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Browser & Editor for efficient image search using re-ranking method

Miss. Kashmira Mandore
Dept. of IT Engineering,
RMD Sinhgad, Warje.

***Abstract* - Image re-ranking, as an effective way to improve the results of web-based image search, has been adopted by current commercial search engines. Ambiguity of query images is hard to describe accurately by using keywords. Given a query keyword, pools of images are first retrieved by the search engine based on textual information. By asking the user to select a query image from the pool, the remaining images are re-ranked based on their visual similarities with the query image. A major challenge is that the similarities of visual features do not well correlate with images' semantic meanings which interpret users' search intention. On the other hand, learning a universal visual semantic space to characterize highly diverse images from the web is difficult and inefficient. So, here is a novel image re-ranking framework, which automatically offline learns different visual semantic spaces for different query keywords through keyword expansions. The visual features of images are projected into their related visual semantic spaces to get semantic signatures. At the online stage, images are re-ranked by comparing their semantic signatures obtained from the visual semantic space specified by the query keyword. The new approach significantly improves both the accuracy and efficiency of image re-ranking.**

I. INTRODUCTION

Web-scale image search engines mostly use keywords as queries and rely on surrounding text to search images. It is well known that they suffer from the ambiguity of query keywords. For example, using "apple" as query, the retrieved images belong to different categories, such as "red apple", "apple logo", and "apple laptop". Online image re-ranking has been shown to be an effective way to improve the image search results. Major internet image search engines have since adopted the re-ranking strategy. When a query keyword input is given by a user, according to a stored word-image index file, pools of images relevant to the query keyword are retrieved by the search engine. By asking a user to select a query image, which reflects the user's search intention, from the pool, the remaining images in the pool are re-ranked based on their visual similarities with the query image.

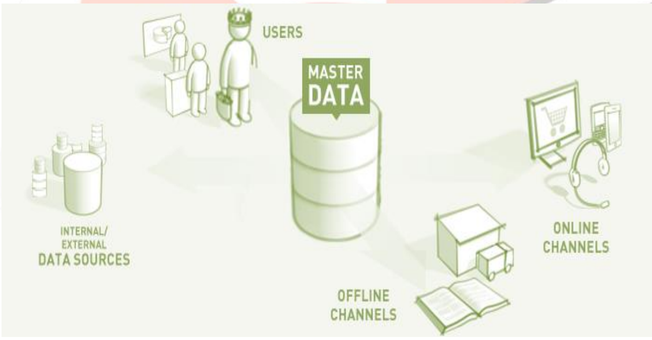

Fig. 1.1 Components involved in the system

The visual features of images are pre-computed offline and stored by the search engine. The main online computational cost of image re-ranking is on comparing visual features. In order to achieve high efficiency, the visual feature vectors need to be short and their matching needs to be fast.

A. Motivation

Yong Rui proposed a relevance feedback based interactive retrieval approach which effectively takes into account the above two characteristics in CBIR. Yang Cao1 studied beyond existing order less bag-of-features, local features of an image are first projected to different directions or points to generate a series of ordered bag-of-features, based on which different families of spatial bag-of-features are designed to capture the invariance of object translation, rotation, and scaling. Then the most representative features are selected based on a boosting-like method to generate a new bag-of-features like vector representation of an image. After reviewing existing edge and gradient based descriptors, Navneet Dalal and Bill Triggs shown experimentally that grids of Histograms of Oriented Gradient (HOG) descriptors significantly outperform existing feature sets for human detection. Maximum search engines depend on textual contents which is not feasible for fastest retrieval of images. So, for maximizing such image search a real time search engine for image reranking was proposed by Xiaoou Tang.

B. Proposed System

Proposed the semantic web based image search engine which is also known as Semantically Intelligent Web Search Engines. It use the features of xml meta-tags deployed on the web page for searching the queried information. The xml page will be consisted of built-in and user termed tags. Here is proposed the intelligent semantic web based search engine. It uses the power of xml meta-tags arranged 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 into .rdf. The practical results showing that proposed approach taking very less time to answer the queries while providing more accurate information.

