A System for the Retrieval of Images from Large Database

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Abstract- Content-based image retrieval (CBIR) approach allows the end userto extract an images from a largedatabase based on query given by user. Best image retrieval can be achieved by using proper transformation Techniques. Currently available transform techniques such as Cosine Transform, FourierTransform, and Wavelet Transform suffer from discontinuities such as edges in images. Moreover there is a lack of tools thatallow us to retrieve automatically relevant images from large image databases. To overcome this problem, a recent technique called RippletTransform (RT) has been implemented to overcome along with the neural network based classifier called multilayeredperceptron (MLP) for finding an effective retrieval of image. Classification using multilayeredperceptron (MLP) with the Manhattan Distance measure will showbetter performance over existing available system for image retrieval.

Keywords-Content Based Image Retrieval (CBIR), Ripplettransform (RT), Edge Histogram Detector (EHD),perceptron (MLP)and Manhattan Distance.

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1. Introduction

Now days, advance development instorage of data and image acquisition technologies have led to huge databases. In order to deal with such information and to efficiently manage these information and images, it is necessary to develop an efficient retrieval system [1]. The explosive growth of the internet and the wide use of digital content necessitate the development of effective ways of managing the visual information by its content and have increased the need for efficient image retrieval procedure [2].Knowledge discovery and business insight from operational data and retrieving similar images from large databases have been powerful weapons to take Competitive advantages in the modern business world [10].The visual content of an image is analyzed in terms of low-level features extracted from the image. These low level features include colour, shape and texture fea. There are several transform techniques implemented for the feature extraction process. But the transform techniques like Fourier Transform (FT) and Wavelet Transform (WT) suffer from discontinuities such as edges and contours in images. Inorder to overcome the limitations of the conventional transforms an effective method called Ripplettransform (RT) has been implemented for feature extraction [1].

Based on the visual content of images, images can be retrieved from a large database. The visual content of an image is analysed in terms of low-level features such as colour, shape and texture extracted from the image [8].For the feature extraction, there are several transform techniques haveimplemented, but the transform techniques like Fourier Transform(FT) and Wavelet Transform(WT) suffer from discontinuities such as edges and contours in images[9].

In order to overcome the limitations of the conventional transforms an effective method called Ripplet transform(RT) has been implemented for feature extraction[1]. In order to improve the performance of retrieval of images and to decrease the computational complexities a neural network based classification tool called Multilayer perceptron (MLP) has been applied. This classification technique is used for the classification of images depending upon the features. Once the classification is over ,Manhattan similarity measure is used to retrieve and display images based on the distance values. The main objective of the system is to check theeffectiveness of Ripplet Transform(RT) with different neural network based classification tools with a point to determine an efficient technique for the Content based Image Retrieval.

2. Related Work

a) Ripplet Transform(RT)

The conventional transform technique like Fourier Transform(FT) ,Cosine Transform, Wavelet Transform(WT) suffer from discontinuities such as contours and edges in images. To address this problem, Jun XU et al. Proposed a new MGA (Multigeometric analysis) tool called Ripplet Transform(RT) [1][5]. RT is capable of representing images or 2D signals at different directions and different scales . RT provides a new tight frame with sparse representation for images with discontinuities along et curves [6].RT could be represented as Continuous Ripplet(CRT) and discrete Ripplet transform(DRT)

b) Multilayered Perceptron(MLP)

Multilayer perceptron (MLP) network is a feedforward artificial neural network model that maps set of input datas onto a set of appropriate output. A MLP consists of multiple layers of nodes in a directed graph, with each layer fully connected to the next one The network consists of a set of source nodes forming the input layer, one or more hidden layers of computation nodes, and an output layer of nodes. The input signal propagates through the network layer-by-layer[7]. Each node in one layer connects with a certain weight Wij to every node in the following layer.Learning algorithms like backpropagation can be used to train the network[1].

Inorder to increase the accuracy and to reduce the search space, the proposed CBIR system uses a MLP-Neural Network based classifier with feedforwardbackpropagation algorithm for training the network which consists of three layers [1]. The learning network consist of certain number of nodes in the input layer and in the output layer .The signal-flow of such a network with one hidden layer is shown in below.

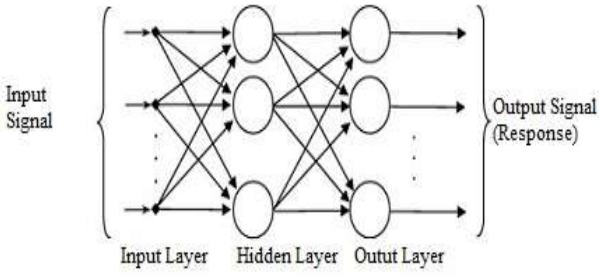

Fig.Signal flow graph of Multilayered perceptron (MLP).

c) **Manhattan Distance Measure**

Manhattan Distance Measure Manhattan distance is also known as city block distance.lt represents the distance between two points in an image. The "closer" the instances to each other, the larger will be the similarity value. The Manhattan distance, lit, between two vectors p,q in an n-dimensional real vector space is the sum of the lengths of the projections of the line segment between the points onto the coordinate axes. It is given by the equation where p and q are vectors. The distance depends on the rotation of the coordinate system, but does not depend on its reflection about a coordinate axis or its translation. It is more commonly used than Euclidean distance because of the accuracy in high dimensional space[6].

3. PROPOSED ALGORITHM

In the proposed method, the image samples are labelled and stored in a database. Then their features based on RT are extracted for the training of a MLP network[1]. The exact configuration of the MLP is selected on trial and error basis, based on the error rate of the output classification. The block diagram of the proposed CBIR system is shown below.

