Techniques for Retrieving Images based on the Region of Interest

PG Scholar V.Divya Madhuri, PG Scholar G.Sai Prasanth Kumar
Department of Electronics and Communication,
JNTUH, Hyderabad, Telangana, India
divyareddyvemunuri@gmail.com, 437saiprashanth@gmail.com

Abstract- This paper depicts how to find interest base image area, techniques and algorithm for image retrieval. Portion of an image is considered important or selected specified area of an image defines a region of interest. With the help of content-based image retrieval systems, retrieval performance in large databases can be revamped which handles the extraction of global and regional features of images. Region-based features exhibited to be more effective, reflecting user specific interests with greater precision and accuracy than global features. Extraction of features, indexing, segmentation and image retrieval are the jobs need to be done in retrieving images in order to meet the similar regions specified in the task given. In this paper, the basic idea of ROI (Region of Interest) based retrieval of image concepts is depicted and it is anticipated to provide researchers that are working in ROI based retrieval system field. This paper also reviews the work of researchers included in the span of twenty years. Main aim of this paper is to provide comprehensive reference source for researchers involved in ROI based image retrieval. Algorithm of operations performed on ROI of images retrieved is implemented in MATLAB software with results are provided.

Keywords- Mental Health - Android Studio – HappyMinds.

I. INTRODUCTION

The speedy growth of the net and rapid development in colour imaging technology have made digital colour pictures greater quite simply available to expert and novice users [1]. The scientific field, surveillance device, and digital forensics are a few of the regions which have been the use of a significant quantity of multimedia information with inside the shape of audio, video, and pictures on this boost improvement of net and multimedia technology. This state of affairs results in the want for growing a device this is capable of keep and effectively retrieve those digital information [2].

The important purpose of a photo retrieval machine is to look and retrieve pics from a selection and large databases in minimum time with excessive accuracy [3]. Two of the strategies which might be commonly used to look and retrieve pics in the database are the Text-primarily based totally Image Retrieval (TBIR) and Content-primarily based totally Image Retrieval (CBIR). TBIR works through the use of retrieval keys which consist of classification codes, keywords or difficulty headings in retrieving pics. TBIR is taken into consideration a non-trendy method of retrieving pics due to the inconsistency of interpretation of keywords utilized by users.

However, TBIR is the most common retrieval method this is being used, where the search is based on the explanation of the photos. Normally a TBIR works by running a database to look for similarity textual content surrounding the photos as given by the question string in textual any key-word utilized by users. At present, Google Images is the maximum regularly used or device. The string matching calls for less computation TBIR making the time, device works fast. Nevertheless, there's additionally a drawback of TBIR where in its far at instances hard to explain the whole photograph content material of photos in phrase form. This issue may also cause the TBIR device to provide inappropriate effects when querying. Some annotations of the photos can also be TBIR and this may eat quite a few times for the wrong, device to yield the favoured output. TBIR may be efficaciously described as a file retrieval problem [4].

CBIR structures had been evolved to overcome the restrictions met through the TBIR structures. CBIR is one of the times of facts retrieval that applies pc imaginative and prescient strategies to clear up looking and dealing with big photograph databases associated problems [5].

A CBIR makes use of image contents of a positive photograph defined by colour texture, shape, and spatial place which might be diagnosed because the low-stage functions to represent the photograph with inside the database. When a favoured photograph is getting used as an enter with inside the system, it'll retrieve a comparable photograph matched to the instance photograph provided. By querying the use of CBIR structures it'll cast off the requirement for expressing the image content material pics

in phrases shape that resembles the human belief of visible data. Among the CBIR structures which might be usually to be had are QBIC [6], Photobook [7], VisualSeek [8], Netra [9] and SIMPLIcity [10].

There had been big research completed on CBIR and the development has been discussed comprehensively in [11-13]. An efficient form descriptor is important to pick out the features of an photograph content, which include its form, colour and texture [14-15]. Region-based Image Retrieval (RBIR) system is identified as one of the classes of the CBIR system. Image segmentation and defining size criteria represent the ROI-primarily based totally picture retrieval system [16]. This gadget works with the aid of using generating the illustration of the picture in the database by using the features extracted from the region or part of the image RBIR systems can be classified into System Designated Region-of-Interest (SDR) [17] and User Designated Region-of-Interest (UDR) [18] approaches. When querying to the database using the SDR approach, dividing the picture into full-size regions and designating each region as ROI is carried out with the aid of using the system automatically.

Meanwhile, by using the UDR method, the selection of ROI in the picture for query method is executed manually by the user. One of the elements to decide the achievement of an SDR technique is the accuracy of the segmentation method used in dividing a picture into many regions. However, unexpected noise in the output may also bring about the reduction of retrieval accuracy, consequently making photo segmentation not always reliable. In quest to identify both the limits of the regions of the objects in the photo are the two various but complementary views which can be generally being utilized in photo segmentation [19].

