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Image Retrieval in Image Annotation Framework Using Relational Semantic Indexing

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ABSTRACT
With the rapid growth in the image count and advancement in digital imagery, there is an increasing need for effective indexing and sharing of images based on the user needs. Inductive algorithm for image annotation (IAIA) integrated the features of label correlation and visual similarity mining. Though, IAIA minimized the prediction error but the quality of image search was not improved for different combination of keywords. To improve the quality of search for different combination of keywords in the image annotation framework, Relational Semantic Indexing (RSI) technique is proposed in this paper
Keywords:- Image Annotation Framework, Segmentation, Classification, Keywords, Feature extraction, Relational Semantic Indexing, Threshold mean

I. INTRODUCTION

This With the availability of increasing number of images from different multimedia devices, effective mechanisms for classifying, penetrating and skimming these images are of high significant by common users. Usually, such images should undergo with indexing with the help of semantic descriptions so that the conventional methods of retrieval of images might be applied for searching of image in a precise manner. However, as it is highly impossible to annotate those images manually, automatic image retrieval in image annotation framework might be a promising solution.

II. RELATED WORK

In the preceding years, certain amount of research works has been concentrated on image annotation. Early work based on Inductive Automatic Image Annotation in [2], combined both the features of label correlation and visual similarity mining. With the advantage of integration, though IAIA reduced the error during prediction but the quality of image search was not improved for different combination of keywords.

Recent years have substantiated the growth of social media and the prosperity of huge number of photo-sharing websites, including Flickr and Picasa and so on. These websites, Flickr, Picasa helps the users by rating and providing tag to the shared images. A semi-automatic framework for image annotation using Locality Sensitive

Hashing (LSH) [2] improved the searching combination of keywords. With the application of LSH, though search effectiveness was improved, search time increased with different combination of image annotation.

Contents of the image and its corresponding textual information in the social media were approximated using semantic representations for two modalities. The framework was designed in such a way that each image was augment with relevant semantic features by applying graphs between various images. Though the rate of image retrieval was higher, more concentration was not made to the emerging social media.

Recent researchers have shown that the designing of manual tags are often insignificant and not reliable. Moreover, as many users select the most general and ambiguous tags for minimizing their involvement while selected more appropriate words, tags are considered to be noisy. To provide solution to this problem, tag completion in [5] filled the missing tags in an automatic manner and also corrected noisy tags for the images provided as input resulting in significant improvement but tag completion based on compressed sensing and matrix completion remain unaddressed.

Most methods involved in image annotation only used single photo at a time and the photos were then labelled in an individual manner. In [6], focus was made on collection of photos and used the contextual information naturally by improving both the precision and recall value. But little measures were taken to minimize the higher level of confusion between certain events. In [7], a novel image retrieval mechanism was presented for medical images where the images from the retrieval database were efficiently annotated with the help of the pre-defined labels that resulted in the improved of retrieval factor. The higher retrieval factor was only possible with pre-defined labels but dynamism was not achieved.

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III. PROPOSED WORK

In this paper, an image annotation framework for automatic image retrieval is developed for training a large number of images using multiple word phrases jointly. The following highlights some of the main aspects of our proposed work

A. This minimum distance classification that includes different class centers effectively classifies the grey-level vector points with minimal runtime.

B. It is worth noting that the grey-level vector points retrieve all combination of objects by reducing the search time.

C. linear quad tree construction can significantly reduce the search time by partitioning the two dimensional space into four quadrants.

The application of relational semantic indexing dramatically encapsulates the function for varying combination of keywords.

1.1 Relational Semantic Indexing

The application of Relational Semantic Indexing enables to register secondary class method at the database server for building an index structure. The semantic keyword relational indexing encapsulates the function for retrieving different combination of keywords. The relational semantic functions are listed in the table given below,

A semantic keyword relational indexing method encapsulates the functions for creating, opening, fetching and closing. The row based processing is carried out in the relational indexing method to add different class of objects into the indexing table.

Moreover, the indexing table is effectual in fetching different combination of user keywords in RSI technique using the different functions as provided in table 1. RSI technique map the index structure to fetch the different combination of keywords using built in relational (i.e.,) pixel values. The relational values are designed in such a way that it operates on top of the relational query language

Table 1 Functions of relational semantic

Function	Task
Rel_Index_Create ( )	Create relational semantic index structure
Rel_Index_Open ( )	Open index structure for operations
Rel_Index_Fetch ( )	Fetch relational information based on user keywords
Rel_Index_Close ( )	The relational index closes the function after image retrieval

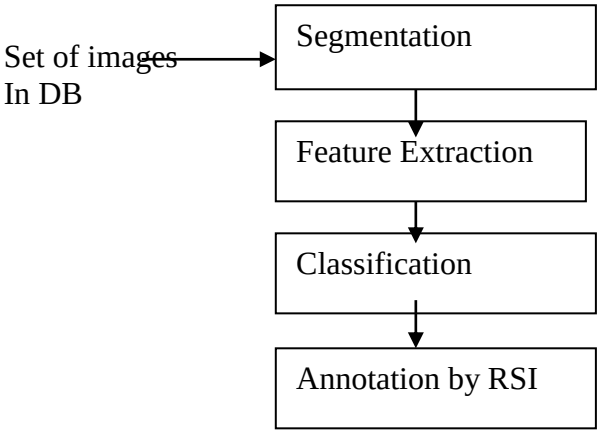

Fig.1 Structure of RSI

Each image annotation framework uses the entity relational model followed in figure 3 to fetch the semantic key word based images to the users using the RSI technique. The most frequently used function in the relational indexing in the Rel_Index_Fetch. With the use of the functional, Rel_Index_Fetch, the indexing significantly simplifies the image fetching process in the RSI based image annotation framework for different combination of semantic keywords.