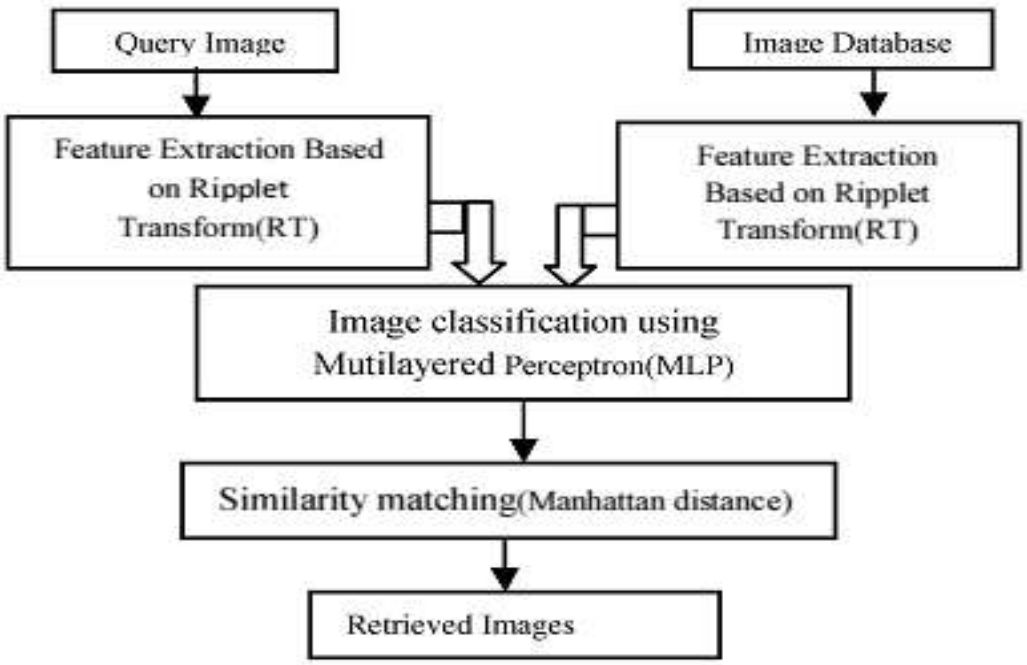

Fig. 1 Block diagram of proposed image retrieval system.

The client gives the question picture to the framework. Ripplet Transform based components are extricated for this specific question picture. These elements, class distinguishing proof of the question picture is done by the chose MLP based pre-grouping piece. Once the grouping of the question picture is over, the framework figures the similitudes between the inquiry picture and every one of the pictures in the divided database by utilizing the Manhattan separation. The framework recovers the comparable coordinating pictures from the apportioned database and presents them to the client. The coordinating process then recovers those pictures whose components coordinate most nearly to that of the question picture.

Training the Algorithm

The Training process extricates the picture components to a discernable degree and readies a database of highlight vectors. These component vectors are acquired by the wavelet change and after that applying EHD on chose wavelet coefficients. The general preparing procedure is appeared in figure 2. The primary strides of preparing calculation are as take after:

Step 1: Input picture (I) of size M×N .

Step2:Resize picture (I) in a size where both M and N are separable by four because of necessity of EHD.

Step 3: Take 2 Level Discrete Wavelet Transform of the data picture (I).

Step 4: The two-level DWT gives the four grids cA2, cH 2, cV2 and cD2 of wavelet coefficients at level 2.

Step5: Calculate Edge Histogram of the estimate coefficients cA2 and itemized coefficients cH2 and cV2 while leaving point of interest coefficients cD2 as it for the most part contains loud subtle elements as opposed to the important data. The EHD gives 85 data focuses as 80 focuses are acquired from standard canisters and 5 extra focuses are gotten by worldwide receptacle.

Thusly, the length of the component vector (fv) is 85 for one wavelet coefficient framework and general length of highlight vector forcA2 , cH2 and cV2 is 85 3=255.

Step 7: Calculate highlight vector (fv) for every picture in the database and mastermind all these component vectors in a database. The measure of database is

Number of Images (Rows)×255(Column)

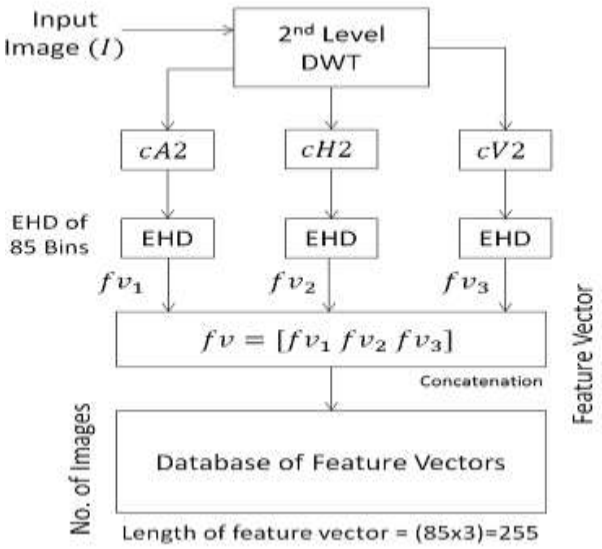

Fig.2 Training process for proposed scheme.

4. Conclusion and Future Work

Images with good multi-resolution analysis will be retrieved from the large database with wavelet transform. It provides a hierarchical representation of images which results in an effective approximation of images from coarse granularity to fme granularity. In this paper, a content based image retrieval algorithm is presented for texture and shape based features. Edge Histogram Descriptor (EHD) and Wavelet transform are approaches to utilize to obtain better efficiency in image retrieval system. Manhattan Distance Measure is technique to calculated approximate distance between the images which will results in better retrieval system.

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