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Refining Image Search Based on Co-clicks and Accuracy Ratio

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Abstract :- The image retrieval has becomes an important feature of multimedia. It plays an important role in daily life. Some image search query results are satisfactory and some are unsatisfactory. To search over an image databases initially text based search approach is used where query text is matched with surrounding text of image. If surrounding information of an image is irrelevant then the search becomes inefficient. Multiple methods for web image search are developed such as keyword expansion, active re-ranking. To refine the image search feature extraction is also used. Using the features extracted from the query image and comparing with other images make a search faster and perfect.
Keywords: - Image Retrieval, Image Search, User Intention, Feature Extraction, Co-clicks

1. INTRODUCTION

The image retrieval is the process of retrieving images with respect to user intention from the large amount of databases. The user first enters query, based on the keywords in the query the search is performed and from the pool of images resulting images are displayed to the user. Initial image search is performed using surrounding text information of the image. The surrounding text information includes filename, caption or description of the image. e.g. If user wants to search an image of animal tiger and enters query as "tiger" then images containing text "tiger" into their surrounding information are displayed. If any image contains text "tiger" into their surrounding text but it is irrelevant to user intention then this image is also displayed. e.g. image of a person having caption "tiger" is also displayed. The performance of the search decreases because of ambiguous surrounding information [8].To improve the performance of search engine new methods are developed which includes Keyword Expansion, Query Difficulty Prediction, Co-click history, Active-Re-ranking, Prototype Based Image Search Re-ranking .

2. LITERATURE SURVEY

As like a traditional method the image search is performed using text keywords in the query. If the keywords in the query appear in the surrounding text of the image then that image is retrieved as a resulting image. There is some work related with textual information is going on which uses text including filename of the image, URL of the image and description or the caption of the image as a surrounding text parameter. If the text is found in these surrounding parameters of the image then that image is displayed as a result image. The textual search is used as a input for visual similarity based search by grouping the images which is having same textual tag. But some difficulty with textual search is that if the external text is ambiguous or not related with the image then this becomes a limitation for textual search [2]. Extraction of visual content from images is split into two parts, namely image processing and feature construction. The features extracted are color, texture, and shape. When users search for pictures, their intent or clarity about what they desire may vary. The clarity of intent plays a key role in a user's expectation from a search system and the nature of her interaction. It can also act as a guideline for system design [3]. A user once find candidate image of target image the re-ranking function is used by choosing that candidate image as a query image. One of the approach described by xiao gang and xiaoou Tang which has offline and online parts [4]. To refine an image search "logs" of search engine are used. These logs are used as a relevance feedback signals to refine image distance function. This approach is similar to soft margin SVM trained with relative comparison of the images [5]. When user enters query for image search the resulting images are displayed by extracting surrounding information of the image. But if user query is not sufficient to express the intention of the user because of lack of knowledge about giving specific

word for image search then the search performance also decreases [6]. To make prediction correctly about the user's query image intention the sample selection strategy is used to decrease the clients labeling efforts To display result of correct images to the user "active re-ranking" is used. In this method the user intention is captured and used for re-ranking the images. To improve the performance of search, labeling information is collected from user and new method is proposed to actively select more informative query images through structural information[7]. Strategies used for image search re-ranking can be divided into two types i.e. supervised and unsupervised. The unsupervised method is not depend upon user labeling. Author proposed prototype based re-ranking method. This method constructs meta re-rankers with respect to visual prototypes presenting the textual query and design the weights of linear model to group the result of individual meta-rankers and produce the re-ranking score of a given image taken from the initial text based search result[8]. The method query difficulty prediction used to predict the quality of results generated by search without user's feedback and judgment. Query difficulty Prediction is easy in text search because query and document both are in textual format whereas in image search query is text and images are visual. This proposed method automatically predict the query difficulty for any query through machine learning approach [9]. For large scale images and indexing the bag of words (BOW) model has been known. In BOW search process depends on voting process. i.e. if image text describes the actual content of image. The voting score exactly reflect the image similarity. In multimedia search area the bag of word model becomes very popular because of its simplicity and effectiveness [10]

