Different methods of Web Image Re-Ranking

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***Abstract* - In Today's world searching of images on internet are very popular, but most of the times searching result not exact match with the searching key. Improve the results of web-based image search as an effective way by Image re-ranking, this is adopted by commercial search engines such as Google and Bing. Given a query keyword, pools of images are first retrieved based on textual information. When the user selects a query image from the pools of images, then the re-ranking of remaining images are based on their visual similarities with the user selected query image. A big challenge is that the similarities of images visual features do not well correlate with semantic meanings of images which interpret users search intention. Recently people proposed to matching images from semantic space which used reference classes or attributes closely related to the semantic meanings of images. Semantic signatures of images are improved both the efficiency and accuracy of image re-ranking. In this paper we discuss different methods for web image re-ranking and propose new re-ranking technique with removing of duplicate images.**

***Index Terms* - Image search, image re-ranking, cluster of images, semantic space**.

I. INTRODUCTION

Normal way for image retrieval by using text based image retrieval technique (TBIR).TBIR-requires rich semantic textual description of web images. Due to the good performance of text document retrieval, most existing systems for image search only rely on the surrounding text associated with their images. Visual relevance cannot be just judged by text based approaches as the textual data is normally too noisy to precisely describe visual content or even not available the obtainable image search engines, together with Google, Bing , and Yahoo, rank and recovers images mostly on the base of textual information belong with an image in the organized web pages, like as the name of image and rounding text. This technique is famous but needs very precise description of the query which is to long and not always possible. Generally the process of searching image based on keyword typed. The process which occurs in the background is difficult thing. In web-scale image search engines most of times use keywords as queries and rely on surrounding textual data to search images. They affected from the ambiguity of query keywords. Consider example, if query is an "apple", then retrieved images are belong to number of different categories like "red apple", "apple logo" and "apple laptop". For effective way to improve searching results for the images required online image re-ranking. Most internet image search engines have since adopted the re-ranking strategy. Given a query keyword input from a user, according to a stored there word-image index file, a pool of images is retrieved by the search engine which is relevant to the query keyword. By asking to a user for select a query image, which mention the user's search interest, from the pool, then the remaining images from the pool are re-ranking dependently on their visual similarities with user selected query image. Pre-compute visual features of images at offline and stored by the search engine. The main computational cost of image re-ranking at online is depend on comparing visual features. In order to high efficiency achieved, the visual feature vectors required to be minimum and their matching needs to be fast.

II. RELATED WORK

A. CBIR

Content based image retrieval (CBIR)[1]This concept clearly define on use of visual content of image like color, texture, shape etc. Here image retrieval rather than text base query. In common words, visual feature of any image is anything that is seen about that image. It includes any visual variation obtain from that image. Then these contents are extracted from images and put in the database. And they are described by multidimensional vectors. These vectors of the images form the feature database. To retrieving images, users provide to retrieval system with example sketched figures or images. Then system converts to them into internal presentation of feature vectors. The distances/ similarities between the feature vectors of the sketch or query example provided and calculated images in the database then retrieval is performed. Under in this work different factors defining the related visual contents are described in detail .Here retrieved images will need comparison based on it's different visual features. "Appearance based image matching" is one approach from comparison based on their appearance, this works using the basis of shapes and parts of image. But its time complexity is very high because every image which is retrieved from the database is required to match with the desired image. So, this concept is not widely in application. So finally, this problem solution found from clustering.

B. Query by semantic example

In this approach used QBVE[2] a collection of query by visual example with semantic retrieval (SR).In query by semantic example(QBSE) approach images are labeled with respect to visual concept vocabulary which are in semantic retrieval. A query by visual example system operating at visual level and taking feature vectors for composing images. In SR system images are taken to be independently in sampling from concept distribution and it taken an attributes of semantic nature.SR research turning to the problem of automatically extraction of semantic descriptors from image. A QBSE system work at semantic level, it taken a vector of concept counts for representing images. This feature vector sampled from probability distribution of a semantic class. In QBSE system estimate semantic multinomial (SMN) and similarity function between SMNs.