II. TECHNICAL SUMMARY

The diagram of this approach is shown in figure. At the offline stage, the reference classes (which represent different semantic concepts) of query keywords are automatically discovered. For a query keyword (e.g. "apple"), a set of most relevant keyword expansions (such as "red apple", "apple macbook", and "apple iphone") are automatically selected considering both textual and visual information. This set of keyword expansions defines the reference classes for the query keyword. In order to automatically obtain the training examples of a reference class, the keyword expansion (e.g. "red apple") is used to retrieve images by the search engine. Images retrieved by the keyword expansion ("red apple") are much less diverse than those retrieved by the original keyword ("apple").

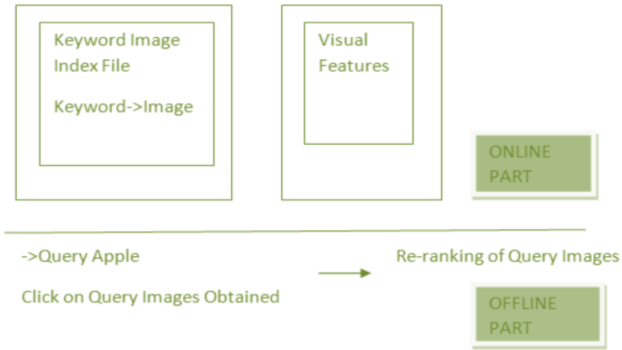

Fig. 1.2 Working of online & offline system

A. Architecture of proposed system

Discussion on computational cost and storage compared with the conventional image re-ranking diagram is shown in figure, our approach is much more efficient at the online stage, because the main computational cost of online image re-ranking is on comparing visual features or semantic signatures and the lengths of semantic signatures are much shorter than those of low-level visual features. For example, the visual features used in are of more than 1; 700 dimensions. Based on our experimental results, each keyword has 25 reference classes on average. If only one classifier is trained combining all types of visual features, the semantic signatures are of 25 dimensions on average. If separate classifiers are trained for different types of visual features, the semantic signatures are of 100 to 200 dimensions.

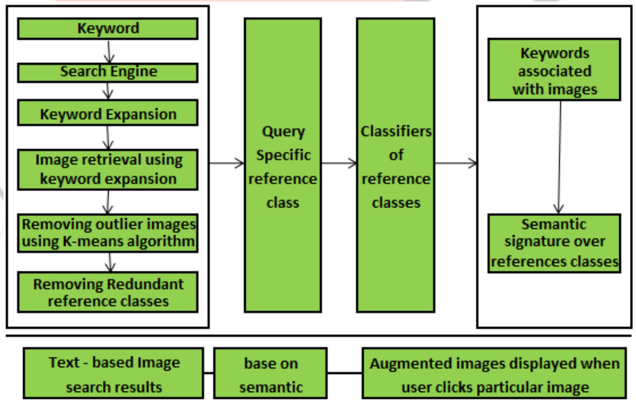

Fig. 1.3 System Architecture

However, this approach needs extra offline computation and storage. It may take 20 hours to learn the semantic spaces of 120 keywords using a machine with Intel Xeon CPU. The total cost linearly increases with the number of query keywords, which can be processed in parallel. Given 1000 CPUs, we will be able to process 100,000 query keywords in one day. With the fast growth of GPUs, which achieve hundreds of times of speedup than CPU, it is feasible to process the industrial scale queries. The extra storage of classifiers and semantic signatures are comparable or even smaller than the storage of visual features of images. In order to periodically update the semantic spaces, one could repeat the offline steps.