3. PROPOSED SYSTEM

3.1 System Architecture

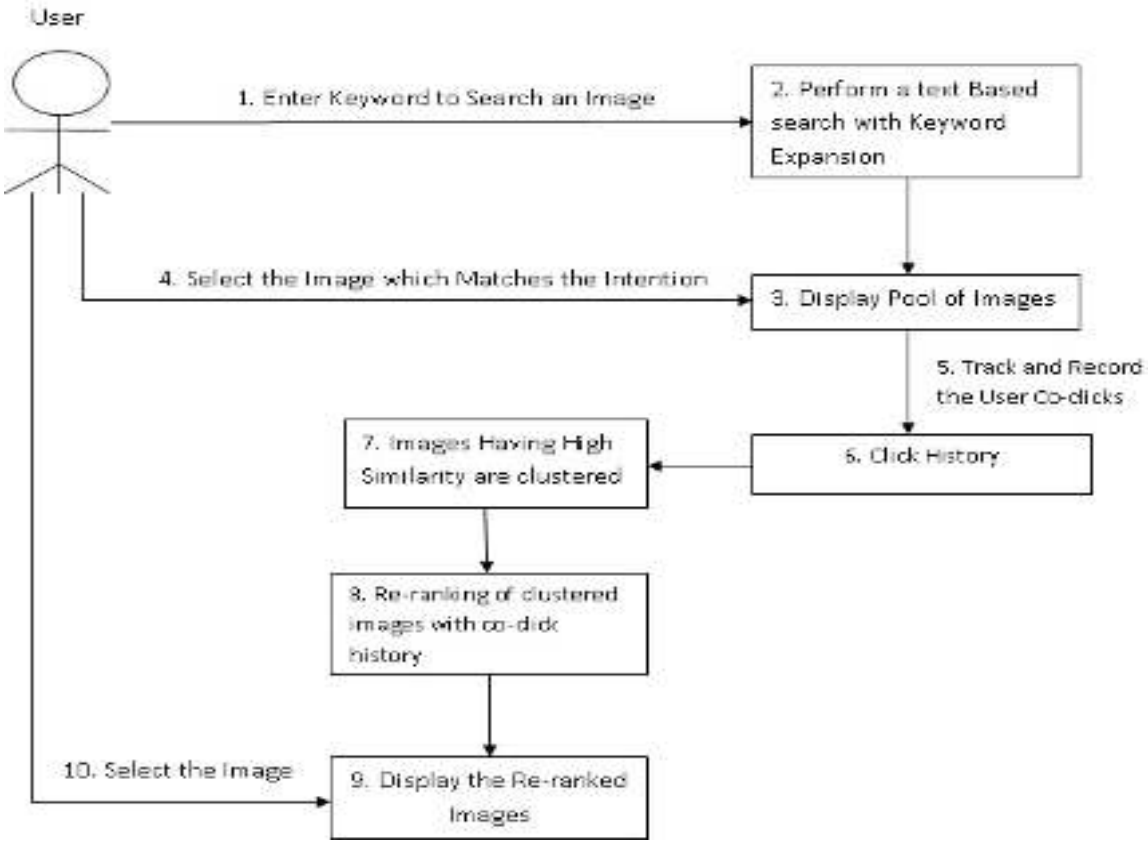

Fig.1. System Architecture of proposed System

Fig.1 shows the steps involved in the interaction of the user with the system. It includes 10 steps which gives refined results of web image search**.**

3.2 System Modules

The proposed work includes following modules:

3.2.1 Keyword Expansion

User has to first enter a keyword for the image which he want to search. When entering a keyword the keyword matching with already searched log history is suggested for expansion. The history also maintains the semantics of every keyword to make a search faster. The similar keyword having more semantic is displayed first. User can select query keyword from the suggested list or user can enter new keyword.

