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An Effective Image Search Reranking Based On Prototype

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Abstract

Reranking is a common methodology used in all variety of fields and the same is applied here for images that are searched from web. The methods available for image search are based on text. The probability of containing irrelevant images in resulset , is more.The precision of text based image search result is improved by Image search reranking. Reranking is applied to rerank the retrieved images based on text surrounding the image, metadata and visual feature. Hence "Prototype Based reranking image search" is proposed here. The top ranked images are used as (noisy) training data and visual classifier is used to improve the ranking further. Given the keyword as input to the proposed system model, the output contains a set of reranked images which leads to increase in probability of exactness of user search requirement. The Principal novelty of overall proposed method is in combining text/metadata and visual features in order to achieve a completely automatic ranking of images. Primary assumption is that top images in the text-based search output are equivalently relevant and it is relaxed by linking the relevance of the images to their initial rank spot. Then to represent query visually and to construct Meta rerankers, employ a number of images from initial search result. From these results we can calculate reranking scores. These scores are then combined using a linear model to generate the final relevance score which is a new rank position for an image in reranking search results.

Keywords: reranking, Prototype Based Reranking image search, noise.

Introductions

User want to search images of apple using Google image search engine. The result is a number of images of fruit apple as well as digital products of company "Apple". The search requirement is either one of them. If user requirement is fruit-apple then all digital products of "Apple" are noise. The popular search engines like Google ,Yahoo are searching the images based on the textual information associated with it. And final result contain relevant as well as irrelevant images. Hence this gives very less probability of user search satisfaction.

To handle this drawback one can't rely only on the textual information but the visual features of the image are to be considered.

Referencing the previous example t if user requirement is fruit apple and clicking on it, further only images of apple fruit are to be displayed. Further categorization may be red and green apple. This defines the reranking method.

So to improve the precision of text based image search ranking ,visual reranking is applied to refine the search result by incorporating the knowledge like color, shape etc. Recently, many reranking methods have been proposed, including the classification-based , clustering- based and graph-based methods. All these require prior assumption regarding to relevance of images in initial text based search result. In all visual reranking methods, an essential problem is how to measure the visual similarity precisely.

In the proposed prototype based image reranking based on initial search result, visual prototype is generated. Each prototype is used to construct a meta reranker to produce a ranking a score for any other image from initial set. Finally all scores from all meta rerankers are aggregated. For visual reranking it is proposed to use SVM(Suuport Vector Machine) algorithm.

Literature survey

Mario Fritz and Bernt Schiele[2]. presented a novel method for the discovery and detection of visual object categories based on decompositions using topic models. The approach is capable of learning a compact and low dimensional representation for multiple visual categories from multiple view points without labeling of the training instances. The learnt object components range from local structures over line segments to global silhouette-like descriptions. This representation can be used to discover object categories in a totally

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unsupervised fashion. Furthermore it employ the representation as the basis for building a supervised multi-category detection system making efficient use of training examples and outperforming pure features-based representations.

***Winston H. Hsu,Lyndon S. Kennedy,Shih-Fu Chang[3*],** have their work in video serach reranking. Multimedia search over distributed sources often result in recurrent images or videos which are manifested beyond the textual modality. To exploit such contextual patterns and keep the simplicity of the keyword-based search, they proposed novel reranking methods to leverage the recurrent patterns to improve the initial text search results. The approach, context reranking, is formulated as a random walk problem along the context graph, where video stories are nodes and the edges between them are weighted by multimodal con- textual similarities.

When evaluated on TRECVID 2005 video benchmark, the pro-posed approach improve retrieval on the average up to 32% relative to the baseline text search method in terms of story-level Mean Average Precision. In the people-related queries, which usually have recurrent coverage across news sources, we can have up to 40% relative improvement. Most of all, the proposed method does not require any additional input from users (e.g., example images), or complex search models for special queries (e.g., named person search).

Li-Jia Li · Li Fei-Fei [4] proposed automatic online picture collection via incremental model learning. The explosion of the Internet provides us with a tremendous resource of images shared online. It also confront vision researchers the problem of finding effective methods to navigate the vast amount of visual information. Semantic image understanding plays a vital role towards solving this problem. One important task in image understanding is object recognition, in particular, generic object categorization. Critical to this problem are the issues of learning and dataset. Abundant data helps to train a robust recognition system, while a good object classifier can help to collect a large amount of images. This paper presents a novel object recognition algorithm that performs automatic dataset collecting and incremental model learning simultaneously. The goal of this work is to use the tremendous resources of the web to learn robust object category models for detecting and searching for objects in real-world cluttered scenes.

