ABSTRACT

Meningioma brain tumors are crucial and life killing disease among the other types of brain tumors. Hence, there timely and accurate detection and segmentation of tumor regions are very important to save the human life. In this thesis, three different approaches are proposed to detect and classify the meningioma brain images from the non-meningioma brain images.

In approach-1, rough k means clustering algorithm and Multi Kernel Support Vector Machine (MKSVM) algorithm is proposed to detect the tumor regions in meningioma brain images. The purpose of these methods are to provide a Magnetic Resonance (MR) image segmentation, to raise accuracy for classification of the tumor feature direction and also maximizes and classified a MR image. The preprocessing method is applied in this work to improve the accuracy of image segmentation and to reduce the noise. There are three steps are followed in this work to achieve a effective results such as (i) The input of brain MRI images are preprocessed. (ii) The preprocessed images are delivered to the feature extraction process then the feature extraction process is performed by Improved Gabor Wavelet Transform (IGWT) (iii) Finally, feature values are transferred in to the clustering process for segmentation process. This proposed method is used to obtain an efficient, accurate and reproducible tumor segmented images.

In proposed approach-2, NN classifier is used to classify the meningioma brain image from the non-meningioma brain image. The shearlet transform is applied on the source brain image and the Local Binary Pattern (LBP) features are computed from the decomposed shearlet coefficients. The obtained LBP features are optimized using Genetic Algorithm (GA) and then Neural Networks (NN) classifier is used to classify the optimized features.

In approach-3, the meningioma images are detected from non-meningioma brain images using Modified Empirical Mode Decomposition-Convolutional Neural Networks (MEMD-CNN) classification method. This proposed method has the following stages data augmentation, spatial frequency transformation, feature computations, classifications and segmentation. The brain image samples are increased using data augmentation process for improving the meningioma detection rate. The data augmented images are spatially transformed into frequency format using MEMD transformation method. Then, the external empirical mode features are computed from this transformed image and they are fed into CNN architecture to classify the source brain image into either meningioma or non-meningioma. The tumor pixels are segmented in meningioma brain image using morphological opening-closing functions.