A Survey on Annotation using Natural Language Vocabulary in CBIR

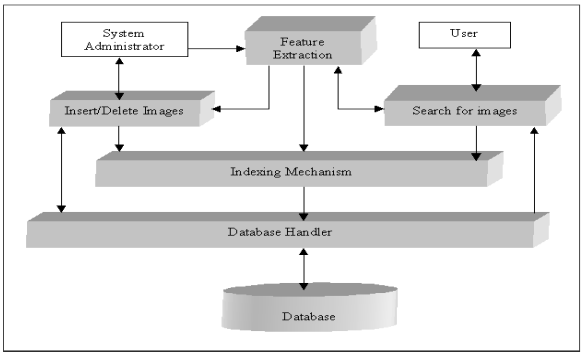
Gurdeep Kaur, Gaganpreet Kaur, Sushil Garg

Abstract- Efforts to reduce semantic gaps in CBIR is an ongoing process, numerous models have been proposed to reduce this gap, each one of these models has some advantages and some limitations. Increase in the volume of multimedia repository has further complicated the design and development of an appropriate model which can help in eliminating the semantic gap [3]. This paper examines the problems that may arise as a result of semantic gap, various models which are presently available for reducing the semantic gap [3].

IndexTerms*: *Fast Image Searching in Huge databases (FISH)*, fuzzydataset, Fuzzy support vector machine (FSVM), *manualannotation, region of interest,semantic.

I. INTRODUCTION

The process of developing content based information retrieval system is like mapping analog world into a digital world. In our world we see complicated network of similarities overlapping and crisscrossing, sometimes overall and sometimes similarities in detail and depth. In simple words we humans create mental categories of objects based on resemblance of object traits that may be associated with some concept, process, task, and depicted in instance of an image frequency.In fact, human mind is a kind of hybrid system which learns fuzzy associations and crisp rules of subsystem. Most of the cognitive system that are build today try to model the different aspects of human behavior into a mathematical model which works on understanding on how human mind works.



If any CBIR system is build for the purpose of mapping the cognitive information that might be depicted in a image interpreted by a subject interested to gain some information which would be useful for him to complete his current task, the system must be based on the words that have been contributed to collective vocabulary of masses and their culture.

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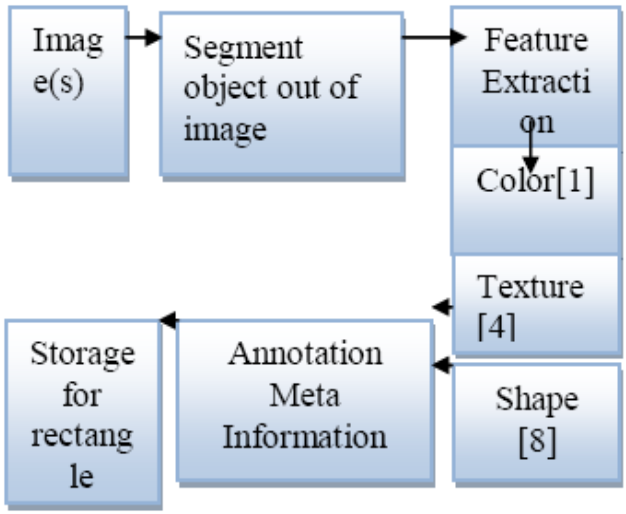
However, the rules of system based on which CBIR[10] is to be build should have similar language grammar, combinatorial and recursive in nature and must be able to incorporate unlimited range of cases, specific to a particular science or domain in question.