III. METHODOLOGY

A. Algorithm

1. There are two parts, offline and online parts.

2. In online part reference classes representing different methods related to query keywords are involuntarily discovered. For a query keyword eg. 'Apple', the set of most related keyword expansions (such as "red apple" & "apple iphone") will be automatically selected using both visual & textual information.
3. Set of keyword Expansions define reference classes for different keywords.
4. A multiclass classifier is used for training set of the reference class.
5. If there are n types of textual and visual features like shape, color, texture they can be combined together to train single classifier.
6. At on-line stage, pools of images are retrieved according to query keyword.
7. Once user chooses query image, semantic signatures are used to compute similarities of image with pre-computed semantic signatures.

B. K means algorithm Properties

There are always K clusters, There is always at least one item in each cluster, the clusters are non-hierarchical and they do not overlap, very member of a cluster is closer to its cluster than any other cluster because closeness does not always involve the 'center' of clusters

C. The K-Means Algorithm Process

1. Define abbreviations and acronyms the first time they The dataset is partitioned into K clusters and the data points are randomly assigned to the clusters resulting in clusters that have roughly the same number of data points.
2. For each data point:
   a. Calculate the distance from the data point to each cluster.
   b. If the data point is closest to its own cluster, leave it where it is. If the data point is not closest to its own cluster, move it into the closest cluster.
3. Repeat the above step until a complete pass through all the data points results in no data point moving from one cluster to another. At this point the clusters are stable and the clustering process ends.
4. The choice of initial partition can greatly affect the final clusters that result, in terms of inter-cluster and intra cluster distances and cohesion.

D. K-means algorithm

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.

E. Duplicate image detection

A duplicate image detection system produces an image table which maps hash codes of images to their corresponding images. The image table will group images according to their feature identifiers formed from the maximum significant elements of hash codes based on importance of elements indicating an image. The image table then segregates images based on their group identifiers. To detect a repeated image of a target image, the detection scheme generates a target hash code for target output image. The detection system then find out the images associated with those related hash codes being duplicates of the expected output image. Duplicate detection done during image upload phase.

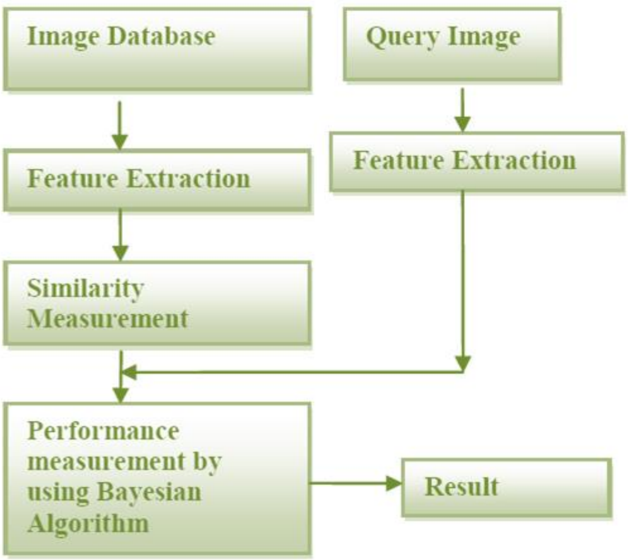

Fig. 1.4 Image Retrieval System

IV. CONCLUSION

A new re-ranking framework will be developed for searching images on the internet in which as a feedback by user only one click will be needed. Specific purpose weight schema will be used to combine visual features and visual similarities, which are adaptive to query image, are used. The human feedback is reduced by combining textual and visual similarities which are compared for more effective image re-ranking. Only on one click of image by the user, online re-ranking of the images is done. Also duplication & repetition of images are distinguished and removed by evaluating hash codes. Image contents are characterized in the form of hash code. Specific query Features are projected into semantic spaces and used to get more improvised re-ranking of image.

V. FUTURE WORK

In future, work can be done on improving the quality of images which are re-ranked. Also, this framework can be further improved by making use of the query log data, which provides valuable co-occurrence information of keywords, for keyword expansion.

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