

Appraise in Flavours of Image Retrieval Practices

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Abstract—This paper presents a review of multifarious applications of Content-Based Image Retrieval (CBIR) in diverse fields. The development of the image retrieval in all the various fields is increasing due to the researcher's interest. Matching of the images plays a crucial role in CBIR as it reflects on the performance. As in recent years visual query became popular due to some pitfalls in the text retrieval systems. In today's era it becomes difficult to manage huge database on web with contains digital data, so use of CBIR becomes a better choice.

Keywords—Classification, Image Matching, Image Search, Content -Based Image Retrieval (CBIR)

I. INTRODUCTION

Content-Based Image Retrieval (CBIR) is speedy and promising way for image retrieval systems. CBIR is involved in all new emerging technologies due to its popularity, which also leads towards its usage expansion. Today user is avail with the variety of voluminous digital information in terms of images, audio, video, photographs and much more that internet provides commercially as it is quick means of communication.

As numerous data is accessible on net for so many applications due to rapid growth, which need to be stored, manage, organize, utilize effectively, efficiently and providing quality data. CBIR have been used in many fields of engineering as it has been vivid in the research areas now. It has its roots in the field of image processing and machine learning. [1] CBIR encompasses of various applications like weather forecasting, architectural, mobile devices, multimedia, pattern recognition, engineering design and many more.

II. APPLICATIONS

A. Medical

It is very grateful to have CBIR have in the medical field. In olden times Query by image content (QBIC) and Query By image Example (QBE) were the initial approaches towards CBIR. This field is approaching towards

the modern age of technology. For all the body parts of human body, there are different systems made available by CBIR systems in the clinical practices like detection, diagnosis, treatment. There are different application domains available in the medical field. Computer-Aided Diagnosis (CAD) is developed by CBIR. [1]. It claims to prove visually similar images along with relevant images which are clinically proven. Decision making has been improved by the usage of CAD. CBIR also have projects related to radiology.

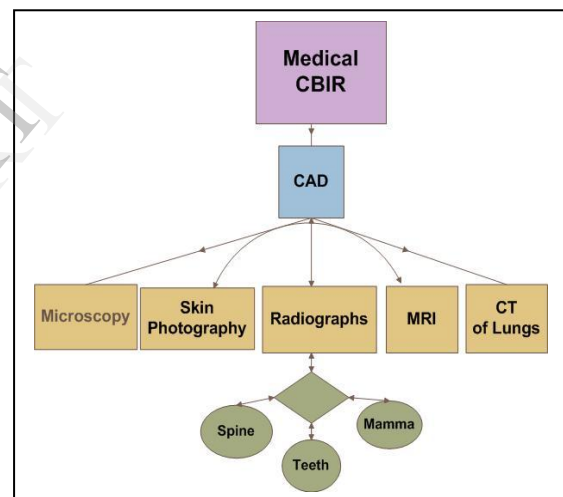


Fig .1 'Medical CBIR'

Fig1. Shows the application of CBIR in the medical field. There are many systems which work for different part of body. Like for instance Assert system works for lung CT, KMeD work for brain MRI. As there are number of growing medical images, manually entering of the digital data becomes a tedious task, also very time consuming. So, there is a better option to switch to visualization of query formulation. Here, human interaction can be done easily as good interfaces are provided.

Agriculture

Agriculture is merely 'farming', cultivating plants, animals and other form of food, which is the most essential part of this sector. It is the part of day-today's life for many Indian farmers. India ranks 2nd in the world for the agri products. Moreover the people around the world whose occupation or service is related with agriculture sector like farmers for growing of their crops, agents, and researchs require images in their work. People in rural areas even presently are dependent on this occupation for their survival. But agriculture is totally dependent on the climatic conditions (rain, drought, etc).

