Survey on Web Image Re-Ranking Using Query Specific Semantic Signatures

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Abstract- Image re-ranking, as an effective way to improve the results of web-scale image search, has been adopted by current search engines such as Bing and Google. These engines mostly based on text features, attributes and limited to user search by keywords which leads to ambiguity among images. The retrieved images are yield noisy results. Web Image Re-Ranking is an evolving concept which helps users to get hold of the large amount of online visual information.

Numerous researches have been carried on this Semantic based Web Images. In this paper, we presents a survey on various Web Image Re-Ranking techniques and contributions in the current decade related to the Web Image Re Ranking. In addition to survey on various techniques, it gives a path to future research enhancement in Semantic-Based Image Ranking of Images.

Keywords: Re-Ranking, Semantic signatures.

I. INTRODUCTION

World Wide Web has become an integral part of our daily life. Flooding of wide range of images on WWW makes it necessary to develop some strategic solution so that exact images can be extracted and easy accessible. Many commercial Internet scale Web Search engines mostly use only keywords as queries i.e. text to search images. They put up with the ambiguity of query keywords, because it is hard for users to accurately describe the visual content of target images only using keywords. Users type query keywords in hope of finding certain type of images.

For example, using “strawberry” as a query keyword, the retrieved images belong to different categories (also called concepts according Semantic Web), such as “strawberry mobile,” and “strawberry fruit”. It is well-known that text-based image search suffers from the ambiguity of query keywords.

Identifying attributes, features and content of objects in images can improve object recognition and classification as well as provide useful information for organizing collections of relevant semantic images.

II. LITERATURE REVIEW

The survey on various Web Image Ranking Techniques are listed below. The search ranked by the text keywords extracted from the surrounding text. However many of returned images are noisy, disorganized, or irrelevant. Even the state-of-the-art, such as Google Images Search [1] and Microsoft Live Image Search [2], use no visual information. Using visual information to re-rank and improve text based image search results is a natural idea.

Surfing images on the web [3], [4], [5], [6] are text-based and are limited by the fact that query keywords cannot describe image content accurately. Content-based image retrieval uses visual features to evaluate image similarity. Content-based image retrieval, a technique which uses visual contents to search images from large scale image databases according to users’ interests, has been an active and fast advancing research area since the 1990s.

Zhang et al. [7] proposed geometry preserving visual phases which captured the local and long range spatial layouts of visual words. One of the major challenges of content-based image retrieval is to learn the visual similarities which reflect the semantic relevance of images well. Image similarities can be learned from a large training set where the relevance of pairs of images is known [8].

Deng et al. [9] learned visual similarities from a hierarchical structure defined on semantic attributes of training images. Since web images are highly diversified, defining a set of attributes with hierarchical relationships for them is challenging. In general, learning a universal visual similarity metric for generic images is still an open problem to be solved. Some visual features may be more effective for certain query images than others. In order to make the visual similarity metrics more specific to the query, relevance feedback [10], [11], [12], [13], [14], [15] was widely used to expand visual examples. The user was asked to select multiple relevant and irrelevant image examples from the image pool. For example, in discriminative models were learned from the examples labeled by users using support vector machines or boosting, and classified the relevant and irrelevant images, types of features were adjusted according to users’ feedback.

Huang et al. [16] proposed probabilistic hyper graph ranking under the semi-supervised learning framework. It utilized both labeled and unlabeled images in the learning procedure. Relevance feedback required more users’ effort. For a web-scale commercial system, users’ feedback has to be limited to the minimum, such as one-click feedback. In order to reduce users’ burden, pseudo relevance feedback [17][18] expanded
the query image by taking the top images visually most similar to the query image as positive examples. However, due to the well-known semantic gap, the top N images may not be all semantically consistent with the query image. This may reduce the performance of pseudo relevance feedback. In order to reduce the semantic gap, query-specific semantic signature was first proposed in [19]. Kuo et al. [20] recently augmented each image with relevant semantic features through propagation over a visual graph and a textual graph which were correlated.

Xiao Tang et al.[21] proposed a novel Internet image search approach. It requires the user to give only one click on a query image and images from a pool retrieved by text based search are re-ranked based on their visual and textual similarities to the query image. We believe that users will tolerate one-click interaction which has been used by many popular text-based search engines.

For example, Google requires a user to select a suggested textual query expansion by one-click to get additional results. The key problem to be solved in this paper is how to capture user intention from this one-click query image. The key contribution is to capture the users’ search intention from this one-click query image in following areas. The query image is categorized into one of the predefined adaptive weight categories, which reflect users’ search intention at a coarse level.

Nikhil Rasiwasia [22] mapped visual features to a universal concept dictionary for image retrieval. He proposed query-by-semantic example (QBSE) which is combination of query-by-visual-example (QBVE) and semantic retrieval. SR research turned to the problem of the automatic extraction of semantic descriptors from images, so as to build models of visual appearance of the semantic concepts of interest.

Yushi Jing et al.[23] proposed Visual Rank algorithm to find out the visual link structure of images and to find the visual themes for re-ranking. Authors present Visual Rank, an end-to-end system, to improve Google image search results with emphasis on robust and efficient computation of image similarities applicable to a large number of queries and images.

