A Deep Study of Content Based Image Retrieval System using Sentiment Analysis

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Abstract- Analysis of visual contents has always been interesting and important yet it is very challenging as well. With the increasing popularity of social grids, images are considered a very expedient way to communicate and diffusion of information among online users. To know the different patterns and different aspects of these images it is very important to first interpret these images in a simpler form. Like the textual information images also carry different levels and different types of sentiments to their spectators. Though it is quite easy to detect any type of sentiment from the text but it is very difficult to analyse sentiments from the visual images. By using the CBIR technique it would be quite easy to get the accurate image but the image with right sentiment is again a challenge. In this paper, I have presented a method which is based on psychosomatic models and web mining that can easily and automatically construct a huge set of Visual Sentiment Ontology (VSO) which comprises around 4000 ANP (Adjective Noun Pairs). I have also proposed the concept of SentiBank, a pictorial notion sensor library that can be used to sense more than 1000 ANPs in an image. These two technique, VSO and SentiBank will positively open the new doors to analyse the sentiments in an image and gives the more accurate results while accessing the images using sentiments.

Keywords: CBIR, Sentiment Analysis, QBIR, QBIC, Social Multimedia

1. INTRODUCTION

In today's world we are living in Internet age. Internet is being known as the major platform for sharing, expressing and understanding the world in a much better way. Knowing an information in the form of image is always better than the text. Now when we want to search for a particular information and want to exchange some information over the Internet in the form of image, finding the appropriate image from the database is not only a crucial task rather it is very time consuming also. To find out the desired image from a small database will be quite easy. But this will become very cumbersome when the database is so large and we don't have just hundreds of images rather we have millions or billions of images. Searching the desired image from the database is a tedious task. Sometimes the feature of image does not get matched, sometimes the color is not matched, and so on. There are number of problems using text based image retrieval system. To overcome from all these problems, Content Based Image Retrieval systems is introduced in 1992. It is called as CBIR system. CBIR is also known as QBIC (Query Bases Image Content) and CBVIC (Content Based Visual Image Retrieval). Keeping in view the number of problems in TBIR (Text Based Image Retrieval), the CBIR has gained a lot of popularity and it has become the most practical research area among researchers. The paper is divided into number of categories, i.e. first I will discuss about the CBIR and then sentiment analysis and whatever the techniques being used for the image retrieval, how can we get the accurate images by adding the sentiments in the query. At the end what are the challenges are involved in the approach.

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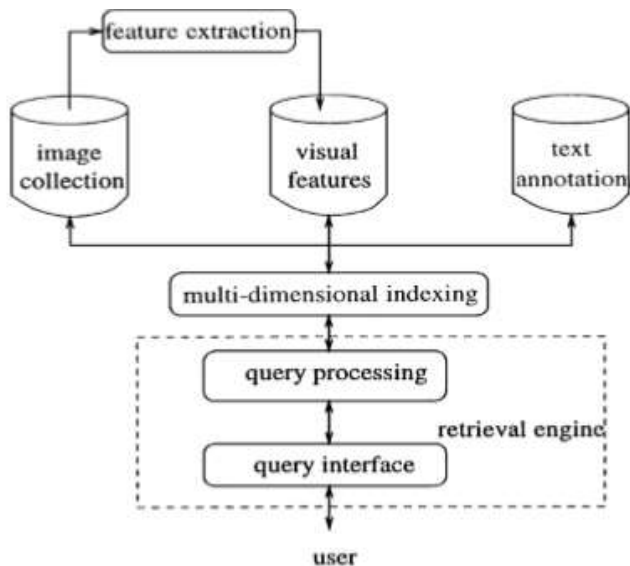
Fig. 1 Image Retrieval System Architecture [1]