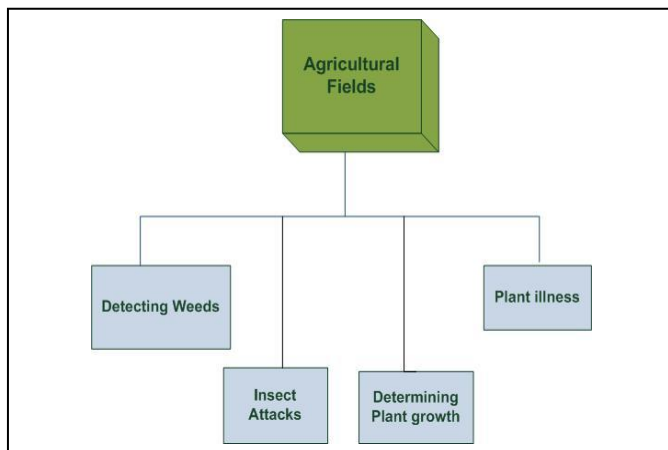


Fig 2. 'Agricultural CBIR'

Image retrieval system is a blessing for agriculture field. Here it is possible to retrieve the perfect images by firing the query to the datasets. CBIR may help to resolve much of the problems from the fields.

The systems developed earlier faced the difficulty in the extraction of image pixel content. [2] In the fig 2. Different ways the utilization of CBIR is shown in the agriculture sector. Here, the first block is 'Detection of Weeds', which means the plant which undesired or unwanted plant could be easily detected by visualization for removal. For the purpose of plant preservation- In the second block is for determining the 'Insect Attacks', 'Plant growth' and lastly 'Plant Illness', so that pesticides could be used at right times.

B. Marine Life

Malaysia is rich in marine life species. [3] Earlier work demonstrated the use of manual segmentation. It uses the silhouette images which used to extract the images using shape. It has noteworthy human awareness with shapes. Object extraction becomes easy and for that there is need of discovering points in the object. [7]

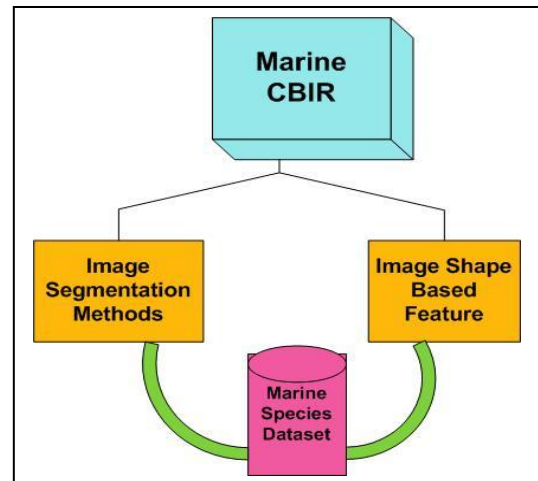


Fig 3. 'Marine CBIR'

C. Handwriting

Any individual's special writing style is 'Hand writing'. The regional documents in the ancient years were in the form of historical manuscripts which was written by hands before the invention of printing. These documents had no formats and also no digital forms like today. The person who studied these handwritings was known as 'paleographer' and study were known paleography. These paleographers played a very crucial role in deciphering the characters since eras. Calligraphy is different than handwriting. The characteristics of the handwriting are curvature and orientation. While representing shapes curvelets transform proved to be one hand upper than wavelets.

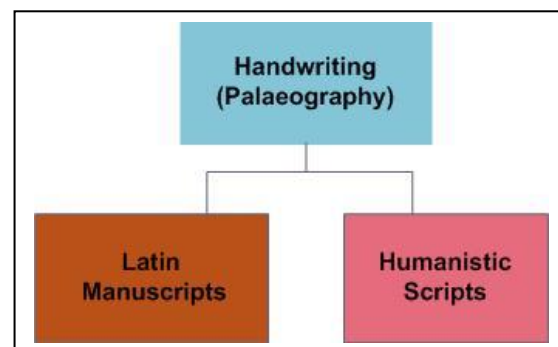


Fig.4. 'Handwriting CBIR'

D. Education

Text based retrieval have lot of trouble in retrieving which proved itself as inefficient in its work. CBIR took a lead in support of education. Education relates mainly with science and technology, engineering fields. To support these fields National Science Digital Library (NSDL) was initiated. NSDL worked for teachers as well as students for to retrieve useful information. It has varied resources from different collections. Earlier systems were based on centralized database.

III METHODS

A. CAD in Medical

Computer-Aided Diagnosis (CAD) provides a prominent way of analyzing as well as interpretation of the medical images. This system has a greater capacity of handling huge data. Earlier CADx was technology used for the purpose x-ray imaging with respect to chest. In past years, CADE is used for cancer screening in mammograms.

