Classification of Brain MRI for Alzheimer's Disease Based on Linear Discriminate Analysis

HEBA MOHSEN MOHAMED MOSAAD HUSSIEN ,El-Sayed A. El-Dahshan, El-Sayed El-Horbaty, Abdel-Badeeh Salem

Abstract

Alzheimerôs disease (AD) is known to be the most common cause of neurodegenerative dementia that affects people over 65 years. Itôs an irreversible, progressive brain disorder that slowly destroys memory and thinking skills, and eventually the ability to carry out the simplest tasks and it has no treatment till now expect slowing down its symptoms if it was diagnosed in early stages. The diagnosis of AD includes mental status, physical exam and neurological exam, which is analyzing different imaging techniques such as magnetic resonance images (MRI). And accordingly, AD become a challenging wide area of research in the medical images application that aims to find a reliable methodology that can early detect and differential diagnosis of cognitive normal (CN), mild cognitive impairment (MCI) and AD by examining the brain MRIs. In this work, we proposed a methodology based on Discrete Wavelet Transform (DWT) feature extraction technique and Principal Component Analysis (PCA) for feature vector reduction then these features are entered to linear discriminant analysis (LDA) classifier. The performance of the proposed methodology was evaluated using two datasets obtained from Alzheimer's Disease Neuroimaging Initiative (ADNI) database and Harvard Medical School website. Our methodology achieved 94.59%average classification rate with AUC of ROC = 0.963over Harvard medical school dataset and 77.78% average classification rate with area under the ROC curve (AUC) = 0.809 over ADNI dataset using a 6-fold cross validation.

Egyptian Computer Science Journa 2017, September

Future University In Egypt (http://www.fue.edu.eg)

Copyright É 2013 [Future University in Egypt]. All rights reserved.