Furthermore, many current segmentation techniques fail to extract objects of interest regardless of their capacity to correctly identify particular regions from images The SDR approach has a few limitations in reflecting the user's aim in the method of retrieval due to these reasons. It is complex to determine in advance a part of the picture that will be selected when the user opts for the ROI using the UDR method manually. Extraction of the images characteristic values and matching them with the ROI for retrieval is performed by dividing the picture into a smaller number of blocks is the solution to this problem. Correct selection of blocks overlying the ROI is an important selection because the UDR approach is capable of have a number of sizes and may have more than one blocks in order to fulfil the user question precisely [20].

ROI placement also performs a significant function in acquiring an effective ROI picture retrieval [21]. Fixed region matching can be the result in the case of blocks having the exact placement because the ROI. However, this approach couldn't retrieve the equal pictures when similar regions to ROI lie in different elements of the

pictures. For instance, the system fails to provide the exact pictures containing an elephant that is located at the top-left nook of a picture when first the user who queries for an elephant in the bottom-right corner of the block picture is being used. Opting for all blocks matching approach may resolve this problem, but using this technique will cause the time complexity that had to be compensated because it increases the computational complexity and time because the blocks will increase in size layout. This paper provides the overview of region of interest-based image retrieval with various of retrieval techniques used and the findings obtained.

II. LITERATURE REVIEW

In this section listing the properties used in the 7 articles related to the review of retrieving image based on region of interest in this document. Properties are categorized into concepts, performance evaluation parameters, databases used, and the results of the authors involved.

Authors T. Chen, L.-H.Chen, K.-K. Ma[31] published in the year 1999, technique used is Region-of-interest (ROI) image retrieval based on colour image indexing and performance evaluation parameter used is Precision of image retrieval , database used is of 500 various contents images, findings made are High precision in results of image retrieval. Rotated and scaled versions of images can also be detected by using the proposed method.

Authors Qi Tian, Ying Wu, Thomas S.Huang [33] published paper in the year 2000 , technique used is Combining user-defined region of interest(ROI) and spatial layout Content-based Image Retrieval and performance evaluation parameter used is Accuracy of image retrieval where database is collected from COREL database images , findings made out are that it is more capable of capturing image details compared to the global approach.

Authors Baback Moghaddam, Henning Biermann, Dimitrios Margaritis[32] published paper in the year 2001 , technique used is Multiple region of interest(ROI) and spatial layout for Content based image retrieval , performance evaluation parameter used is accuracy and speed of image retrieval , databases used are VisTex and GIS orthophoto imagery database images, findings made out are that the proposed method can reduce computational time and speed up the retrieving possibility based on partial spatial configuration.

Authors Feng Jing, Ming JINg Li, Lei Zhang, Bo Zhang [34] published paper in the year 2003, technique used here is learning in region-based image retrieval which has the performance parameter of accuracy of image retrieval. Databases used here are 10,000 COREL database images. This paper shows the effectiveness of retrieval after

comparing results using the learning schemes of region-based image retrieval with database images.

Authors Khanh Vu, Kien A. Hua, Wallapak Tavana pong [35] published paper in the year 2003, based on the technique region of interest (ROI) queries based on sampling matching. Performance evaluation parameter used here is robustness and speed of image retrieval. Databases used here are Art Explosion commercial database images. Findings made out of this paper are that the user defined region query can overcome irrelevant region retrieved results, fast results when indexing technique is used.

Authors B.G.Prasad, K.K.Biswas, S.K.Gupta[36] published paper in the year 2005, technique used in this is region-based image retrieval using integrated colour, shape and location index. Performance evaluation parameter used is efficacy of image retrieval. Databases used here is MPEG-7 database images. Proposed method used in this paper is robust towards scaling and rotation invariance.

Authors Chaobing Huang, Quan Liu, Shengsheng Yu[37] published paper in the year 2011, technique used here is ROI extraction based on visual saliency. Performance evaluation parameter is based on accuracy of ROI extraction. Databases used are 200 SIMPLIcity database images. This paper shows that Discrete Moment Transform(DMT) based sailency can determine large ROI.

III. IMAGE PROCESSING METHODS

Image processing is generally based on the specific property of an image and its correspondence to a particular object. focuses on enhancing image information for human interpretation and processing image data for transmission and storage.

Since all objects are part of the image, matching ROIs can also be displayed as objects in the specific image. Image processing methods include several operations, including representation, segmentation, clustering, feature extraction, matching. These operations are described below.