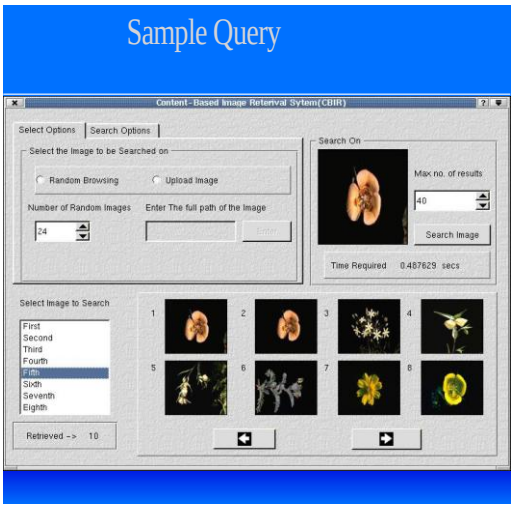
Of course not all people know formal science but everyone knows folk science (often blended with religion) in which world and its parts are explained by elaborate interactions understood in their own fact finding and reason finding context. Therefore, for an image to be annotated with some meta knowledge there will neither be any perfect annotation in nature and nor there would be correct logical order. It is also not possible that an information which is put in some domain specific logical order will be self sufficient and complete in itself because technical advancement everyday adds not only scientific theories but also adds new verbs, nouns, interaction patterns and meanings. Therefore, one of the performance parameter of an information retrieval system should also be with respect to consistency, besides the validity of the semantic stretching and annotation done with image instances.

There are many semi-automatic, automatic and manual annotation [10,11] algorithm available for us to explore and experiment, which can be useful in their application to specific task completion, but all these need to remain dynamic in nature.

Most of these algorithms try to find a probabilistic relation between the parts of images with some keyword or phrase that would correctly explain or describe that image instance part. Others try to annotate the image as a whole by exploring relationship between the image and annotated words.

Typical flow of Annotation System





As discoursed in introductory section of this paper, that there always remain some level of semantic gap[3] between the humans and CBIR systems, especially when system incorporation particular, way of annotation in the system, however this gap can be reduced by using methods that can added one the following type of annotation, which have following advantages and disadvantages.

II. ADVANTAGES

Manual	Automatic	Semi-Automatic
It is human edited and maintained. Most accurate in reducing semantic gap, if validated against ground truth. Time consuming and expensive. Prone to subjectivity.	Less accurate in nature. Unable to map natural world of things to digital world of things properly, therefore may suffer from high semantic gap. Less time consuming than manual.	Quality improves if human interaction is added with automatic process in CBIR system Less time consuming than manual.

Domain specific CBIR	Generic CBIR
Expert system can only be built by domain specific specialty and may only be used by semi-expert, experts. The semantic gap in domain specific CBIR will be considerable less.	CBIR is not specific to any particular domain and can be used for all purposes. However, semantic gap in generic CBIR will be large as.
Very few domain specific CBIR available only related to medical etc. available.	Lot of them available.

Numerous models have been adopted forcreating CBIR involving Image segmentation based object categorization. Bag of visual word (BoVW) is a sparse vector of occurrence counts of a vocabulary of local image features. However, the "flat" BoVW models ignore potentially relevant topological relationships between the Region of Interest (ROI).

Researchers have proposed several methods to incorporate the spatial information. “Phrasing model” generates groups of ROI called Visual Phrases according to relationships constraints. Phrasing model, defines two kinds of Visual Phrases taking into account topological ROI relationships which can significantly overcome the results of the classical BoVW model.

Another proposed model is Fast Image Searching in Huge databases (FISH). The system focuses on the learning the intent of the user within a session, referred to as short-term learning. In the FISH system, this learned knowledge is represented succinctly and stored in the \long-term memory" [8] for providing better results in later queries.

Conventional relevance feedback in content-based image retrieval [10] (CBIR) systems uses only the labeled images for learning. Image labeling, however, is a time-consuming task and users are often unwilling to label too many images during the feedback process. This gives rise to the small sample problem where learning from a small number of training samples restricts the retrieval performance [4]. In order to increase the size of the training data set a technique based on the concept of pseudo-labeling is proposed.

As the name implies, a pseudo-labeled image is an image not labeled explicitly by the users, but estimated using a fuzzy rule[6]. Therefore, it contains a certain degree of uncertainty or fuzziness in its class information. Fuzzy support vector machine (FSVM), an extended version of SVM, takes into account the fuzzy [6] nature of some training samples during its training.

