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Re-Ranking Images by Semantic Signature

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Abstract— Image re-ranking is an effective way to improve the image search result, has been used by many search engines such as MSN,Bing,and Google. Re-ranking is a common methodology used in all variety of fields and the same is applied here for images that are searched from web. Most existing approaches used text based image retrieval which is not so efficient.

Image search engines mostly use keywords and ambiguity of query image is hard to describe accurately. Low level features are sometimes inconsistent with visual perception. The visual and textual features of image are projected into their related semantic space to get semantic signatures. Images are re-ranked by comparing semantic signature and removing of duplicate image.

Keywords— Image Retrieval, Re-ranking, k-means Algorithm, Semantic Signatures

INTRODUCTION

Most of the web search engine are based on keywords as queries. Collection of image on web is growing faster and faster daily millions of images are added on web. It is challenging problem to retrieve image from search large collection. One of main problems is locating the desired image in large collection of images. Due to keyword search ambiguity issue occurs because for a user it is hard to describe the visual content of images.

In recent years, with large scale storing of images the need to have an efficient method of image searching and retrieval has increased. It can simplify many tasks in many application areas such as biomedicine, forensics, artificial intelligence, military, education, web image searching. Most of the image retrieval systems present today are text-based, in which images are manually annotated by text-based keywords and when we query by a keyword, instead of looking into the contents of the image, this system matches the query to the keywords present in the database.
This technique has its some disadvantages:

Firstly, considering the huge collection of images present, it is not feasible to manually annotate them.

Secondly, the rich features present in an image cannot be described by keywords completely.

These disadvantages of text-based image retrieval techniques call for another relatively new technique known as Content-Based Image Retrieval (CBIR). CBIR is a technology that in principle helps organize digital image archives according to their visual content. This system distinguishes the different regions present in an image based on their similarity in color, pattern, texture, shape, etc. and decides the similarity between two images by reckoning the closeness of these different regions. The CBIR approach is much closer to how we humans distinguish images. Thus, we overcome the difficulties present in text-based image retrieval because low-level image features can be automatically extracted from the images by using CBIR and to some extent they describe the image in a more detail compared to the text-based approach

Text re-ranking:
It is the re-ranking of images which we get from database, when we apply text based search. It is about searching the images and re-ranking of them.

Image re-ranking
Given the images retrieved by a text query, using *e.g.* an image web-search engine, the goal of image re-ranking is to sort the retrieved images so that the ones relevant to the query are ranked higher than the ones that are not, using the visual content of the image.

LITERATURE SURVEY

Xiaogang Wang et al.[1] proposed the semantic web based search engine which is also called as Intelligent Semantic Web Search Engines. They use the power of xml meta-tags deployed on the web page to search the queried information. The xml page will be

consisted of built-in and user defined tags. Here propose the intelligent semantic web based search engine. They use the power of xml meta-tags deployed on the web page to search the queried information. The xml page will be consisted of built-in and user defined tags. The metadata information of the pages is extracted from this xml and the practical results showing that proposed approach taking veryless time to answer the queries while providing more accurate information.They used six types of visual features such as attention guided color signature,colorspatialet,wavelet,multi-layer rotation invariant edge orientation histogram,histogram of oriented gradients and GIST.Semantic signature can also be computed from textual features and combined with those from visual features.Use of K-means clustering for clustering of image in offline mode.SVM classifier for classification of images.

Yuxinchen et al.[2] they developed a vertical image search engine that integrates both textual and visual features to improve retrieval performance..iLike system architecture which focused on crawlers/parsers are able to identify patterns and link text descriptions and images with higher confidence.

Xiaoou Tang et al.[3] 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. Image feature like Attention Guided Color Signature, Color Spatialet,Multi-Layer Rotation Invariant EOH,Facial Feature.The key contribution is to capture the users' search intention from this one-click query image in four steps.

(1) The query image is categorized into one of the predefined adaptive weight categories, which reflect users' search intention at a coarse level. Inside each category, a specific weight schema is used to combine visual features adaptive to this kind of images to better re-rank the text-based search result.

(2) Based on the visual content of the query image selected by the user and through image clustering, query keywords are expanded to capture user intention.

(3) Expanded keywords are used to enlarge the image pool to contain more relevant images.

(4) Expanded keywords are also used to expand the query image to multiple positive visual examples from which new query specific visual and textual similarity metrics are learned to further improve content-based image re-ranking. All these steps are automatic without extra effort from the user. This is critically important for any commercial web-based image search engine, where the user interface has to be extremely simple. Besides this key contribution, a set of visual features which are both effective and efficient in Internet image search are designed. Experimental evaluation shows that our approach significantly improves the precision of top ranked images and also the user experience.

Jun Huang et al.[4] Proposed a new algorithm for image re-ranking in web image search application. The proposed method focuses on investigating the following two mechanisms Visual consistency. In most web image search cases, the images that closely related to the search query are visually similar. These visually consistent images which occur most frequently in the first few web pages will be given higher ranks. 2) Visual saliency. From visual aspect, it is obvious that salient images would be easier to catch users' eyes, and it is observed that these visually salient images in the front pages are often relevant to the user's query.By integrating the above two mechanisms, our method can efficiently re-rank the images from search engines and obtain a more satisfactory search result.

