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Effective Image Tagging: A Survey on Techniques to Improve Image Retrieval Experience

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Abstract - Images are generally searched using textual queries. For relevant images to retrieved effectively, they need to properly tagged. Tagging can be done manually or automatically. This paper is a survey on techniques to improve image retrieval experience by computing better tags for images. It also discusses some problems with the current techniques which opens up opportunities for further research.

Key Words: image, tagging, searching

1. INTRODUCTION

In today's era taking a photo is as simple and quick as just taking out your phone and tapping the screen a couple of times. Further, with the availability of cheap storage through the cloud we are not worried about the number of pictures we take every day anymore. This has resulted in our digital galleries being cluttered with thousands of photos without any systematic organization. And this is where tagging comes in. With appropriate tags we can quickly search for the photos we are looking for. People usually don't want to manually tag their images as it takes a lot of time and effort. And when they do tag their images manually there is no guarantee that those tags are good enough for searching. On the other hand, is automatic tagging, which looks at a image and tries to identify features in the image and generate appropriate tags. This approach does not take much effort on the user's side, but building an accurate and scalable automatic image annotation system is not a trivial task.

2. PRIOR WORK

This section discusses methods/techniques proposed by other researchers on how to improve image tagging systems.

Jia Li and Wan (2008) developed the Automatic Linguistic Indexing of Pictures—Real Time (ALIPR) system [1] to meet the need of real-time automatic annotation of online images by words. To establish probabilistic relationships between images and words they developed novel statistical modelling and optimization methods. Their work showed that using a large collection of example images computer can learn to annotate general photographs with substantial accuracy.

Renuse and Bogiri (2017) implemented an image annotation framework [2] that used a C4.5 classifier. The framework uses label matrix and nick name matrix for building the classifier, in order to reduce the computational complexity. For improving the efficiency and annotation accuracy the system uses multi feature extraction and multi label learning. They tested the system with the IAPR TC12 dataset and after comparing with the naïve bayes classifier it was found that the system was more accurate and time efficient.

Usually, automatic image annotation systems just identify different types of objects and generate tags from them. But when users refine their search queries by describing the objects, the search usually fails as the tags do not describe the properties of the objects. Thus, in their research Yang et al. (2011) proposed a tag tagging scheme [3] which generates property tags from existing tags to give more descriptive information about the objects in the image. The proposed scheme looks at the initial set of tags and maps regions in the image to each tag. It then analyses the regions to generate property tags for the object in the region. This significantly improves search relevance as users are able to get results for refined queries. One drawback with this scheme is that it needs a good set of initial tags for the image to generate the appropriate property tags for the objects in the images.

3. PROBLEM OF RELATIONSHIPS

In Sec. 2 we saw various techniques to improve tag generation for images. But there is one problem common with all the mentioned techniques. The generated tags only identify objects in images and sometimes even properties of objects. But they do not describe relationships between objects. While searching for "ball on table" and "ball under table", users may get similar results if the search engine worked only by looking at tags. Actual relevant images for both queries would include the tags "ball" and "table", but they would usually not contain tags describing the relationships between the two. After detecting the objects in an image, a model should analyze the relationships between the generated objects. Then along with the individual object tags, combination tags describing the relationships between objects should be generated. So if initially bag and ball were detected as objects, the objects relationship analyzer could generate tags like "ball under table", "ball below table", etc. along with the individual object tags "ball" and "table". If this approach is combined with the tag tagging scheme [3] discussed in Sec. 2 then the system could generate very robust tags which would significantly increase search performance.

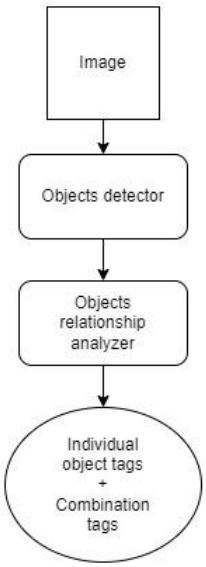

Fig -1: Generating combination tags that describe relationships between objects in the image

4. CONCLUSIONS

We discussed various methods for better image tagging in this paper. We also showed that a common problem with the current approaches is that the generated tags do not describe relationships between the various objects in the images. Thus, a model needs to analyze the relationships between the objects before combination tags that describe these relationships can be generated.

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