In addition, the relational semantic indexing uses the linear quad tree for partitioning the two dimensional space into four quadrant in order to reduce the search time. The algorithmic steps involved in the design of linear quad tree is described below

// Linear Quad tree Construction

Begin

Step 1: Resolution of image size is initialized

Step 2: $C_{x,y}{}^{*}$ denote linear code of pixels

Step 3: x←0, y←0, Δx ← -1, Δy ← -1

Step 4: Partition the coordinated into four partitions in square form

Step 5: If (x, y) = indexed table value

Step 6: Fetch the objects from relational semantic indexing table

Step 7: End If

Step 8: Repeat step 5 to 7 on all partitioned coordinates

Step 9: Semantic keyword related objects fetched from the stored database images

End

IV. EXPERIMENTAL EVALUATION

Image Annotation Framework based on the Relational Semantic Indexing (RSI) technique performs the experimental work using MATLAB coding. RSI indexing is experimented using the Image Net database according to the WordNet hierarchy (3,4).RSI is compared against the Inductive Algorithm for Image Annotation (IAIA) and Semi-automatic framework with Locality Sensitive Hashing (LSH).

Each meaningful concept in WordNet, possibly described by multiple words phrases named as synset. There are more than 100,000 synsets in WordNet in which the Image Net provide on average 1000 images to illustrate each synset. Images of each concept are quality-controlled and human annotated for experimental work. In its completion, Image Net offer tens of millions of cleanly sorted images for experiment the factors such as search time, recall ratio, precision rate, classification rate on image annotation and quality of search rate low-resolution image

V. RESULT ANALYSIS OF RSI

The Image Annotation framework based on the Relational Semantic Index (RSI) technique is compared against the existing inductive algorithm for image annotation (IAIA) [1] and Locality Sensitive Hashing (LSH) [2]. The simulation results using MATLAB are compared and analyzed through table and graph form given below.

No. of test images (MB)	Search Time (ms)		
	RSI	IAIA	LSH
100	23	28	31
200	26	32	35
300	32	34	38
400	28	33	34
500	34	38	41
600	37	40	43
700	40	45	48
800	39	42	42

Table 2 provides a few statistics on search time with respect to 800 test images for experimental purpose. Consequently, the results obtained using proposed RSI is compared with the existing IAIA [1] and LSH [2].

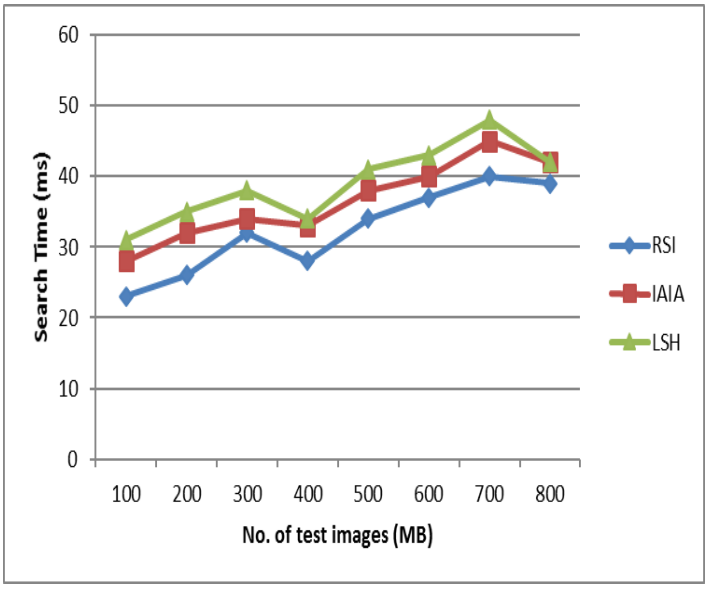

Figure 2 No. of test images versus search time

Figure 2 shows a graph representing the search time using our proposed method RSI technique and comparison is made with two other methods, IAIA [1] and LSH [2]. The graph shows the search time with respect to 800 test images taken for experimental purpose. It is observed that the search time using RSI is better as an entity relationship is developed to identify the relationships with different combination of semantic keywords by minimizing the search time.

It is also observed that the performance of search time are affected using the existing IAIA [1] and LSH [2]. This is because the Locality Sensitive Hashing (LSH) though improves the searching combination of keywords but the time of search is increased for different combination of image annotation. This improves the search time using RSI by 6 – 23 % when compared to IAIA. In addition, using RSI, the keyword retrieves all combination of objects from classified class and reduces the search time using the relational semantic indexing by 16 – 34 % when compared to LSH [2].

1. CONCLUSION

This work advances automatic image retrieval using relational semantic indexing technique on image annotation framework. First, it plays a significant role in the quality of search for different combination of keywords and hence reduces the classification time for different combination of images. This is achieved by building an entity relationship model in image annotation framework by constructing linear quad tree.

With the application of minimum distance classification, the tasks of classifying various annotated objects get reduced with time using RSI technique. Experimental results demonstrate that the proposed RSI technique outperforms two existing works by improving the classification rate by 25 % and increases the precision rate by 20 %.

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