even with the same query keywords, the intention of users can be highly diverse and cannot be accurately captured by these expansions.

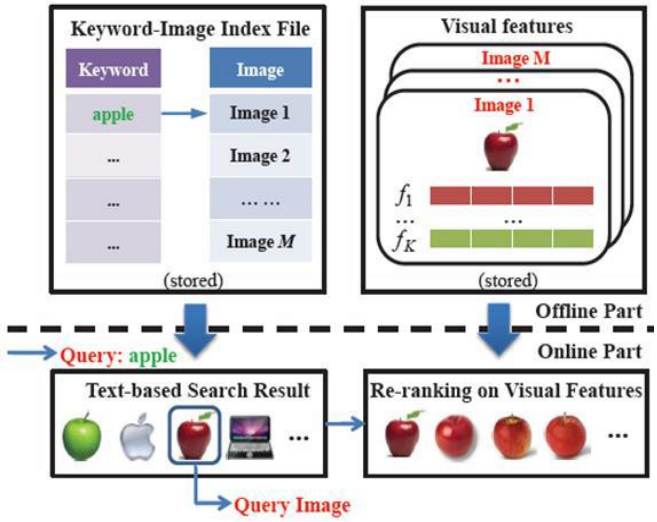

Fig – 2 : An Example of Traditional Image Re-ranking

4. PROPOSED SYSTEM

We suggest the semantic web based search engine which is also called as Intelligent semantic web Search Engine by using keyword expansion and semantic signature concepts.

4.1 Keyword Expansion

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 awareness 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.

4.2 Semantic Based Approach

Algorithm

It has two parts offline and online. In offline stage reference classes are automatically discovered. For e.g. for keyword “Apple” keyword expansions are Red Apple & Apple Macbook.

1. This keyword expansion is used to find different reference classes.
2. Image obtained from keyword expansions are less diverse than obtained from query image. These images obtained from keyword expansions are used to find reference classes. The reference classes for keyword apple can be for e.g.: Apple Macbook & Apple Fruit (Red Apple).
3. In order to improve re-ranking redundant reference classes are need to be removed. For each query keyword, its reference classes forms the basis of its semantic space. A multiclass classifier is trained using reference classes.
4. If there are K types of visual/textual features, such as color, texture, and shape, one could combine them together to train a single classifier, which extracts one semantic signature for an image.

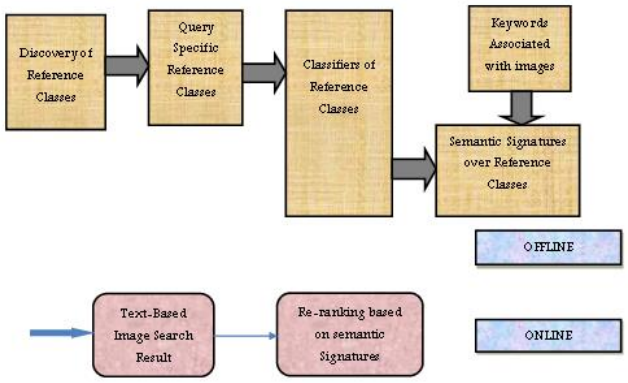

Fig – 3 : Proposed Image Re-ranking

4.3 An Example

1. User inserts a query keyword.
2. Query keyword & query image clicked by user is checked against database.
3. Here semantic search can be used to match features of image against the (reference classes) or eg:-apple can be apple fruit tree, apple, iPod, apple macbook etc
4. There are different classifiers on whose basis reference classes are classified for e.g. hey may be color, texture or shape.
5. Finally semantic signatures can be computed over it.
6. Based on semantic signature keyword expansion visual query expansion & image expansion is done.
7. Finally re-ranking result is obtained.

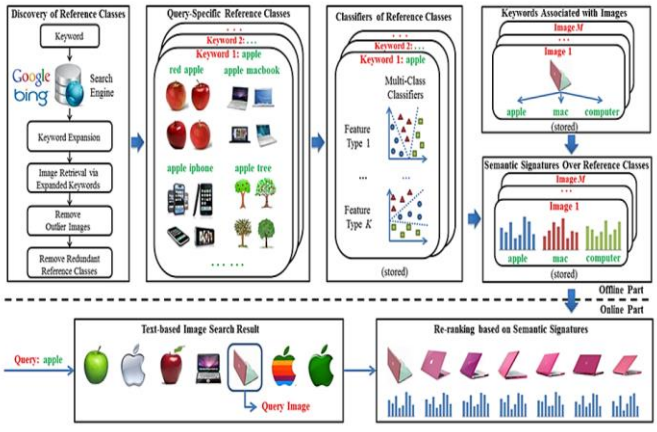

Fig – 4 : An Example of semantic signature Image Re-ranking

There are two different new approaches for computing semantic signatures as:

1. Query specific visual semantic space using single signature (QSVSS_Single)

For an image, a single semantic signature is computed from one SVM (Support vector Machine) classifier trained by combining all types of visual features.

2. Query specific visual semantic space using multiple signatures (QSVSS_Multiple)
For an image multiple semantic signature are computed for multiple SVM (Support vector machine) classifiers each of which is trained on types of visual feature separately.

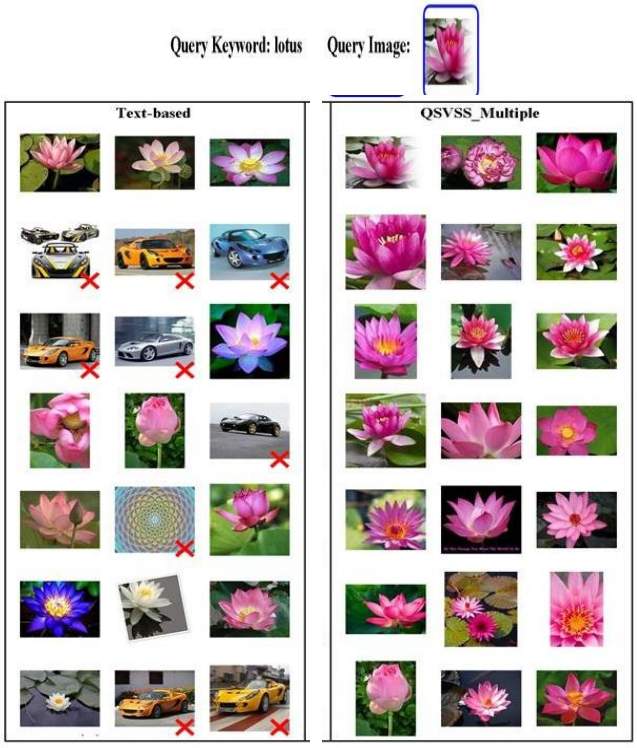

Fig-5 : Query specific visual semantic approach

5. CONCLUSION

We propose a novel image re-ranking structure, which learns query-specific semantic spaces to significantly improve the effectiveness and efficiency of online image re-ranking. The visual features of images are projected into their related visual semantic spaces automatically learned through keyword expansions at the offline stage. The extracted semantic signatures can be 70 times shorter than the original visual feature on average, while achieve 20%-35% relative perfection on re-ranking precisions over state-of the-art methods.

In future work, image re-ranking can be further enhanced along several directions by learning other metadata and log data along with the textual and visual features for finding the keyword expansions used for defining the reference classes. To get better quality and performance of re-ranked images, the images re-ranked

by the content similarity and also the visual quality of that images. Although the semantic signatures are already minute, it is possible to make them more compact and to further enhance their matching efficiency using other knowledge such as hashing.

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