Identification of Species Using Image Retrieval: A Review

[1]Aaliya Yousuf, [2]Yojna Chandel
[1]Department of Computer Science and Engineering,
[1]Panchkula Engineering College, Panchkula, India

Abstract: **In the past, images were annotated manually. They were provided through keywords, texts and tags, generally known as metadata. This type of manual description is time consuming, costly and requires a lot labour for manual work. The term 'content based image retrieval' was introduced by T. Kato in 1992. By 'Content based' we means that the images are searched on the basis of the visual contents present in the image. The same can be used to retrieve the images of species from the databases for analysis and study. CBIR systems are fast, reliable cost effective and efficient for browsing. . Content based classification approach is becoming necessary to support the retrieval and indexing of images. Classification accuracy is evaluated in two, one is color spaces and other is image sizes. Here, we review some of the existing techniques for retrieval of image of different species based on their features.**

Keywords: **CBIR, ANN, image processing, features**

I. INTRODUCTION

In the recent years, database size has been increasing with the boom in technology. Several storage devices, high speed internet, have led to the growth of image retrieval systems. The demerit of text based retrieval systems is that the description is available only in one or two languages. Also, two individual users may have distinct selection of words to describe the characteristics of image. Due to which irrelevant retrieval results may be observed. All these limitation have led to the development of content based image retrieval (CBIR) systems. IBM's Query by Image Content (QBIC) was the first commercial CBIR system. Content Based Image Classification is a way to classify images into pre-defined set of classes based on their properties. These properties can be based on the colors that make up the image, the edges included in the image or even its temporal features. Content based retrieval includes several segmentation system followed by feature extraction methods. The extracted features are then compared to discover the best suited matches among the images. Feature extraction techniques are used to describe an image in the form of a single feature vector. There are several ways in which features can be extracted from an image. Most commonly used feature extraction techniques include Block Truncation Coding, edge detection, applying transform matrices, etc.

Neural network has been implemented for maximum efficiency of the proposed system. The earth is capable of massive amount of animal species. Every species has uniquely recognized through several shapes, colours and dimensions. The extraction of these features is very challenging task. The animals have distinct characteristics like stripes, number of horns, stripes that is different from each other.

Image retrieval based on wavelets descriptors has heavily been depended upon the type of wavelet descriptors used to define the image and hence the process is relatively time consuming. Therefore, fast and improved retrieval of pictures from a giant database is a vital requirement that must be self-addressed. High retrieval potency and fewer machine quality area unit the required characteristics of CBIR systems. In typical image databases, pictures area unit text-annotated and image retrieval relies on keyword looking out.

A. Wavelet Transform

For texture feature extraction, Wavelet transform has been used because of their computational effectiveness. Haar wavelets have been used as they are fast in computation. Pyramidal wavelet decomposition of an image is obtained by decomposing the real image into 4 sub- sectioned images such as LLl, LH 1, HLl, HH1. L signifies low frequency and H signifies high frequency. Again, LLl band is divided into four sub-images and the process carries on till the third level. Ten sub-images are formed with different scales and orientation.

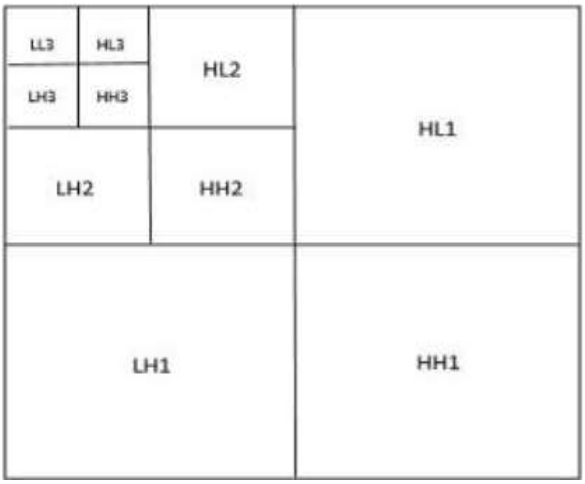

Fig.1: Wavelet Transform of an image

Texture properties such as energy, cluster prominence, cluster shade and wavelet signature have been obtained from the coefficient matrices obtained from the wavelet transform.

Cluster prominence is given as follows:

$$CP = \sum_{i,j-1}^{N} (i - M_x + j - M_y)^4 W\ (i,j)$$

Cluster shade is given as follows

$$CS = \sum_{i,j-1}^{N} (i - M_x + j - M_y)^3 W\ (i,j)$$

Where W(i,j) is wavelet coefficient matrix.

Energy is given as follows:

$$E = \frac{1}{MN} \sum_{i=1}^{m} \sum_{j=1}^{n} |W(i,j)|$$

Wavelet texture signature is as follows:

$$f = \sqrt{\frac{\sum (W(i,j))^2}{i * j}}$$

B. Artificial Neural Network

Neural networks may confine the information about a continuous quantity. In ANN, the number of hidden layers may depend upon the complexity of classification. As the number of hidden layers will increases, the performance of the neural network gets better but the time of processing may increases. The output layer carries nodes equal to the number of classes.

