Image Searching Using AutoAnnotation

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Abstract: The number of digital images has increased with the increase of digital cameras which requires effective search methods. However, due to the semantic gap between image visual features and human concepts, most users prefer textual queries. Since manually annotating images is a very slow and expensive task, auto-annotation of image has become a popular research topic in recent years. AnnoSearch is a new way to annotate images using search and data mining technologies. Taking the advantage of Web-scale images, AnnoSearch is done in two-steps: 1) search for semantically and visually similar images on the Web, 2) and mine annotations from them. Firstly, at least one correct keyword is required to enable text-based search for a set of semantically similar images. Then content-based search is performed on this set to retrieve visually similar images. At last, annotations are exploited from the descriptions (titles, URLs and surrounding texts) of these images.

Keywords: Image Auto-annotation, Image retrieval, Machine learning, Semantic gap;

I. INTRODUCTION

The number of digital images has increased with the increase of digital cameras which requires effective search methods. However, due to the semantic gap between image visual features and human concepts, most users prefer textual queries. Hence, it is always difficult to find a specific image if we want to show it or share it with another person. Since manually annotating images is a very tedious and expensive task, image auto-annotation has become a popular research topic in recent years.

A traditional approach to retrieving images is to manually annotate the picture with textual keywords and then retrieve images using these keywords. Manual annotation is expensive. For automatically annotating images, a few approaches have been proposed. These techniques usually learn from a model. They use a training set of images annotated with keywords and use this model to automatically annotate test pictures.

Although many previous works have been proposed using computer vision and machine learning techniques, image annotation is still far from practical. One of the reasons is that it is still unclear how to model the semantic concepts effectively and efficiently. The other reason is the lack of training data, and hence the semantic gap cannot be effectively linked. With the affluence of the Web, it has become a huge deposit of almost all kinds of data and provides solutions to many problems that were believed to be unsolvable. The use of annotation can facilitate the task of images management. Besides, the image annotation establishes the main tool for semantics associated with an image. Moreover, the addition of meta-data to an image improves its description and allows the construction of more successful visualizations. Our work objective is to describe the multimedia documents contents, aid and optimize their search. To do so, we build on the documents annotation by semantics descriptors. With semantics, we imply any information that can be deduced and explicitly specified. We can conclude that it is a Car in the parking without such information being directly mentioned in the document. According to semantics, it depends on the knowledge level and on the user perception as well as on its objective. Therefore, the semantics of a situation (or of a context) can be differently expressed by diverse users. Moreover, labeling the semantic content of images by adding a set of keywords is known as image annotation. Annotation is used primarily for image database management, especially those using keyword-based search, while non-annotation images can be extremely difficult to find in large database. Once the documents are annotated, they can be searched using search engine.

II. NEED FOR IMAGE AUTO-ANNOTATION

Nowadays, many pictures are available. However, to find a specific image from the entire collection of his images, for an ordinary user is a difficult task. Many researches on image retrieval have been carried out in the past two decades.

Increasing photo collections motivate the needs for automatic image annotation for effective manipulations (e.g., search, browsing). Most of the prior works rely on supervised learning approaches and are not practical due to poor performance, out-of vocabulary problem, and being time consuming in acquiring training data and learning.

III. RELATED WORK

In image annotation one seeks to annotate an image with its contents. Object detection systems find objects like a car or a face. This can be done by making separate training and test runs for each object. For annotation scheme, background objects are also important. We have to handle thousands of different object types and visual events at the same time. The model presented here learns all the annotation words at the same time. Object recognition and

annotation are both very challenging tasks.

A number of models have been proposed for image annotation. Images are described using a vocabulary of blobs.

ISSN: 2278 – 7798

Initially, a segmentation algorithm like normalized cuts is used to create regions. Then for each region, features are computed and blobs are generated. This is done by clustering the image features for these regions across images. By using a certain number of these blobs, each image is generated. Their Translation Model applies one of the classical statistical machine translation models to translate from the set of blobs forming an image to the set of keywords of an image. [10]

Web-scale data for image understanding is used by the researchers. Yeh et al. proposed to identify locations by searching the Internet. Given a picture of an unknown place, by using content based search they first obtain a small number of visually relevant Web images. Then extraction of a few keywords is done from the descriptions of these images and text-based search is performed whose results are further filtered by visual features. The disadvantages are that due to the efficiency problem, only a small number of relevant images can be retrieved as seeds which possibly degrades the performance. And the semantic gap problem will inevitably bias the final results. [2]

IV. ARCHITECTURE

The overall framework of this system contains three stages: 1) the text-based search stage, 2) the content-based search stage and 3) the annotation learning stage. Initially, images stored in file/database are clustered depending upon Color, object, etc. Input to AnnoSearch System is either a query image or keyword or both. Related images are fetched from file/database as a cluster depending on query image or keywords or both. Working of AnnoSearch System is shown as below.