2. IMAGE RETRIEVAL SYSTEM USING CONTENT (CBIR)

Image retrieval is the process of the retrieving the desired image from the image database. When we retrieve the digital image it is containing both the elements i.e. visual contents and semantic content. The visual content is always a domain specific which includes color, feature and texture etc. whereas the semantic content may use different kind of procedure for the image content analysis. Content based image retrieval is the process of supplying of query as an image and demand for the desired image from the image database based on the given query. We will call CBIR as QBIC (Query based Image Content) or QBIR (Query Based Image Retrieval). In some cases, CBIR is also known as CBVIR (Content Based Visual Information Retrieval). CBIR works not on the based on the text rather is works on the digital image where the query is the image itself. It is helpful to overcome from the image mining problem. Number of search engines are using the concept of CBIR where we can search the images based on the image as query. Google, Yandex, Bing, all these search engines are using this technique. Earlier the researchers were using the another technology i.e. ABIR (Annotation Based Image Retrieval) which was having many problems. Now CBIR has removed all these problems. The CBIR system performance mainly depends on the image representation methods and functions that use similarity matching techniques [1]. From the last few years' researchers have given lot of attention on CBIR. In this approach the images

are searched on the basis of low level features like color histograms, textures and shapes are mainly computed from the image which is given as the query and then matched the similar image from the image database. The result is much more relevant and accurate compared to any other method. In CBIR systems input is provided in terms of an image and based on image attribute matching the most similar images from database are retrieved [2]. CBIR comprises following steps:

- Collection of images
- Extract the features of all images including the query image
- Make a search in the database
- Extract the visual features from the image database and stored in the feature matrix.
- Let user enter the query.
- The features of the query image will be matched from the image database using some methods of similarity matching.
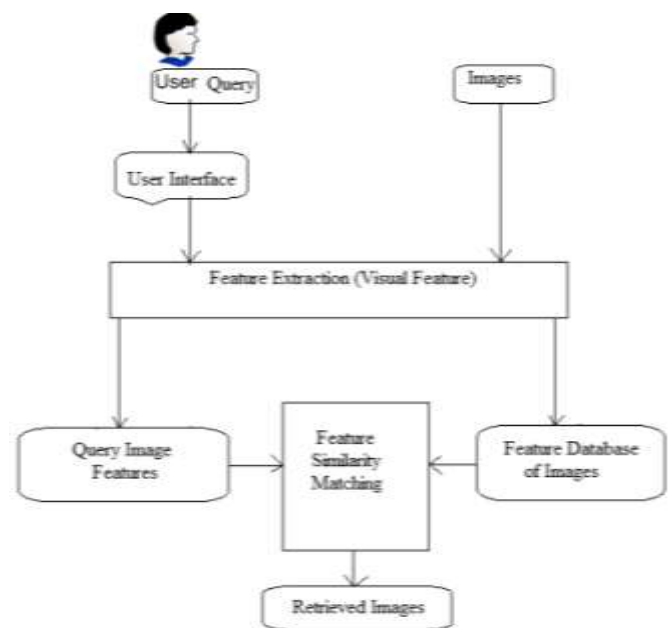- At the end the desired image is retrieved.

Fig. 2 Flow Diagram of a CBIR System [3]

3. Emotional Semantic Image Retrieval System (ESIR)

Nowadays when we know that Internet is playing a vital role in today's life. It has become very obvious that for every communication we are dependent on Internet. Internet is not only used to exchange the

