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Automatic Image Tagging using Template Model for Domain Specific Images

Arunkumar Panneerselvam¹, Selvaganapathy Shanmugam²

¹Faculty, ²Assistant Professor

¹Pondicherry University, Karaikal Campus, ²E.G.S Pillay Engineering College

¹Karaikal, Pin no. 609605, ²Nagapattinam, Pin no. 611002

¹arunkumar.pselvam@gmail.com, ²sganapathy84@gmail.com

Abstract: Image retrieval always poses a challenge for computer systems. This is because of the limitations of the computer system in recognition of images. Now days the image retrieval is done extensively by keyword based searching rather than by its contents. Content based search is not yet popularized because of its complexity. This paper deals with tagging of domain specific images with appropriate keywords which is used by the computer system for automatic tagging of other images. A template image of the domain is used as example for automating tagging of images.

Keywords: image retrieval, automatic tagging, template model, domain specific images.

1. INTRODUCTION

The automatic image tagging concept deals with tagging of digital images with meaningful keyword or captions automatically by the computer system [1]. To automatically tag an image with right keyword or caption the computer system must recognize the digital image which is not easy as humans who can easily recognize an image and tag it. However human tagging consumes lot of time, effort, labor and cost. To overcome these limitations of human tagging, automatic image tagging is employed. Automatic image tagging employ content based retrieving where images where retrieved by color, shape and textures of a sample image and tagging is done. Content based image retrieval is still under research and development so that users cannot employ the CBIR technique efficiently for all domains of digital images with a common algorithm. Hence domain specific automatic image tagging would be helpful for tagging the images based on domains. For each domain, specific sample image is used as a template to retrieve images of same kind.

2. CATEGORIES OF DOMAINS

First step in the proposed methodology is choosing of various domains. Domains specify specific category of image [2]. Domains can be broadly classified as General, Business and Personal. These Image taxonomies may be further divided into granular level to get the exact domain of the image that is to be tagged. The following are some of the examples of Image taxonomies of Business domain.

2.1 Medical Images

The health care industry is one of the important areas where the digital images are extensively used to identify the structure and anatomy of human body, cell arrangements and patterns, Disease identification etc. Fuzzy logic can be used to recognize the medical images. Fuzzy clustering technique can be employed to identify Medical images [3].



Figure 1: Doppler scan image

2.2 Geographical and Spatial Images

The geographical images include structure of various landforms, rocks, mountains. The spatial images includes metrological images such as cloud accumulation, cloud density, fog clusters etc.

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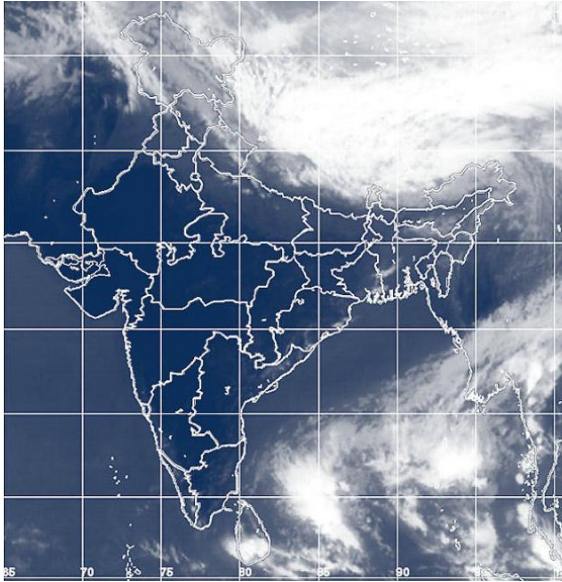


Figure 2: Cloud accumulation image

2.3 Biometric Images

The Biometric images include finger print patterns, retinal structures and face images etc captured by biometric devices and CC cameras.



Figure 3: Finger Print image

2.4 Product Images

The product images include the products of companies. It may also include gallery of images used by the online shopping web sites like flipkart, Amazon etc.



Figure 4: Online store dell mouse image

3. STEPS IN DOMAIN ORGANIZATION

The following are the steps involved in the proposed model.

- 1) Organize the General domains. Let the general domains be $\langle GD1, GD2, GD3 \dots \rangle$.
- 2) Organize the Sub domains. The general domains may contain n levels of sub domains and the sub domains itself may contain n levels of inner domains. The sub domains and its inner domains may be figured as $\langle SDn.Leveln \rangle$.

Thus an image having $\langle GD2.SD3.L6 \rangle$ represents the image of sixth level in sub domain three of general domain 2. See the below domain classification example:

Business->online shopping->product->computer->dell->mouse

4. STEPS IN SELECTING A TEMPLATE

The following are the steps involved in the proposed model.

- 1) Select an image from each level and in each sub domain.
- 2) The template image should exactly match and depict the level, sub domain and the general domain.
- 3) Mark the template image by $T \langle GDn.SDn.Ln \rangle$

5. ANNOTATE THE TEMPLATE IMAGE

After selecting the template image, the image can be tagged manually with appropriate keywords or caption. The organization can have its own set of domain specific keywords or caption to tag the image. Ranking of keywords can be followed so that the template image is tagged very accurately. Text mining of keywords can also be employed for choosing accurate keyword [4]. Since the template image is used for annotating the images of similar type, due care should be taken in tagging the template image.

If necessary the template image can be enhanced using histogram techniques [5].

6. RANKING BASED TAGGING

While tagging the template image the ranking based keyword assignment [6] needs to be done by the domain experts for the images in the specific domain. Since the domain experts are assigning the tags based on ranking of keywords the template image would be tagged accurately.

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7. CREATING DATASET

The template images of each sub domain are used as the training dataset. With the help of the training dataset the computer system automatically tag the images of the same domain using supervised learning technique. Since the domain experts are assigning the tags based on ranking of keywords the template image would be tagged accurately.

When we add some extra features to this system the performance of this system degrades. In our work we will define certain set of rules which will check that which extra features degrades the performance of the system and also check the impact of these features.

8. SUMMARY IN STEPS

- Classify the image for its domain. Image taxonomy is used for domain organization.
- Select an image for each level in the sub domains.
- Selected image will be the template image.
- The domain experts tag the template image based on domain specific ranking keywords.
- The template image is used as the training dataset and using supervised learning the same kind of images in the domain are automatically tagged.

9. ADVANTAGES OF TEMPLATE MODEL

- Digital images are well classified by the domain experts of the image.
- The template image is manually tagged by the domain experts with higher ranking keywords. So the digital image is accurately tagged.
- Image of the same domain are automatically tagged by supervised learning.
- High performance
- Time is reduced by automatic image annotation.
- Well applied for particular domain.

10. DISADVANTAGES OF TEMPLATE MODEL

- Sufficient time is needed to classify the image based on domains.
- Efficient image taxonomy is required.
- Template image requires manual tagging by domain experts.
- Time required for training the image retrieval system based on the training dataset.

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