A. *Text-Based Search*

For our approach we have collected 1000 images of high quality, associated with meaningful descriptions. These descriptions capture the corresponding images' content to certain degree.

B. *Content-Based Search*

Similarity-oriented search based on visual features is always a bottleneck for large-scale image database retrieval on search efficiency because visual features are generally of high dimensional. To overcome this problem, we adopt a hash K-means algorithm.

C. *Learning Annotations by clustering*

A small set of images are manually annotated initially. By using K-means algorithm this training dataset is then clustered. Then newly uploaded images which are similar to the clusters are annotated automatically according to them. [2]

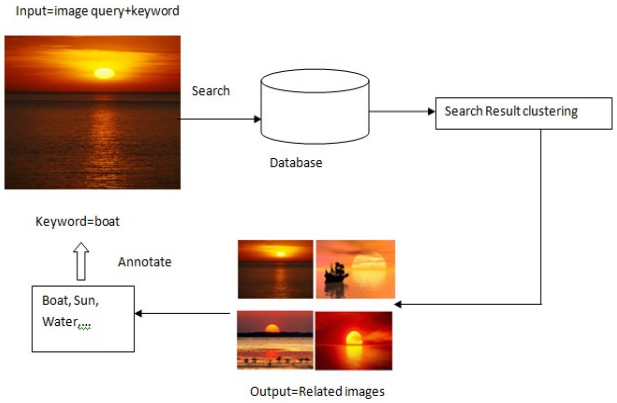

Fig. 1 Architecture of AnnoSearch System

V. APPLICATIONS

Users would like to be able to browse and to search from very large collections of images which are widespread. An advantage of search-based annotation is that it tags an image with an open vocabulary. Ideally, as long as we can find enough partly labelled similar images correlated with a new concept, we can recognize a new image with this concept. AnnoSearch system can be used in concepts such as celebrities, consuming electronics, landmarks, and entertainment images. It provides great potential to develop interesting and useful applications.

A. *Construction of Large facebook*

This is an interesting application to construct a large face book of celebrities. It successfully identified all the celebrity names. **B**ased on this approach person identification or face recognition can be developed. We are able to build a very large face book of celebrities by applying some name identity extraction or term categorization techniques to the tags, and utilizing face detection result.

B. *Medical Application*

The need for annotating digital image data is required in a variety of different medical information systems, covering both professional and educational region of medical imaging. Multimedia information search and retrieval based on textual descriptions is not always an efficient and sufficient solution, particularly for specific applications such as the medical diagnosis information systems due to the high recall and low precision attribute of keyword-based search. Also, it is not a trivial task to use image processing techniques to provide search on the content specific data for multimedia information. [3][13]

C. *Museum*

Some audio-guides are provided to the visitors in the museum in order to guide them through the museum. An

ISSN: 2278 – 7798

image annotation system is used in order to provide more interactivity and more value-added contents, which can recognize paintings or other planar images and annotate them. We can create a client-server architecture where the server is able to recognize the images and to send image annotations to the clients, which are, in this case, mobile phones by using an algorithm. The clients then receive and display annotations on top of the picture, which has been sent to the server.

Because searching the collection is typically difficult and expensive, commercial image collections can't supply an attractive service to a casual user. A tool that could automatically suggest images to illustrate blocks of text might expose value in the collection by making it possible for casual users to get reasonable results cheaply. Auto-illustration is possible if one can obtain images with high probability given text. [1]

VI. CONCLUSION

We proposed a fresh approach to reformulate the image auto-annotation problem by searching for semantically and visually similar images on the Web and then mining annotations from their descriptions. It has three steps:

1) A text-based search is performed to retrieve semantically similar images based on the given query keyword;

2) Then a content-based search is used to identify the images that are also visually similar based on the given query image;

3) At last, the selected images are clustered and prominent phrases are extracted from their descriptions, from which the annotations are learned and assigned to the query image.

ACKNOWLEDGMENT

The authors would like to thank HCL Infosystem Ltm. for giving us the opportunity to work on this project. We take this opportunity to thank our project guide Mr. Deokate and Head of the Department Prof. A.N.Adapanawar for their valuable guidance and for providing all the necessary facilities, which were indispensable in the completion of this paper. We are also thankful to all the staff members of the Department of Information Technology of Sinhgad Academy of Engineering, Pune for their valuable time, support, comments, suggestions and persuasion. We would also like to thank the institute for providing the required facilities, Internet access and important books.

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ISSN: 2278 – 7798