information rather it is the platform where people can give their opinion and sentiment about a huge range of different topics. Such information is entrenched in number of facets like comments, tags, shared media objects and user's browsing actions. These types of information are going to analysed for the purpose of opinion mining and sentiment analysis which plays an important role in the behavioural science which aims to understand and predict human decision making [4]. All these sentiments related information are further used in political voting, brand monitoring and prediction for stock market and so on. So far, the computational analysis of sentiment mostly concentrates on the textual content [4]. Very limited efforts have been done in the direction of analysing the sentiments from the visual contents like images and videos. So we can say that this is the open issue for the researchers for the research. This issue will portrait a different challenge where we address the nonconcrete of human concepts in form of emotions and other feelings. Normally when we extract the desired image it is really very uncertain that are we going to have the accurate image because if the emotions of images are matched with the different types of images then it is much possible that we can have wrong image. That is the reason we are involving the sentiments along with images to retrieve the desired image from the image database. In CBIR normally we work on low level features like color, shape, features etc. Now by using these features we may not get the desired image so to overcome from this problem we have involved the mid level representation which is based on the visual contents and with the sentiments also. Number of search engines are available to filter images according to the query image passed and its sentiments. Not only this approach will give the better results rather it is much more time saving as well. There are number of search engines which are available to retrieve the desired image from the image database based on the query passed in the search engine. Google is one of the most popular engine in this direction. We don't have to give the text in the search bar rather we have to give the image in the search bar. For achieving this we need to open https://images.google.com and we can either drag and drop the image in the search bar or we can directly upload the image and based on that image result will come. Once the images are retrieved we can easily choose the right image. Now this is the second phase where we will be giving the images with sentiments. Sentiments always put more accuracy in the retrieval

of desired images. The approach which is being used in the paper is much more expressive and accurate as compared to any other approach. With the help of sentiment prediction analysis, we would be able to get the exact image from the large database. There are number of ways where we can use different sentiments and see their effects on the retrieved images. In this paper, we have used three emotions i.e. positive, negative and neutral. On the basis of these emotions images will be searched.

4. Visual Sentiment Ontology

As we all know that there are number of emotions in the human concepts but mainly there are 24 emotions those can be used and utilized as per the psychology matrix. We will be using Plutchik's Wheel of Emotions [5] which will be used to develop a large scale of VSO that consists of more than 3,000 sematic concepts. After applying this approach few guidelines must be taken care:

1. There must be strong replication of emotion
2. It must have strong link to emotions
3. Must be used frequently in the routine practice
4. Must have reasonable detection accuracy

To achieve above these objectives, we use Paired Adjectives concept in this paper. Few examples are like "fabulous French restaurant" or "cute puppy". The advantage of using these adjectives instead of using simple noun will positively give the best result and more near to the desired image searching. This feature will add the strong sentiments over the neutral noun. These types of paired adjective are having much more capability to return the more accurate image rather to use the simple noun instead. This way Visual Sentiment Ontology works and gives the more accurate and desired image based on the sentiments as per the query passed by the user using QBIR. This way we are just putting the text and making it paired adjective. In this paper we have the images in the form of .JPEG, .GIF, .PNG and so on. These image must carry the emotions or sentiments and we are required to upload or give the link of these images in search bar and can see the result. Along with the VSO we are also taking the help of SentiBank which is a complete library of sentiments and we can analyse these sentiments based on our desire. Once the image will be searched based on the sentiments supplied in the query image we can see that the result which is coming is much more accurate and appropriate. With the vast scope of internet, it is seen that the usage of images has become more and more powerful and useful. So there is lot of scope for the researchers to do more work in

area of retrieval of images and their future use. By putting the sentiment in images we can get much better results in compared to text based retrieval. In summary there are basically four benefits of using this technique: first, we can have a very large number of database related to images and we have to look into this database based on data driven methodology which can be searched over the internet for the fast retrieval. Second, we have generated the large physiological model for finding the sentiments in the images. Third, a mid level representation has been evolved to fill the gap which is noticeable by using low level representation in the image retrieval. Fourth, the VSO and sentibank are used for very large volume of dataset and is being referred in other public releases. There are number of social media sites where people are tweeting and chatting, based on their sentiments supplied in their images we can simply use them for the best retrieval of images. The ontology which is developed here is based on visual sentiments. This ontology will be used for the future purpose of retrieval of images which may not be resulting in the simple retrieval process. Once the process will be started it will be more and more in demand. We have demonstrated the VSO and its interface in figure 3.
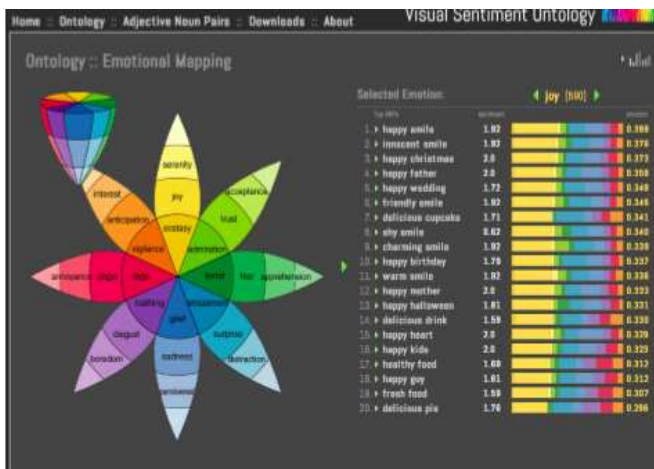