LinjunYang,AlanHanjalic[5] proposed supervised reranking for web image search**.**

Visual search reranking that aims to improve the text-based image search with the help from visual content analysis has rapidly grown into a hot research topic. The interestingness of the topic stems mainly from the fact that the search reranking is an unsupervised process and therefore has the potential to scale better than its main alternative, namely the search based on offline-learned semantic concepts. However, the unsupervised nature of the reranking paradigm also makes it suffer from problems, the main of which can be identified as the difficulty to optimally determine the role of visual modality over different application scenarios.

R. Fergus, L. Fei-Fei, P. Perona, and A. Zisserman [6], have proposed the idea of training using just the objects name by bootstrapping with an image search engine. The training sets are extremely noisy yet, for the most part, the results are competitive (or close to) existing methods requiring hand gathered collections of images.

Proposed system framework and design

A. Problem Definition :Reranking

Retrieve a large number of images for a specified object class from browser.Now assuming we have these N images ,retrieved from initial text-based search results (as in fig 1). The reranking process is used to improve the search accuracy by reordering the images based on information extracted from the initial text based search results , the auxiliary knowledge and the example image (prototype). The auxiliary knowledge can be the extracted visual features from each image.

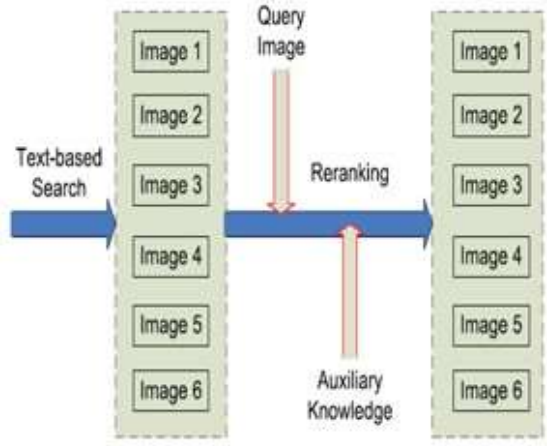

Fig 1 Illustration of reranking problem

In this paper we use a prototype based reranking freamework from [1], which constructs meta rerankers corresponding to visual prototypes representing the textual query and learns the weights of a linear reranking model , is used to combine the results of individual meta rerankers and produce the reranking score of a given image taken from initial text based search result.

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B. Block Diagram

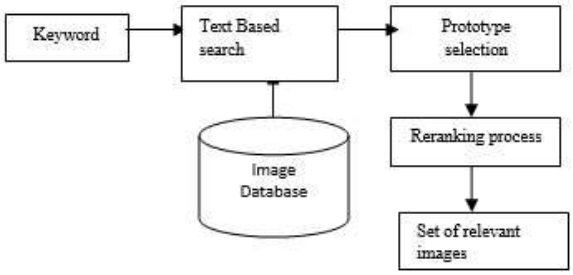

Fig 2 Proposed prototype based reranking System framework

C. Working:

1. Candidate images are obtained by a text based web search querying on object identifier e.g. keyword "cat".
2. Then noise (irrelevant images) are to be removed and reranked remaining set of images. For ranking surrounding text as well as visual features are used.
3. To the top ranked images, visual classifier is learned and visual prototype is generated, that visually represent a query.
4. Final output is reranked images.

In short the process can be redefines sequentially in following algorithm.

D. Algorithm:

1**:** start
2: User requests an image to Search Engine.
3: Search Engine collects images and stores in the database.
4: Filter images by removing symbols and drawings from the collected images.
5: Rerank filtered images using metadata.
6: Rerank images using SVM algorithm.
7: Get the SVM reranking result which is more relevant to the image requested by user.
8**:** Render the relevant images to the user.
9: Stop

Conclusion

Here the proposed a prototype-based reranking framework, which constructs meta rerankers corresponding to visual prototypes representing the textual query and learns the weights of a linear reranking model to combine the results of individual meta rerankers and produce the reranking score of a given image taken from the initial text-based search result. The induced reranking model is learned in a query-independent way requiring only a limited labeling effort and being able to scale up to a broad range of queries. The experimental results on the Web Queries dataset demonstrate that the proposed method outperforms all the existing supervised and unsupervised reranking methods. It improves the performance over the text-based search result by combining prototypes and textual ranking features.

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