III. DEVELOPMENT OF NLP MODEL BASED MATHEMATICAL FORMULAS FOR INTERPRETATION

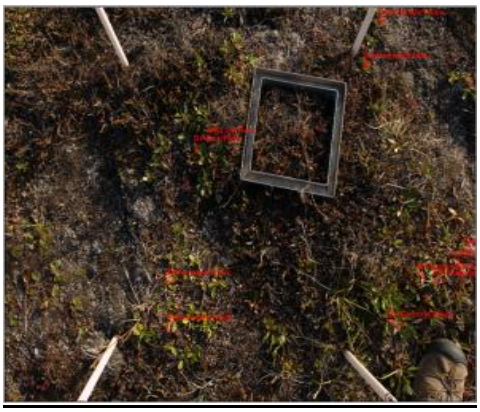


Fig 2 (a) Original Image

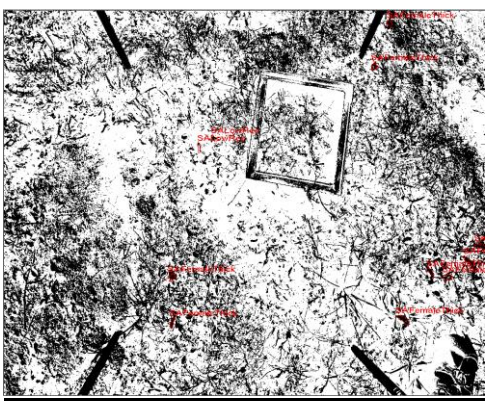


Fig 2(b) Annotated Image

The technical description are as follows:
First of all take the image which have to be annotated.

A. Let C be Circumstances associated with each instance of image:
   C={C1,C2,C3} Image n ←
B. Let E be phenomenon associated with each instance of image:
   E={E1,E2,E3} Image n ←
C. After that we have to go through the various process for which we have to take annotation process.
D. Annotation process for converting colour pixels and other desired properties for the domain sets of images of retrieval system.
E. Go through the Natural Language processing mathematical model process as according to fuzzy rule through data sets.
F. Result of the annotated image.

A picture/image tells us thousands of things which can't be expressed even by writing millions of words. Especially when the things are technical in nature, it is hard to describe, understand the causal relationship it might have with other objects and events. For e.g. a picture showing the design of a clay image with this lot of events /procedures might be associated which might be highly technical in nature and difficult to describe as such. Therefore design of any retrieval system must be able to understand how an inquiry might occur and how this inquiry may lead to occurrence of causal, trivial, technical and scientific events and objects associated with the image. Things only occur in certain conditions and those conditions will be associated with an image's content. For e.g. The clay image might have a particular description type and have a particular revision, therefore for any retrieval system to maintain this information associated with the image content will be hard to store and hard to maintain as multiple aspects might be inquired from the same content of the image.

IV. FUZZY SET DEVELOPMENT FROM NATURAL LANGUAGE SETS

Since, currently only low level features of images, such as colour pixel, texture, and shape can be extracted automatically by computers, but humans recognize images based on high level concepts. This difference between current machine operation and human indexing is known as the semantic gap problem of content-based image retrieval (CBIR) systems. The semantic gap problem leads to users often finding the results produced by CBIR systems to be unsatisfactory. In this case, bridging the semantic gap is usually approached by mapping the combination of different feature vectors of regions such as colour pixel etc into high level semantics directly, for recognizing and getting right image instances in result, therefore for handling this issue following methodology has been implemented,

A. The selection of annotation keyword with the associated image are sourced from local dialect , which may sound multi lingual in nature .
B. The selection of annotation keyword with the associated image are sourced from local expects who were professionally or indirectly associated with domain specific domain.
C. To make them available in the records , section discusses how each annotation is stored as Master Annotation Object ,which will associated with regions of image in question.

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