INTRODUCTION

Early detection and classification plays important role in healthcare monitoring system. The development of automated brain tumor detection and classification techniques using medical imaging modalities such as Magnetic Resonance Imaging and Computed Tomography has made major advances in recent years. This research involves multiple image processing tasks for brain tumor classification. Image processing tasks involves Pre-processing, Segmentation, Feature Extraction and Feature Classification. Different algorithms at each stage with hybrid methods are implemented and compared. The qualitative parameters are compared and analyzed further. All the tasks are implemented using mathematical model in software.

First task is in Tumor Classification in which different types of filters are used. Filtering task involves Median, Wiener, Anisotropic, Non-Local Means and Combined filters. The results are compared with statistical parameters, like; PSNR, MSE, RMSE and UQI. In this comparative analysis, combined Wiener and Anisotropic filter gives the better result compare to the others.

For Segmentation task, multilevel thresholding with Cuckoo Search Algorithm is used. Results are compared with different objective functions, like; Otsu, Kapur Entropy, Tsallis Entropy and combined Otsu and Tsallis Entropy. In this Cuckoo Search Algorithm using combined Otsu and Tsallis entropy as an objective function gives superior result in terms of the region extraction in comparative analysis.

For Feature Extraction task, Discrete Wavelet using second level decomposition is used to extract the different features, like; Mean, Standard Deviation, Variance, RMSE, Entropy, Skewness, Kurtosis, Energy, Contrast, Correlation, Inverse Different Moment, and Homogeneity.

For Feature Classification task, Support Vector Machine is used. Confusion Matrix is created using different parameters, like; Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value and Accuracy. Parameters are compared for Cuckoo Search Algorithm using different objective functions. The proposed method provides a better result for classification whether image is With brain tumor, either Benign or Malignant, and Without Brain Tumor. Graphic User Interface is implemented for Pre-processing or Filtering, Segmentation, Feature Extraction and Feature Classification task.