Also authors proposed a novel extension to previously proposed random-walk models that can take advantage of current progress in image-search and text-based Web search. Visual Rank employs the Random Walk intuition to rank images based on the visual hyperlinks among the images. Used Global features histograms and shape analysis. Local features include Harris corners, Scale Invariant Feature Transform, Shape Context and Spin Images.

Linjun Yang [24] presented Visual search re-ranking to induce higher text-based image search with the assistance from visual content analysis. The unattended character of the re-ranking model makes it expertise from troubles, to optimally resolve the role of sight over totally different application situations. In this paper the “learning to-re-rank” model is employed, that derives the re-ranking operate in a very supervised fashion from the human labeled training data. Query-independent re-ranking models are going to be learned for all queries exploitation query dependent re-ranking options.

Jingyu Cui[25] presented real time searching. Generally search engines rely almost purely on surrounding text features. Text based searching leads to ambiguity and noisy results. This paper uses adaptive visual similarity to re-rank the text based search results. Initially query image is sort out into one of several predefined target category, and a precise similarity measure is used inside each category to combine image features for re-ranking based on the query image.

Cai et al. [26] re-ranked images with attributes which were manually defined and learned from manually labeled training samples. These approaches assumed that there was one major semantic category under a query keyword. Images were re-ranked by modeling this dominant category with visual and textual features.

Based on the classifiers for all the pre-defined attributes, each image is represented by a attribute feature consisting of the responses from these classifiers. A hyper graph is then used to model the relationship between images by integrating low-level visual features and attribute features. Hyper graph ranking is performed to order the images. Its basic principle is that visually similar images should have similar ranking scores.
### III. Comparative Summary of Existing Methods

<table>
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<tr>
<th>Paper</th>
<th>Author</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tr>
<td>iLike: Bridging the Semantic Gap in Vertical Image Search by Integrating Text and Visual Features. Year:2013</td>
<td>Yuxin Chen, Hari Prasad Sampath Kumar, Bo Luo, Xiaowen Chen</td>
<td>Proposed to infer users’ (visual) intention behind search terms, and apply such intention to improve relevance assessment &amp; ranking through textual-feature-guided visual feature selection &amp; weighting.</td>
<td>Explores the possibilities of integrating visual and textual features to improve search performance</td>
<td>Human perception is yet to be mapped to low-level feature spaces.</td>
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<tr>
<td>Intent Search: Capturing User Intention for One-Click Internet Image Search Year :2012</td>
<td>X. Tang, K. Liu, J. Cui, F. Wen, and X. Wang</td>
<td>Proposed a novel Internet image search approach. Image feature like Attention Guided Color Signature, Color Spatiality, Multi Layer Rotation Invariant EOH, Facial Feature.</td>
<td>Interaction is user friendly just by one click</td>
<td>1. The ambiguity issue occurs. 2. The result needs filtering. 3. Duplicate image where not removed</td>
</tr>
<tr>
<td>Real Time Google and Live Image Search Re-ranking Year:2008</td>
<td>Jingyu Cui, Fang Wen, Xiaowu Tang</td>
<td>Proposed a framework and build a system to re-rank text based image search results in an interactive manner.</td>
<td>Without additional human feedback, textual and visual expansions are integrated to capture user intention.</td>
<td>1. Quality of re-ranked images. 2. The size of the image cluster selected as visual query expansion.</td>
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<tr>
<td>Bridging the Gap: Query by Semantic Example Year:2007</td>
<td>Nikhil R. P. J. Moreno, and Nuno Vasconcelos</td>
<td>Proposed QBSE which is a combination of QBVE (Query by Example)and SR.</td>
<td>Semantic feature where used which are high level features</td>
<td>All features of image are not considered.</td>
</tr>
<tr>
<td>Automatic Attribute Discovery and Characterization from Noisy Web Data Year: 2005</td>
<td>Tamara L. Berg, Alexander C. Berg, and Jonathan Shi</td>
<td>Proposed to support image retrieval based on content properties (e.g., shape, color, texture), usually encoded into feature vectors.</td>
<td>1. Visual features, such as color, texture, and shape information, of images are extracted automatically. 2. Similarities of images are based on the distances between features.</td>
<td>1. High feature similarity may not always correspond to semantic similarity. 2. Different users at different time may give different interpretations for the same image.</td>
</tr>
<tr>
<td>Majority Based Ranking Approach in Web Image Retrieval Year:2003</td>
<td>Gunhan Park, Yunju Baek, and Heung-Kyu Lee</td>
<td>The proposed approach determines the candidates using keyword first, and then automatically re-ranks images using visual features of retrieved results.</td>
<td>It has an advantage that it can use the contents of image in determining the rank of web images.</td>
<td>The overhead of this algorithm is that it has additional computation time for constructing the clusters</td>
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### IV. Conclusion

This paper presents a survey on various Web Image Re-Ranking techniques that were proposed by earlier researchers for the better development in the field of Web Image Mining. Various techniques and methods discussed above will help in developing advanced and effective web Image Re-ranking.

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### REFERENCES