

Comparative study of image retrieval methods for mining user queries

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Abstract— Image retrieval is most important concept nowadays. When user provides a query in the form of keywords or in the form of image then system provides similar kind of images according to user queries. When database is very large then to deal with such database is hard process. Hence Annotation Based Image Retrieval is the technique is used to retrieve the similar images according to the query provided by user. Query may be in the form of image known as Content Based Image Retrieval or may be in the form of text. Content based image retrieval process is having certain limitations in terms of retrieval accuracy and time. Hence Annotation Based Image Retrieval technique is used to retrieve the images from large database. Markov chain method with relevance feedback method is used to speed up the performance of Image retrieval method.

Keywords— Annotation based image retrieval, Markov chain, image annotation, relevance feedback, implicit feedback, explicit feedback.

I. INTRODUCTION

Image retrieval is the process of retrieving images from available database. Database can be small or it may be large. When database is large then it decreases the efficiency of the retrieval system. System may have problem with large database because growth in image database is increased regularly. There are different search engines based on Content Based Image Retrieval technique and Annotation Based Image Retrieval technique. CBIR technique is consisting of very vast area of study and also useful in dealing with large database but two main challenges of this method is, one is semantic gap. Semantic gap is nothing but the lack of coincidence between the information that one can extract from the visual data and the interpretation that the same data have for a user in a given situation [1]. Another is sensory gap which is nothing but gap between object of the world and information about that object represented by computer.

Annotation Based Image Retrieval technique in cooperate with semantic content approaches such as image captions and also text based queries. For example Google Image Search, Yahoo! Image Search etc. Annotation of image is the process of assigning text to images and automatic image annotation is nothing but process of automatically assigning

semantic labels to image, hence the process of retrieving images using annotations assigned to images such type of retrieval system is called as Annotation Based Image Retrieval System (ABIR). Another similar kind of system is called Latent Semantic Indexing method which is one of the document indexing and retrieval techniques and used along with ABIR to provide better result. Limitation of LSI is when there is difference in per-image keyword annotation data to the number of keywords that are assigned to documents. Markovian Semantic Indexing (MSI) is another method which is introduced by Raftopoulos et al [2]. MSI method is used to improvement of performance of system in terms of precision and recall compared to other methods but it does not provide guarantee in satisfaction of the end user requirements.

II. RELATED WORK

Image retrieval system is having vast area of research. There are number of CBIR search engines are available. More than 200 content-based retrieval systems have been developed [3]. But due to limitations of content based retrieval system another system called ABIR has been developed.

Annotation based image retrieval technique works with semantic contents of images, text queries as well as image captions effectively. Latent Semantic Indexing [4] is the first technique which was used to perform document retrieval. Previously it was considered that document retrieval method can be used to retrieve the images. Latent semantic indexing method handles the problem of synonymy and also provides half solution to polysemy problem. But this method fails when each term is represented as single point in the space.

Hence, Latent Semantic Analysis (LSA) [5] performs noise reduction at some level and having efficiency to detect synonyms as well as words that belongs to same topic. In many applications this method has proven to result in more robust word processing. Even LSA is applied in different domains including automatic indexing (Latent Semantic Indexing, LSI) [6], it has number of deficiencies, because of unsatisfactory statistical foundation. Probabilistic Latent Semantic Indexing (PLSI) [7] has good statistical

foundation. It means in particular that standard methods from statistics can be applied for important questions like model fitting, model combination, and complexity control. Also, the factor representation obtained from PLSA allows to tackle with polysemous words and to explicitly distinguish between different meanings and different types of word usage. Even PLSI is work good for text analysis method but it has limitations like it is incomplete because at the level of documents it does not provide probabilistic model, when there are large number of parameters in the model then it has over fitting problems if and also it does not demonstrate how to provide probability to document when the document is outside of the training data.

Another method called Latent Dirichlet Allocation (LDA) This method is initially discovered by Blei et al.[8] to overcome drawbacks of LSI method. In this method Small numbers of latent topics are combined called document; so here each single topic is characterized by a distribution over words. So it is used as efficient probabilistic model implemented for mapping words in a document. Griffiths and Steyvers combined a Markov chain Monte Carlo methodology to LDA [9]. Steyvers et al.[10] stated new probabilistic model in that both authors and topics in document retrieval system and also used to solve the problems of overfitting incorporation with Gibbs sampling. Applying LSI or pLSI based techniques to find more useful details which are related with ABIR systems have been demonstrated in [11], [12] and [13].

To improve the efficiency and remove extra work recent method called Markovian Semantic Indexing. So, Konstantinos A. Raftopoulos et al [2] introduced a novel probabilistic approach called as Markovian Semantic Indexing (MSI) for automatic annotation, indexing and annotation-based retrieval of images. This method is more suitable when per image sparse keyword annotation is limited.