Nikhil Rasiwasia et al.[5] mapped visual features to a universal concept dictionary for image retrieval. Proposed query-by-semantic example(QBSE) which is combination of query-by-visual-example (QBVE) and semantic retrieval. SR research turned to the problem f 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.[6] proposed VisualRank algorithm to find out the visual link structures 1.of images and to find the visual themes for re-ranking. Author present VisualRank, 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. 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. VisualRank employs the Random Walk intuition to rank images based on the visual hyperlinks among the images. Used Global features like color, histograms and shape analysis. Local features include Harris corners, Scale Invariant Feature Transform, Shape Context and Spin Images.

Lixin Duan et.al.[7] proposed a new bag-based re-ranking framework for large scale text-based image retrieval. Clustering of relevant image using both textual and visual feature was done. Bag was treated as a cluster and images in the bag where treated as instances, thus multi-instance problem was formulated. To address the ambiguities issues in bags GMI-SVM new method was invented. Proposed automatic bag annotation method to find our positive and negative bags automatically for training classifier. Automatic bag

annotation method can achieve better performance as compared to traditional image re-ranking method.K-means method of clustering method was used to partition of relevant image in bags/clusters.In the future more effective methods of clustering can be used.

Xinmei Tian et.al[8] proposed a novel active re-ranking framework for web image search. Active sample selection strategy and a dimension reduction algorithm was used to reduce labeling efforts. To learn the visual characteristics, a new local-global discriminative dimension reduction algorithm transfers the local information in the domain of the labeled images domain to the whole image database.

Author	Year	Description	Advantages	Disadvantage/limitation
Xiaogang Wang Shi Qiu,ke Liu Xiaoou Tang [1]	2014	Proposed novel image re-ranking frameworks. Image features used are attention guided color signature, colorspatialet, wavelet,multi-layer rotation invariant edge orientation histogram, histogram of oriented gradients and GIST	1.Improve efficiency. 2.Visual features of thousands of dimensions can be projected to the semantic signatures as short as 25 dimensions	1.Duplicate image where not removed
Yuxin Chen, HariprasadSampathkumar,BoLuo,Xue-wen chen [2]	2013	Proposed vertical image search engine that integrates both textual and visual features to improve retrieval performance. Visual features of image where taken into consideration.	1.Better search performance. 2.iLike architecture is effective and capable of bridging semantic gap.	1.Duplicate image where not removed 2. Only text query wasconsidered.
Xiaoou Tang ,KeLiu,JingyuCui, FangWen,Xiaogang Wang [3]	2012	Proposed a novel Internet image search approach. Image feature like Attention Guided Color Signature, Color Spatialet,Multi-Layer Rotation Invariant EOH,Facial Feature.	1.Interaction is user friendly just by one click.	1 1. The ambiguity issue occurs. 2. The result needs filtering 3.Duplicate image where not removed
Jun Huang,Xiaokangyang,XiangzhongFang,Weiyao Lin and Rui Zhang [4]	2011	Proposed a new algorithm for image re-ranking in web image search application. Method focused on visual Saliency and Consistency.Image features like color,edge,texture and visual saliency where used.	1.Efficent re-ranking of images from search engine. 2.More satisfactory result where obtained	1.The ambiguity issue occurred. 2.All image features where not considered.

