ABSTRACT

Based on a given input query image Content-Based Image Retrieval (CBIR) retrieves similar images from a large database. A conventional keyword-based search was inefficient in retrieving data because of large scale digitization of images, diagrams and paintings. A CBIR system gets inputs and responds to image queries relying on image content through use of techniques from computer vision and image processing to interpret it. It uses techniques from information retrieval and databases to locate and retrieve images suiting the query. CBIR is used in medicine as it increases doctor’s confidence when they make informed decisions.

Various methods were suggested for CBIR with low level image features like histogram, color layout, texture and image analysis in the frequency domain including Fast Fourier Transform (FFT) and Wavelets. Similarly classification algorithms like Naïve Bayes classifier, Support Vector Machine (SVM), Decision Tree (DT) induction algorithms and Neural Network (NN) based classifiers were also studied extensively.

Future medical information systems will play a very important role in the clinical decision making process by providing similar pathological
conditions in a medical image and thus help the physician view the significant images to make a better decision. CBIR has been effectively used to retrieve images from databases based on the query input which can either be an anatomical region or pathological image. In this work, it is proposed to investigate CBIR on medical images obtained through various techniques including Computer Tomography (CT) and Magnetic Resonance Imaging (MRI).

This research investigates the efficacy of the various classification algorithms used in CBIR and proposes a novel Gaussian Fuzzy Feed Forward Neural Network classifier using Fuzzy and Genetic algorithms to improve the classification accuracy. The proposed classification model is tested using medical images. The work is classified into the following areas:

- To investigate CBIR using Discrete Cosine Transform (DCT) for feature extraction and existing classification techniques for classifying medical images. Investigate feature reduction techniques to improve the classification accuracy and time.

- To propose an improved kernel for Support Vector Machine and investigate the classification accuracy.

- To propose an improved Neural Network classifier to improve the classification accuracy.
To propose an optimization technique for the proposed Neural Network classifier to optimize the momentum and learning rate.

Classification accuracy using DCT for feature extraction is pretty promising. SVM based techniques is able to classify medical images in the range of 69.77 to 82.35% accuracy. Higher training set has established better results. The classification accuracy obtained using proposed Neural Network classifier is 95.83% for the three class problem used in the dataset.