3.1 Image representation

Although many images are available in today's digital world, the actual representation of an image, is called a collection of individual image elements called pixels. Pixel values are mostly shades of gray in the range 0-255 (black and white). Binaries are a commonly used image representation format, which will later be converted to various image formats such as jpg, bitmap, and png [22-23]. These image representations are pixel size dependent and these images are represented by pixels similar to the building block. To reduce the complexity and computational time of image processing, high quality images are needed [24].

3.2 Image segmentation

The definition of image segmentation in computer vision is given as the process of splitting a digital image into multiple segments. Image segmentation divides image pixels into groups that are strongly correlated with objects in the image. The purpose of segmentation is to simplify the image into a representation that is easier to analyse and more meaningful [19, 25]. In the field of image retrieval, the segmentation process is still considered an open problem in computer vision even though some systems may deliberately be very efficient. By segmenting only, the area required by the user instead of having to go through the segmentation process for the entire image, the ROI concept used can reduce computation time because the area is segmented smaller than the whole image.

3.3 Region clustering

As for the features that exist, there may be features that are very similar in many areas that belong to different image sets [26]. Training data and codebook size are generated by averaging the efficiency and accuracy of the search based on the characteristics taken from the area of the entire database image. All data and details are calculated and saved as codewords. The cluster is recognized as and registered in the codebook. Matching indexes are stored in each area of the image in the database used, and the deletion is performed for the original function of that particular area. The following entry in the codebook is found and the matching index replaces the new image area functionality. Region clustering relies primarily on the assumption that pixels in the region are similar to adjacent pixels.

3.4 Feature extraction

Feature extraction is important because it is the process of retrieving global image features such as colours and local descriptors such as the texture and shape of a particular image. In this phase, IDs are assigned to each character represented by the feature vector [27]. Compared to the - dimensional histogram, these representations are considered more efficient in terms of search. The most prominent features of the image are extracted only after the feature extraction analysis has been performed by the 4484 system [28]. One of the key attributes of a segmented image region is the region shape, which plays an important role in demonstrating the effectiveness of a robust image retrieval system [29]. The purpose of feature extraction is to extract several feature sets to minimize image search rates.

3.5 The general framework of RBIR

User-dependent recovery and system-dependent recovery are two of the most commonly used methods that exist in sector-based image recovery. In the UDR approach, the characteristics of the blocks in the layout that the user chooses will be the characteristics of the region that the system will extract. Meanwhile, using SDR approach,

regions or objects in the image would be potential ROI based on segmentation algorithm.

The resulting features will then be used for suitable purposes to generate image retrieval results and generate region selection database images [25]. RBIR works by filtering candidate image and calculating similarity to the query using the image database, which should lead to a significant improvement in the retrieval speed [30]

IV.METHODOLODY

1. Based on filtering
Many a time we need not apply a filter to an entire image, but only to a particular region within it. Usage of nonlinear filter can cause computationally expensive and process gets slow on applying to an entire image or only a particular small region of interest. These small regions are called ROIs (Region of Interests), and their processing is called ROI processing. So, separate ROI filters are used.

Implementation of steps involved in ROI filtering using MATLAB:
- Read the image to be ROI processed
- Get the region of interest coordinates using *implixelinfo*
- Use *roipoly* function to define region of interest and consider it as mask
- ROI mask is a two grey level image the same size as original image with 1s for ROI and elsewhere 0s
- Use *roifilt2* to perform spatial filtering, which gives results based on input image, filter and mask
- Different filters can be used based on application, here average, unsharp, Laplacian of gaussian filters are used

4.2. Based on Segmentation
As said earlier, Segmentation refers to operation of partitioning of an image into component parts or into separate objects. If we wish to isolate objects from background, thresholding which is an important part of image segmentation can be used. It is also an important part of computer or robot vision.
- Implementation of steps involved in segmentation using MATLAB:
- Choose a grey level T in original image as a threshold
- Levels above T considered as white and below considered as black
- Use double thresholding to isolate boundaries objects, which single thresholding can't do.

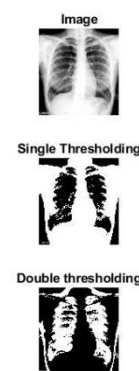# V.RESULT

Fig.1.ROI filtering

Fig.2. Image segmentation.

VI. CONCLUSION

This paper classifies the various techniques and examples used in region of interest base image retrieval. A collection of papers were studied ,multiple concepts and methods are categorized in the literature review section.There are numerous fields that uses RBIR techniques, applications such as medical imaging, archaeology,zoology and criminal investigation. Results of operations such as filtering and segmentation done on a particular region of an image which is retrieved using RBIR technique. Overall, the purpose of this study was achieved which is to provide a comprehensive reference to researchers in similar fields of study.

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