3.2.2 Image Search with Query Keyword

Based on the keyword entered by user the images are first searched from the database including their Meta information. The meta information is either file information, file name or any text included to describe an image. If the text matching with the entered keyword found in surrounding information of images then that images are retrieved as a result images. After retrieving the images based on the keyword user have to select one

of the images for refining the image search. This refinement is done by comparing selected image with other images.

3.2.3 Image Comparison based on clicked image

After viewing pool of images, user clicks on one of the image which is mostly perfect image as he wants. That image is compared with the images in database. Using the comparison algorithm the images are compared. The images having accuracy ratio greater than or equal to specified minimum accuracy are clustered and displayed. Following is the basic algorithm for image comparison.

Algorithm for image comparison:
1.Initialize pointX to image height and i to 0
2.Initialize pointY to image width and n to 0
3. Repeat step 4 while i<=pointY
4.Repeat step while n<=pointX
i)Compare search_image with n_image
ii)if(rgb[search_image]==rgb[n_image]) then increment matchcount
5.return matchcount(100/pointX*pointY)
6.if(Visual_Similarity>=accuracy_ratio)then show image.

3.2.4 Finding Co-Clicked Ratio

Recording image click history of user clicks it is easy to find out co-relation between the images. In a single image search if image Qi and Qj are both clicked by the user then they are said as co-clicked. Two images that are co-clicked frequently are more similar to each other than to third image that is co-clicked less often. Images with given query results are Re-ranked according their co-click history. By maintaining past history of co-clicks is also helpful for faster results.

3.2.5 Re-ranking Based on Accuracy

The cluster of images resulted in 3.2.4 which is highly related with query image are fine tuned by checking the result of pattern matching the images having high visual similarities assigned higher priority. All the images in the cluster are Re-ranked based on their visual similarity and co-click activities and then the result is displayed to the user.

4. Mathematical Model for proposed System

Following is the mathematical model for proposed work.

Let SE be the System
SE={I,Cc,Ar,O}
where, I=Set of input{Qk,Qi}
Qk=Query Keyword
Qi=Query image
Cc=Co-click Count
Relative Comparison for Cc is:

$$\delta'(Qi, Qj, Qk) = \begin{cases} Qi, & \text{if } Cc(Qi, Qj) > Cc(Qi, Qk) \\ & S(Qk) < S(Qj) \\ Qk, & \text{if } Cc(Qi, Qj) < Cc(Qi, Qk) \\ & S(Qj) < S(Qk) \\ \emptyset, & \text{Otherwise} \end{cases}$$

Qj and Qk= other images clicked in session with respect to Qi
Rs=S(I)
where,
each I ε S(Q)
having Ar(I) ≥ min_Ar
S(I)= Set of Images based on visual similarities
S(Q)=Set of images
Ar=Accuracy Ratio
mn_Ar= Minimum Accuracy Ratio
The Output O is as follows:
$O=\sum\delta(Qi,Qj,Qk)+Rs$

5. System Design with UML

5.1 Class Diagram

Following is a class diagram which shows static structure and describes the structure of a system by the real entities , their attributes, operations and relationships among the classes.