C. Visual Rank algorithm

Visual rank algorithm[3] is finding the visual link structures of images. And from this algorithm find the visual themes for re-ranking the images. Proposed a novel extension used a random walk models for taking advantages of current progress in text-based web search and image search. From the visual hyperlinks among the images to rank the images by using the random walk which are employs from Visual rank. It used global features like histogram and shape analysis, color. And also it used local features include scale invariant feature transform, spin images and Harris corners. In this approach following steps are involve-

1. Local features are generated for a group of images and create feature vectors.
2. A collection of L hash tables H=H1,H2,…,Hl constructed and each contains k number of hash functions. Descriptors are indexed into each of the hash tables.
3. For each descriptor aggregate the objects with identical hash keys across hash tables L.
4. Here use a Hough Transform for enforcing a loose geometric consistency and used a four-dimensional histogram to store the "Votes" on the space (rotation, translation and scaling).Then at last we select the entry of histogram with the most votes consider as the most consistent interpretation. The similarity score compute from surviving matching points.
5. If A pair of images is share more than three matched descriptors then these considered as a match. The two images similarity is computable by the total number of matches which are normalized by their local features average number.
6. Given S similarity matrix, and then generate the top N number of images from the Visual Rank algorithm.

D. Active re-ranking framework

Active re-ranking is the re-ranking with involving user interactions [4].It includes structural information based sample selection technique to reduce user's efforts for labeling. And it uses a local-global discriminative dimension reduction algorithm. From this algorithm localize the visual characteristics of user intention in space. The above active re-ranking framework including techniques, which are an use of single feature for re-ranking, but the type of most effective features are vary across queries, as detailed above under the topic extraction of visual features. Active re-ranking procedure summarized as follows-

1.Initialization of image set I, number of interaction round T, labeled image set S and Y=X.
2. r = Bayesian reranking {S,Y}. /*Perform Bayesian reranking(r)*/
3.For t = 1 to T do
  St=SInfo{r,Y} /*Perform SInfo*/
  S=S U St /*Update S*/
  Y=LGD{S} /* Perform Dimension reduction algorithm LGD for new Y1*/
  r = Bayesian reranking {S,Y1}. /*Perform Bayesian reranking derive new r*/
  End for
4. Return r.

E. Visual consistency and visual saliency

The proposed method focusing on two mechanisms visual consistency and visual saliency[5].Mostly in web image search,visual similar images that closely relate to search query.Frequently in the first web pages occurs visualy consistent images will be given higher rank.Visual saliency – from visual aspects, generally salient images are easily catches by user eye.And it is observing that visual salient images in front pages,which are relevant to the user query.When above two mechanisms are integrated then re-rank the images efficiently from search engines and getting a satisfactory search result.

F. Bag based image re-ranking

Clustering of images means grouping images together which are similar and then matching or comparing among clusters. This will reduce the time complexity to a great extent. Cluster of similar images containing the relevant images is called positive bag and the bag containing irrelevant images related to query is labeled as negative bag[6]. Here the theory of Generalized Multi-Instance Learning (GMI-SVM)[6] is used for clustering, known as bag based image re-ranking. This proposed method to find out positive and negative bags automatically for training classifier.Varying degree of success of diverse clustering algorithms because it is based on domain requirement. The following task of bags formation is removal of irrelevant images and re-ranking the remaining.

Following steps for bag based image re-ranking-

1. Initial ranking.

From user textual query to automatically find relevant web images, and for each retrieved image x, ranking score can be define r(x).
2.Weak bag annotation process.
Only the bags are annotated,while the label of the instances in each bag are still ambiguous.We refer the annotation of a bag as a weak bag annotation.
3.GMI-SVM learning.
From this classified images in positive bags and negative bags.

G. Capturing user intention by one click internet image search

It is a novel internet image search approach, in this approach solved a key problem of how to capture intention of user by one click query image. It uses image features like attention guided color signature,Multi-Layer Rotation invariant EOH,Facial feature,color spatialet. For capturing user intention following four steps are involved [7].
Step1:
Adaptive similarity-in this step query image is categorized into predefined adaptive weight categories. Inside category, a specifically pre-trained weight schema for using to combine different visual features of images for better re-rank the text-based search result. This making a correspondence between the selected query image and its similar measurement which are reflects the user interest.
Step2:
Keyword expansion-query keywords are expanded, A word *w* is taken as an expansion of the query. Drawn a cluster of images from visually similarity to the user query image and all images contain the same word *w* . Here consistency of both textual description and visual content is ensured.
Step3:
Image pool expansion-From keyword expansion both textual and visual information capture users intention. keyword expansion are automatically added into the text base query and expand the image pool to include more similar images.
Step4:
Visual query expansion-clustering of images from keyword expansion are given a expanded positive examples to learn textual and visual similarity metrics, which are used for image re-ranking. From this similarity metrics reflect intention of user at a finer level, for every query image has different metrics.

