ABSTRACT

Medical images play a vital role in ensuring information on the anatomy of human body. Because of the invention of a number of digital image equipments including Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and Positron Emission Tomography (PET/CT) are proving to be inevitable in the arena of diagnosis of diseased condition. Segmentation technique is used in surgical plans, anomaly identification, post-surgery appraisal and other medical applications. In spite of using automated and semi-automated image segmentation techniques, in almost all cases there is noise which is not relevant, intensity in homogeneity, bad contrast values and weak boundaries which are inherent in medical images. MRI and other types of image contains complex anatomical structures that need precise segmentation for medical diagnoses. Brain image segmentation as such is very complex and tough but accurate segmentations are needed to detect tumors at an early stage, edema and also brain cell death. Diagnosis is made possible through precise identification of tissues.

Dementia is a chronic or progressive nature syndrome due to various brain illnesses affecting thinking, memory, behavior and ability to perform daily work. Dementia is a clinical syndrome of cognitive decline which interferes with occupational and social functioning. It is an anchor point of reference in revised Alzheimer’s Disease (AD) diagnostic criteria. AD is a foremost public health problem in countries with long life expectancy. According to estimates about three million Americans and about two million Japanese suffer from AD. This work classifies brain images for dementia detection.
The Open Access Series of Imaging Studies (OASIS) data set is employed for experiments in this work. The wavelet texture features are obtained for feature extraction. Boosting and bagging enhance accuracy and K-Nearest Neighbor (KNN) with naive bayes algorithms are employed classifiers. Wavelet transforms are calculated through the application of separable filter banks to images. With regards to classification, boosting is supposed to be accurate, especially with respect to AdaBoost algorithm. Predictions are enhanced by bootstrap which is used by bagging. A weak classifier is improved through bootstrap aggregating procedure. Classification accuracy is improved through bagging and performance of unstable learning algorithms. Weak learners are combined by boosting in locating highly accurate classifiers or better fit training set. Boosting aims to increase a weak learning algorithm’s strength. Bayes’ theorem is the basis for naive bayes classifier which is simple with strong independent assumptions. In terms of general pattern recognition domains, KNN pattern classifier is an effective learner. Due to its conceptual simplicity, they are quite easy to implement. Experimental results show that the bagging and boosting algorithm improved classification accuracy than naive bayes and KNN classifiers.

Here, for segmentation of medical image, a number of techniques such as wavelet features, Fuzzy C Means (FCM), boosting and bagging techniques are proposed in this work. The notion of partial memberships is incorporated through fuzzy set theories as put forth by membership functions, and for segmenting images, fuzzy clustering as soft segmenting technique are widely researched and employed. Of the number of fuzzy clustering techniques that are being used, the most frequently used is FCM algorithm for segmentation of images as there is strength and ambiguities and it has the capacity to retain more data than tough segmenting techniques. FCM is widely used for segmentation of medical images, though it though the image intensity is more and the result is obscure as they seem to be more noise-
filled. Bagging and boosting classifiers are quite common in re-sampling ensemble. Many classifiers can be created and merged through the use of the same learning model for base classifiers. Experimental results show that the FCM segmentation-bagging algorithm improved classification accuracy than boosting, bagging and FCM segmentation-boosting methods.

For better accuracy through bagging and boosting, the segmentation of fuzzy bee is used. In this work, Artificial Bee Colony (ABC) and hybrid ABC-FCM methods are proposed. Foraging activity of honey bees is the inspiration for ABC. Starting at the time of inception, successful employment of ABC is done in various optimization issues. Bees with greater fitness values are denoted through optimal solution. To start with, the capacity of global searches is utilized by ABC-FCM algorithm in order to search for optimal solutions as initial clustering centres for FCM. Secondly, algorithm which is suggested uses up FCM for optimization of initial clustering centres and global optima are captured. Experimental results show that the fuzzy bee segmentation-bagging method increased classification accuracy than FCM segmentation-boosting, FCM segmentation-bagging and fuzzy bee segmentation-boosting methods.