Figure 3: Plutchik's Wheel of Emotions and Ontology' Visual Interface based on the Wheel

Related Work

The challenge of automatically detecting semantic concepts such as objects, locations, and activities in visual data, referred to as video annotation [6]. Number of technologies have been explored by the researchers

in this context, like concept detection, semantic indexing and event detection etc. Now keeping in view of increasing size of internet and images in the online database, the large ontologies and database have been created. YouTube and Flickr are the recent approaches in this area. Available online tags on the images are also very helpful for this purpose. Earlier the work has been done in the direction of physical concept of the objects rather than the visual contents. But in current scenario the physical concepts of the objects are not gaining much attention rather users are more interested in the visual contents of the image where visual sentiments can be seen on the large scale. There is much progress in the sentiment analysis and the visual content retrieval as compared to text based image retrieval. The main part of the sentiment analysis is that we have to work with the emotions of the image. In the past decades while retrieving the images we have to be based on the few features like color, feature extraction and so on, where visual sentiments were missing and we may not be able to get the accurate picture number of times. In this approach we have used the paired adjectives like "beautiful flowers" or "misty clouds" for the purpose of textual sentiments. This type of ontology is one of its kind of technique which will open the new opportunities for the researchers and users. Moreover, with the help of such ontology it is very beneficial to learn the new era of image world and we can easily combine it with the sentiments as well. Till now a very limited dataset is available for the purpose of analysing the visual contents. The main dataset is International Affective Picture System (IAPS) which provides a large volume of emotions (pleasure, anger, happy) for the set of colored photographs. This dataset is containing number of pictures containing insects, puppies, poverty, children and many more. Number of participants are using this dataset for their research. This dataset is containing more than 370 pictures with different emotions and feelings. More than 60% participants have rated this dataset as a valid and useful. Like this, there number of other datasets also on which number of participants have already worked. Some datasets are containing 700 datasets some are containing 500 datasets and so on. But the technique which is discussed in this paper is able to produce a larger volume of images(dataset) i.e. more than 0.5 million of images from different web portals, social media which are labelled with paired adjectives. There are number of emotion (positive, negative and neutral) have also been mentioned and utilised. Fig. 4 gives the details about the ontology and the different sentiments and indicated colors accordingly.

Fig 3: Tags for different emotions. Box color gives the indication of different sentiments.

5. CONCLUSION

In this paper, we have demonstrated that the technique, which is used, is not only giving the better image retrieval results, but also improves its accuracy. To build the strong CBIR system number of modules are combined together i.e. segmentation & grid module, extraction of feature module, extraction of color module, neighbourhood module and K-means clustering. The neighbourhood module will also recognizes the side of every grid image. After doing this research we come to this point that the mentioned CBIR system gives the better image retrieval solution for the user. Color feature will also help to increase the better result and it is also easy to implement.

6. SCOPE IN FUTURE

In future we will try to build a generalized query technique which will escalate and searching capability and deliver more precise content descriptions of images by performing color feature analyses and Contrast Context Histogram extraction features concurrently. So, in the future the CBIR system will be giving more appropriate results for the image retrieval. As an end result the CBIR system will be able to propose more appropriate observations and metaphors.

7. ACKNOWLEDGMENT

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