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# Classification of Brain MRI Tumor Images: A Hybrid Approach

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## Abstract

Nowadays, brain tumor has been proved as a life threatening disease which cause even to death. Various classification techniques have been identified for Brain MRI Tumor Images. In this paper brain tumor from MR Images with the help of hybrid approach has been carried out. This hybrid approach includes discrete wavelet transform (DWT) to be used for extraction of features, Genetic algorithm for diminishing the number of features and support vector machine (SVM) for brain tumor classification. Images are downloaded from SICAS Medical Image Repository which classified images as benign or malign type. The proposed hybrid approach is implemented in MATLAB 2015a platform. Parameters used for analyzing the images are given as: entropy, smoothness, root mean square error (RMS), kurtosis and correlation. The simulation analysis approach results shows that hybrid approach offers better performance by improving accuracy and minimizing the RMS error in comparison with the state-of-the-art techniques in the similar context.

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## 1. Introduction

MRI stands for magnetic resonant imaging is an imaging procedure that delivers excellent pictures of the structures which are anatomical in context of the human body, particularly in the cerebrum, gives rich data for clinical analysis and biomedical research. The indicative estimations of MRI are incredibly amplified by the computerized and precise characterization of the MRI pictures. MRI (Magnetic Resonance Imaging) has demonstrated out as an effective instrument in location of brain tumor with the assistance of MR Images. It is a

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non-intrusive strategy which delivers exceptionally point by point 2D and 3D pictures of the organ inside the brain toward each path. As the large amount of information given through MRI system, it is illogical to build up a strategy which can characterize the pictures in typical or strange through human assessment. [2]

Brain Tumor is a bunch of abnormal cells developing in the brain. It might happen in any individual at any age and show up at any area and have wide assortments of shapes and sizes. They can be dealt with by radiotherapy or by chemotherapy. This turns out to be a severe problem which causes even death. Tumor is additionally classified in two: malignant and benignant. Benignant tumors have homogeneous structure and don't contain disease cells while malign have heterogeneous structure and contain malignancy cells. Benign tumors are either radio-logically or surgically crushed and have uncommon odds of become back. Malignant are life undermining tumor and can be dealt with by chemotherapy, radiotherapy or their blend. In order to deal with brain tumor, MRI is a useful technique which provides us all fine details of brain such that we can easily detect the area of tumor.

Data mining helps up to a greater extent to face out with such fine details. As SVM turns out be the best approach in order to deal with detection of tumor [17, 18], we analyze some brain images with the techniques SVM, PCA and DWT obtained from SICAS Medical Image Repository.

## 2. Literature Review

S. Chaplot et al. [2] proposed a novel strategy for the classification of magnetic resource images of human brain which utilizes wavelets as contribution to support vector machine and neural system self-organizing maps. The proposed technique orders MR brain images as abnormal or normal. Their proposed approach has a dataset of 52 MR brain images. A rate of over 94% was achieved with the self-organizing maps (SOM) whereas and 98% using the support vector machine method. It was observed that the classification rate is high for a support vector machine classifier if compared with a self-organizing map-based approach.

M. Maitra et al. [3] proposed new approach for mechanized diagnosis, for the classification of MRI images. The proposed strategy is seemingly a variant of orthogonal discrete wavelet transform (DWT), called Slantlet transform for highlight extraction. Here, a 2-D MR picture processes its intensity histogram and then connected to Slantlet transform as its histogram flag. At that point an element vector is made by considering the sizes of Slantlet transform yields comparing to six positions which are supposed to be spacial, picked by a particular rationale. The components which are extricated used to prepare a neural system based classifier. The fundamental reason for classifier is to arrange the pictures either as typical or unusual for Alzheimer's sickness. From this strategy, they accomplished the productivity of 100% in accurately characterizing the Alzheimer's malady.

Y. Zhang et al. [4] proposed a hybrid technique in light of forward neural network (FNN) to group MR brain images. The proposed strategy initially utilized the discrete wavelet transform in order to extract main features from MR Images and after that applied the principal component analysis technique to diminish feature space to a limit. The diminished components were sent to a forward neural network (FNN), where the parameters were upgraded utilizing an improved artificial bee colony algorithm (ABC) calculation in view of both fitness scaling and chaotic theory.. At that point, K-fold cross validation technique was utilized to maintain a strategic distance from over fitting. The outcomes demonstrate that SCABC can acquire the minimum mean MSE and 100% accuracy.

JankiNaik et al. [6] introduced a proposed method to classify the medical images for diagnosis. Here, pre-processing, feature extraction, association rule mining and classification are the steps involved. Some

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