III. PROPOSED WORK

In this paper we are extending the existing method of online image retrieval system by using relevance feedback method. Log base feedback method in which system uses both implicit and explicit Log base feedback method as well as Markov model based online image retrieval system. So we have studied the Markov Chain based method for online image retrieval system, this is most efficient in terms of precision and recall rates. But we have identified some limitations of MSI method in terms of end user satisfaction. We are here extending the existing method of online image retrieval by using the concept of relevance feedback

methods. Hence, using both implicit and explicit feedback method along with Markov model based online image retrieval system. This method is used to make this approach more efficient in terms of accuracy as well as reliable. So it improves the performance of proposed system in terms of efficiency and robustness.

Retrieval Module consists of mainly two modules:

A. MSI Module:

This module mainly works on Markov chain process in which the next state of system – is depends on current state of system.

Algorithm:

- Step1. Prefix is a Markov chain prefix of one or more words.
- Step2. Check the Rules in order from top to bottom to see whether any of the patterns can be found in the input string.
- Step3. If none is found, the algorithm stops.
- Step4. String returns the Prefix as a string (for use as aindex).
- Step5. Shift removes the first word from the Prefix and appends the given word.
- Step6. Chain contains string ("chain") of prefixes to a list of suffixes.
- Step7. A prefix is a string of prefixLen words joined with spaces.
- Step8. A suffix is a single word. A prefix can have multiple suffixes.
- Step9. New Chain returns a new Chain with prefixes of prefixLen words.
- Step10. Build reads text from the provided Reader and
- Step11. Parses it into prefixes and suffixes that are stored in Chain
- Step12. Generate returns a string of at most n words generated from Chain.
- Step13. Return to step 1 and carry on

B. Relevance Feedback Module:

Relevance Feedback method is mainly based on log base feedback method belongs to two types of methods which are mainly implicit feedback and explicit feedback method. Implicit feedback is generated by system itself and another method called explicit feedback so it is generated by user of the system. Relevance Feedback module is used retrieve the images to fast which are already visited by user and stored in database by system. We are implementing this method for improving the speed of system in terms of time and accuracy. So to improve the system performance, we are going to implement MSI along with Relevance Feedback method.

Algorithm:

- Step1: User issues a simple and short query $K=(K1,K2,\dots,Km)$.
- Step2: The system returns an initial annotation set S of retrieval image results.
- Step3: For each annotation set less than is prefixLen System Returns matched annotated image as relevant or not relevant.
- Step4: Then the system computes a better representation of the information need based on the user's latest return result as a relevant feedback.
- Step5: If annotation result is not equal to null then system returns revised set of retrieval results.

IV. CONCLUSION

Currently existing method for efficient image retrieval is found to be not effective for providing the satisfactory results to the user. Relevance feedback method used is used to implement the system which provides satisfactory results to the end users. In this paper we stated comparative study between Markov chain method and relevance feedback method and is stated to improve the user satisfaction in terms of image retrieval result. So users can provide their explicit feedback and system provides the feedback and checks its real time performances as result. Similar way we can improve the future performance of system combining and comparing the different strategies to retrieve the images.

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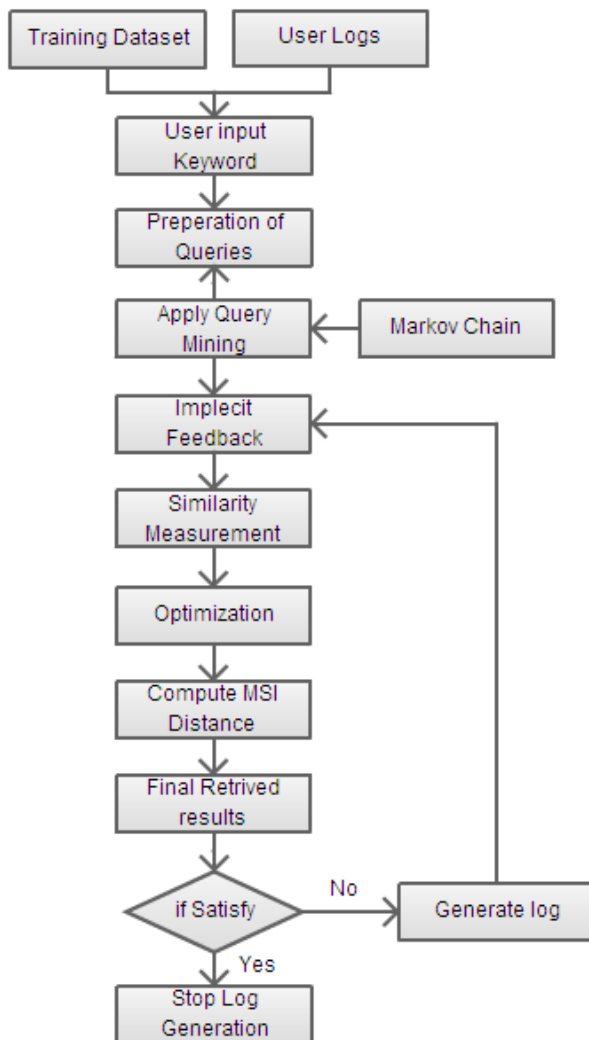


Fig. 1. System Architecture