Medical image segmentation using fuzzy c-mean (FCM), Bayesian method and user interaction

ABSTRACT

Image segmentation is one of the most important parts of clinical diagnostic tools. Medical images mostly contain noise and in homogeneity. Therefore, accurate segmentation of medical images is a very difficult task. However, the process of accurate segmentation of these images is very important and crucial for a correct diagnosis by clinical tools. In this paper a new method is proposed which is robust against in-homogeneousness and noisiness of images. The user selects training data for each target class. Noise is reduced in image using Stationary wavelet Transform (SWT) then FCM clusters input image to the n clusters where n is the number of target classes. User selects some of the clusters to be partitioned again. FCM clusters each user selected cluster to two sub clusters. This process continues until user to be satisfied. Each cluster is considered as a sub-class. Posterior probability of data to each sub class is calculated using data in those sub-classes. Probability density of each target class at sub classes is calculated using training data. Probability of data to each target class is calculated using probability density of each subclass at input data and probability of each subclass to each target class. At last, the image is clustered using probability of data to each target class. Segmentation of several simulated and real images are demonstrated to show the effectiveness of the new method.