H. Novel image re-ranking framework

A novel framework [8] is for web image re-ranking. They uses the strength of xml meta-tags deploying on the web page for searching query related information.Xml pages consisted of built-in tags and user defined tags. The metadata information of pages is collected from xml.They used six different types of visual features such as color spatialet,multi-layer rotation invariant edge orientation histogram, GIST and histogram of oriented gradients,wavelet,attention guided color signature.SVM classifier used for classification of images. Substitute of manually defining a universal concept dictionary, it learns about different semantic spaces for different query keywords automatically and individually. From query-specific semantic spaces can more accurately model the images to be re-ranked, since they have excluded other unlimited number of irrelevant concepts, which spend only as deteriorate and noise.The performance of image re-ranking depend on both computational cost and accuracy. Semantic signatures are getting from the images (visual and textual) features are projected into their relational semantic spaces. At the online stage, from the semantic space of the query keyword obtained their semantic signatures and comparing them then re-ranked images. The semantic correlation is computed when computing the similarity of semantic signatures .The semantic web based search engine is also known as Intelligent Semantic Web Search Engines.

Author	Year	Description	Advantages	Limitations
Shi Qiu,Ke Liu Xiaoou Tang,Xiaogang Wang[8].	2014	Image features are used color spatilialet,attention guided color signature,wavelet,histogram,GIST and histogram of oriented gradients.	Large number of visual features can be projected in to semantic signatures as short as 25 dimensions.	Detection of Duplicate images are not done and not removed.
KeLiu,Xiaoou Tang,Jingyucui,Fang Wen,Xiaogang Wang[7].	2012	It uses image features like attention guided color signature,Multi-Layer Rotation invariantEOH,Facial feature,color spatialet.	Interaction is very friendly just by one click.	1. Results need filtering. 2.Detection of Duplicate images are not done and not removed.
Wen Li,Ivor Wai-Hung Tsang,Lixin Duan and Dong Xu[6].	2011	Bag based image re-ranking- 1. Clustering of images using textual and visual features. 2.Uses a multi instance GMI framework. 3.Each cluster as bag and images as instances.	Achieve best Performance from automatic bag annotation method.	1.Machine Intelligence learning problem. 2.Calculate average precision for images.

Author	Year	Description	Advantages	Limitations
Xiaokangyang,Jun Huang,Xiangzhong Fang,Weiyao Lin and Rui Zhang[5].	2011	1.Used for image re-ranking in web image search. 2.Used image features like-edge,texture,color and it focused on visual consistency and visual saliency.	1.Getting more satisfactory result. 2. Efficiently re-ranking of images from search engine.	All image features are not considered.
Dacheng Tao,Xinmei Tian,Xian-Sheng Hua,and Xiuqing Wu[4].	2010	1.Active sample selection technique. 2.Algorithm design for Dimension reduction. From this algorithm localize the visual characteristics of user intention in space.	Reduce efforts of user labeling.	1.Ambiguity issue occurred. 2.Detection of Duplicate images are not done and not removed.
Y.jing and S.Baluja[3].	2008	1. Algorithm of Visual Rank . 2.It uses global features–colors,shape and histogram.And Local features- SIFT and Harris corner.	1.Web document search into image search by using link and network analysis. 2.Reduce irrelevant images efficiently.	Too expensive for constructing a graph for all images.
N.Raisiwasia,NunoVasconcelos and PedroJ.Moreno[2].	2007	Proposed query by semantic example which is combination of query by visual example and semantic retrieval.	High level semantic features are used.	All features of image are not taken.
A.W.M Smeulder,M.Worring ,S.santini,A.Gupta and R.jain[1].	2000	1.Consider Visual contents of image like color,shape,texture. 2.Multidimensional vector of the images form feature database.	Visual contents describe in details.	Very High Time complexity

III. Conclusion

From above different methods of re-ranking images, our conclusion is needed to work on how to avoid retrieving duplicate images. So, we will combine the text base feature with visual features of image to retrieve quality images from internet search. Our proposed system will overcome the drawbacks of exiting system. It generating exact match result of user intention and also avoid retrieving duplicate images in system output. So user will be getting plain, intended images in final output.

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