II. RELATED WORK

Kalpathy-Cramer et al. [1] this paper discussed performance of biomedical image retrieval systems. Biomedical retrieval system becomes active research topic over the last decades. a standard test bed was produced within the CLEF benchmark in retrieval system. This allows researchers to distinguish their techniques and ideas. A detailed analysis of the data also highlights the value of the resources created.

Murala, Subrahmanyam et al [2] presented a novel algorithm which uses spherical symmetric 3D pattern for biomedical retrieval application. The presented algorithm encodes the relation among the centre pixel and its surrounding neighbours with 5 directions in 3D plane that is produced from the 2D image using multi-resolution Gaussian filter bank. Moreover, color SS-3D-LTP (CSS-3D-LTP) has also been presented in this paper in which the RGB spaces have considered as three planes of 3D volume. The databases used for biomedical image retrieval applications are Corel-10K, Brodatz and open access series of imaging studies (OASIS) magnetic resonance databases respectively. The results analysis indicates improvement in terms of evaluation as compared to the other existing transform domain techniques on respective databases.

Simpson, Matthew S et al.[3] Literature-based image informatics approach has been proposed in this paper. Moreover, gradient-based optimization strategy has also been discussed in this paper. These strategies are used for identifying combinations of features and then apply the method to the image retrieval task. Additionally, the result of the 2013 Image CLEF evaluation

indicates the efficiency of our approaches. Specifically our text-based and mixed image retrieval methods ranked first among all the participating groups.

Murala, Subrahmanyam et al [4] proposed a novel algorithm for medical image retrieval. An 8-bit gray scale image is divided into eight binary bit-planes, and then binary wavelet transform (BWT) is executed on every bit plane to extract the multi-resolution binary images. The results analysis indicates improvement in terms of evaluation measures as compared to the other existing transform domain techniques on respective databases.

Rahmanet al [5] presented a multi-modal image search techniques which develops hierarchical association of modalities and utilizes both intra and inter-modality fusion approaches. The results indicates that mean average precision (MAP) is attained having score of 0.2533 and better in performance (7 % improvement) over comparable results in Image CLEFmed 2012.

Jain, Snehaet al. [6] proposed a neural network image retrieval of species. Some morphological operations have been performed on images and also feature extraction approaches have been implemented for the retrieval of images. In order to get the solution of a wide variety of computer vision issues, the neural networks are being. The extracted features are fed to the neural network which is then trained. The feature vectors of the query image and database images are then compared. MATLAB has been used for the execution of proposed method. The analysis indicates remarkable improvement in the retrieval system in comparison with other existing systems.

Murala, Subrahmanyam, R. P. Maheshwariet al. [7] In this paper, a new image indexing and retrieval algorithm using local mesh patterns are proposed for biomedical image Retrieval application.By comparing gray levels, the LBP makes a relation between reference pixel and its surrounding neighbors. The proposed method can able to extract the directional edge information in 0◦, 45◦, 90◦, and 135◦ directions in an image. The result is compared with existing approaches such as local edge patterns for segmentation, local edge patterns for image retrieval, center-symmetric local binary pattern, block-based LBP. The results after being investigated show a significant improvement in terms of their evaluation measures as compared with other existing methods on respective databases.

Hiremath, P. S., and JagadeeshPujari et al. [8] in this paper, CBIR method has been proposed using color, texture and shape information to attain high efficiency. In this work image may be divided into two equal parts as serve as local descriptors of color and texture. A new method of matching scheme has been presented based on the most similar highest priority (MSHP) principle and the adjacency matrix of a bipartite graph formed using the tiles of query and target image, is provided for matching the images. The combination of the color, texture and shape features provide a robust feature set for image retrieval.

Demner-Fushman et al [9] this paper presents ways to move beyond conventional text-based searching of these resources, by combining text and visual features in search queries and document representation. A combination of techniques and tools from the fields of natural language processing, information retrieval, and content-based image retrieval allows the development of building blocks for advanced information services.

M.M Rahman et al. [10] proposed classification-driven biomedical image retrieval architecture relied on image filtering. This approach is performed in a various collection of biomedical images of different orientations, modalities and body parts. The results indicates the efficiency the efficiency and effectiveness of the approach which is improved 10- 15 % at each recall level.

III. CONCLUSION

Content based image retrieval is a challenging method of capturing relevant images from a large storage space. Although this area has been explored for decades, no technique has achieved the accuracy of human visual perception in distinguishing images. Whatever the size and content of the image database is, a human being can easily recognize images of same category. Overall the performance of content based image retrieval depends on features, feature extraction techniques, similarity measures and the size of database. Several feature extraction techniques have been developed to the task of image retrieval. Further, it is observed that by combining different features, the performance can be increased.

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