B. Segmenting image in Agriculture

It uses image segmentation techniques, which works on the bases of selecting the region of an object. It tries to extract the exact pixels from the given image and ignoring its foreground and background color. It is necessary to grab the components with low variance, initially to have a good segmentation. Gaussian Mixture Models (GMM) components and color space have same dimensions.

C. Segmentation in Marine Life

The new technique has been introduced of Species matching from the marine life from the dataset. The system uses segmentation which extracts the region of interest (ROI) with the help of automatic method in then stores in the database. There are 2 methods of segmentation: Manual, Automated. The first method deals with the manually comparing the images with the retrieved images. In the second method, saliency value measure algorithm is used, which highlights the images. The dataset consist of the images like fish, sea horse etc of diverse families with 10 categories.

D. Signatures in Hand writing

Curve lets Transform method is from the family of the multi scale geometric transforms. It is used for curved handwritten shapes in document images. The datasets used are collections of Latin (9th to 15th century) and humanistic (18th and 19th century) manuscripts. The input query to the CBIR system is writing samples. Matching function is used for the purpose of query comparison based on signature sample handwriting.

E. DIRECT in Education

In Decentralized Image Retrieval System for Education (DIRECT) it doesn't require any collection providers. It follows decentralized approach. [5] For improving the performance feature fusion method has been implemented which combine 2 features for single feature. DIRECT service works in peer-to-peer environment of NSDL. The network is been created by it.

IV EXTRACTION OF FEATURES

Feature descriptors are used for comparing the query image with the image stored in dataset. To gain an image it is needed to obtain the features of images which is color, texture and shape which are considered as basic as well as low level features. [1] An image is combining made up of its size or scale and orientation. It could be 2D or 3D image like a photograph. Digital image has variations in 3 basic colors- red, green and blue at the particular pixels of an image. Machine learning provides the link between low level and high level features. High performance could be achieved by enabling the usage of current technologies in image processing.

A. Clinical Image Features

Datasets stores medical images and features that are its shape, relative position of the body part, texture, color with respect to the medical parameters. It can be manually, automatically as well as in some cases semi-manually extracted for different medical application like CAD, Bone etc.

B. Agricultural plants

Analyzing the images of is done by using the different colors and shape as a features. Each plant is blessed by the nature with beautiful different colors but this beauty also complicates the retrieval process. The plants are categorized as flowering and non-flowering. Every plant has green color each with different shades in it. With the combination of the color histograms (RGB) and color co-occurrence matrices image matching is done. [2]

The equation given below shows the computation in terms of normalization for red and green channels :-

$$nR = \frac{R}{(R + G + B)} \quad \& \quad nG = \frac{G}{(R + G + B)} \quad \dots(1)$$

Datasets used is agriculture plant images from the web.

C. Marine

There are various colors, textures and shape in the case of marine life species. Shape based Features introduced are Pyramid of Orientation Histogram (PHOG) which is used for recognition of object, Zernike Moment (ZM) and Fourier Descriptor (FD) are used for shape feature. [3]

D. Education histograms

Color histograms are used as the representation in case of DIRECT for color description purpose. It checks the similarity between 2 images as well. [5]

$$D_H(I_Q, I_D) = \frac{\sum_{j=0}^{n-1} \min(H(I_Q, j), H(I_D, j))}{\sum_{j=0}^{n-1} H(I_D, j)} \dots(2)$$

From the above equation the notations are given above:

I_Q – Query Image

I_D – Image in dataset

$H(I_Q, j)$ and $H(I_D, j)$ - Histograms of query image and database. [5]

V PERFORMANCE EVALUATION

Performance of computerbased system like CAD is much higher and accurate than a human being.

Relevance feedback helps in the improvement of search performance. For the signature retrieval, precision and recall provides assuring results which proved to be accurate.

III. CONCLUSION

CADe in upcoming years could be used for the domains like chest, brain, liver, skeletal, vascular systems. CBIR have still not been used commercially in medical field. Although CBIR have taken lead to lighten agriculture sector but still not yet been establish significantly. Segmentation achieves good results for retrieval.

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