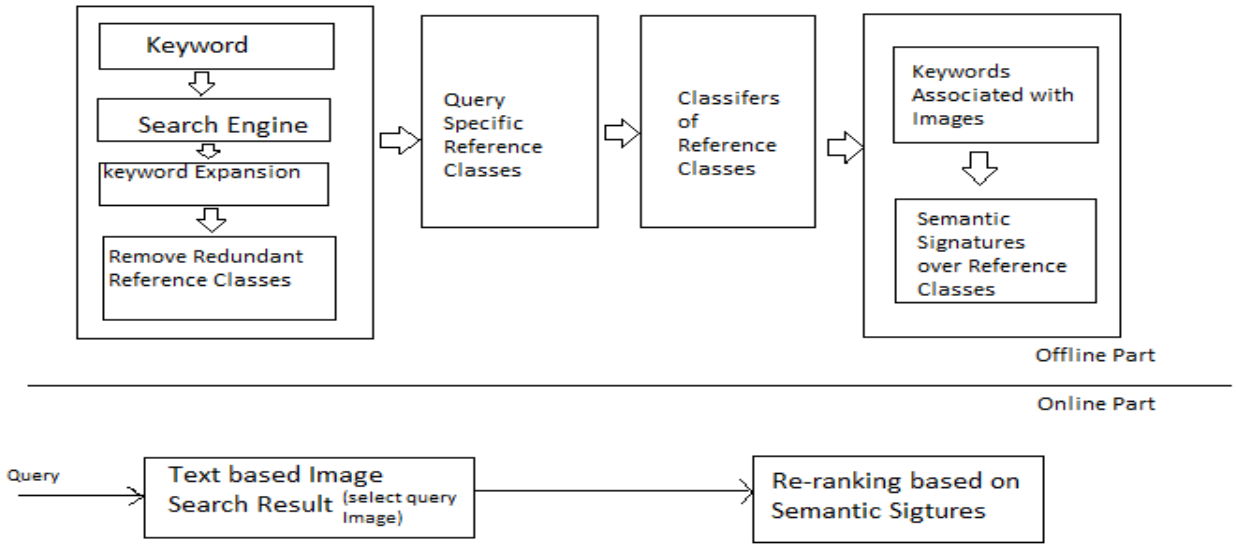
Author	Year	Description	Advantages	Disadvantage
Nikhil Rasiwasia,PedroJ.Moreno,andNunoVasconcelos[5]	2007	Proposed QBSE which is a combination of QBVE and SR.	Semantic feature where used which are high level features	1.All features of image are not consider.
Yushi Jing and Shumeet[6]	2008	It used VisualRank algorithm. Use of Global features like color,histograms and shape. Local features like Harris corners,SIFT,shape context and Spin Images	1.Using link and network analysis for Web document search into image search. 2.Reduce the number of irrelevant images efficiently.	1. Since no links explicitly exist in the image search graph. 2.Unnecessary image link where given preferences. Too expensive to construct a graph for all images
Lixin Duan, Wen Li, Ivor Wai-Hung Tsang, and Dong Xu [7]	2011	Bag Based re-ranking- 1.Partition images into clusters using textual and visual features 2.Uses multi instance(GMI) framework 3.Treats each cluster as Bag and images as instances	1.automatic bag annotation method can achieve the best performance.	1.MI learning problem 2.Average precision for images
XinmeiTian, Dacheng Tao, Xian-Sheng Hua,andXiuqing Wu[8]	2010	Active re-ranking- 1. Collect labelling information from user to obtain specified semantic space. 2. Localize the visual characteristics of the user intentions in space.	1. Use both ambiguity and representativeness . 2. Reduce user labelling efforts	1.Duplicate image where not removed 2.The ambiguity issue occurred.

PROPOSED SYSTEM

To develop a search engine for re-ranking of image with the use of meta-tags and some visual features, and removal of duplicates image.

Removal Duplication

Removed the duplicate image entries. While searching relevant images there are some numbers of images with similar pixel values and features so we are searching with category for exact result. We are also detecting the repeated images by calculating their pixel size and removing repetitive images. Other removal of duplications method are hash code and MD5 algorithm.



SEMANTIC APPROACH OF RE-RANKING OF IMAGES

ALGORITHMS

K-means algorithm for Clustering

1) Select K points for initial group centroids.

2) Each object is assigned to the group that has the closest distance to the centroid.

3) After all objects have been assigned, recalculate the positions of the K centroids.

4) Steps 2 and 3 are repeated until the centroids no longer move. This produces a separation of the objects into groups from which the metric to be minimized can be calculated.

SIM Rank Algorithm for ranking of image

For textual query expansion we use SimRank algorithm.

1) In this system generate a matrix. In matrix rows consists of all tags which are present in image database & columns consists of all the images from database.

2) If tag is present in image then matrix value changed to 1 otherwise 0 & so on the matrix is build**.** When user enters textual query, that query matched with tags. Images from all matching tags are retrieved for resultant set.

3) Next system will read the tag files of resultant images & images with these tags are also retrieved for resultant set.

4) Now for ranking of the images, system will check that how many tags the image has other than query keywords entered by user.

*5)*An image with few other tags is more relevant & according to this ranking of images is done & resultant set is displayed to the user.

Colour Moment Algorithm for colour extraction.

1) System extracts the RGB (Red, Green, Blue) values for each image.

2) For every value of RGB, system calculates mean, median & standard deviation. These all value are stored in image database.

These all values are colour features of image. These values are going to be used for comparing colour features with other images. Less difference in value, more the relevant image.

Canny Edge Detection Algorithm

For detecting edge attributes of image canny edge detection algorithm is used

1) Blurring of images is done for reducing the noise from image.

2) System finds image gradients for every image. The edges are marked where the gradients of the image has large magnitudes.

3) Only local maxima marked as edges.

4) Potential edges are determined by thresholding.

5) Final edges are determined by suppressing all edges that are not connected to a very certain (strong) edge.

6) For every edge pixel value 1 is assigned & non-edge pixel value 0 is assigned & matrix is generated.

Texture Extraction Algorithm

For extracting texture attributes texture extraction algorithm is used.

1) The matrix from edge detection algorithm is taken for texture extraction.

2) Values for Texture attributes such as energy, brightness etc are calculated & stored. These all values are Texture features of image.

These values are going to be used for comparing Texture features with other images. Less difference in value, more the relevant image.

CONCLUSION

We will combine text based feature with visual image feature to retrieve quality images from internet search. Our system will overcome the drawbacks of existing system by generating quality and exact match result of user intention and the additional function stops retrieving duplicate images and also the repeated images are detected and avoided by system in output. So user will be getting final output as plain, intended images

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