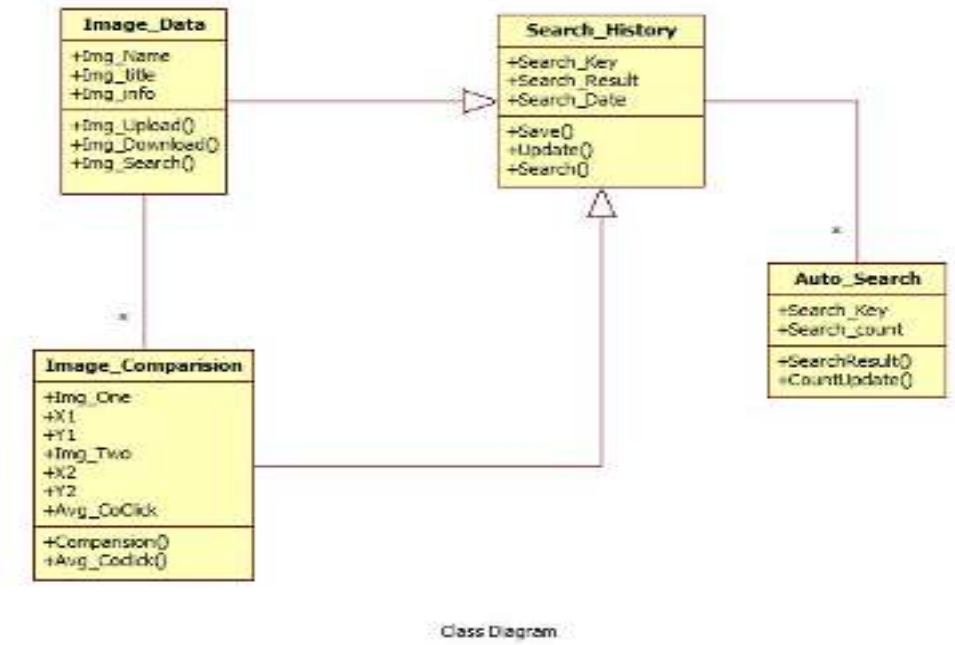

Fig.2. Class Diagram

5.2.2 Usecase Diagram

Following is the Usecase Model represents the interaction between end user to the system under consideration.

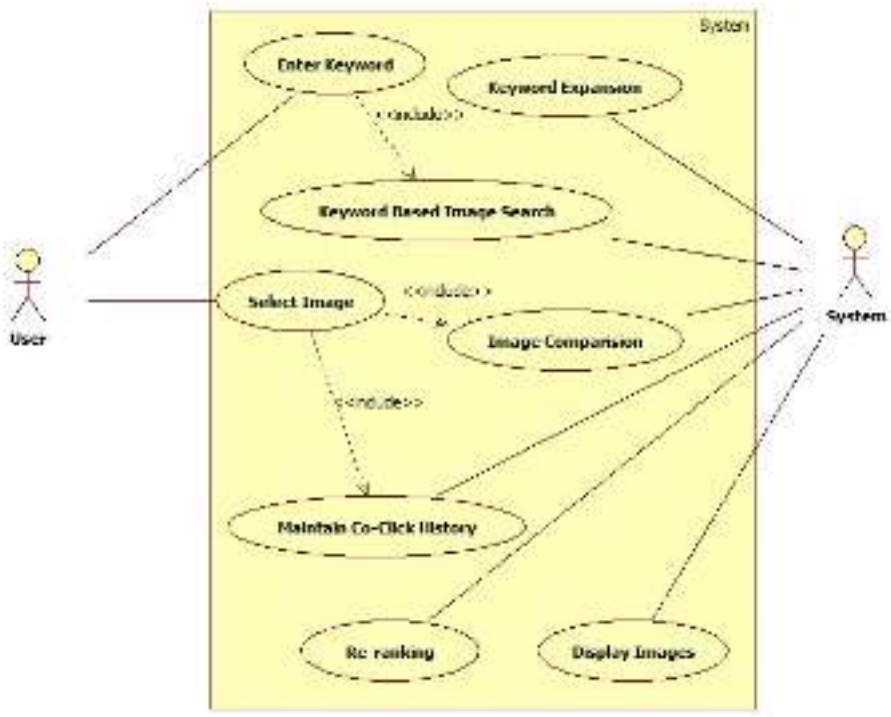

Fig.3. Usecase Diagram

6. CONCLUSION

To remove unreliability and to increase the performance of web search engine multiple methods are applied. In this proposed work Image re-ranking is based on similarities between query image and the group of images. By observing click session information of user, which indicates visual similarities among the query images and group of images are compared. Images having high similarities with query image are retrieved. The search is refined based on visual similarities of the images. So the generated results are more efficient. By using keyword expansion most relevant images with query image are found. Co-click session derived from text based search engine query logs provides fastest results for similarity based search. Overall performance of the search engine is improved using visual similarities between query image and pool of the images.

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