OMICS International
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2nd Biomedical Engineering Conference and Expo

November 30-December 01, 2015   San Antonio, USA

Statistical Analysis of 3D Images of Alzheimer's disease

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Alzheimer's disease is the most common type of dementia which it has no cure nor imaging test for it. Diagnosis of the Alzheimer's disease (AD) still a challenge and difficult. An early diagnosis for Alzheimer's disease is very important to delay the progression of it. This paper extract and analyze various important features of 3D-MRI brain medical images to provide better analysis and diagnosis of AD. These extracted features had been used for detection of the abnormalities among different demented and non-demented MRI AD images. This paper deals with the statistical analysis to discriminate among the different types of tissue. Also, it investigates and building up an efficient Computer Aided Diagnosis (CAD) system for AD to assist the medical doctors to easily diagnose the disease. Statistical, structural, and textural features had been extracted for different images. These extracted features had been used as an input to the SVM classifier. In addition, all these features had been applied to the proposed algorithm and then had been classified using SVM classifier. The performance of the CAD system based on statistical analysis and the proposed algorithm had been measured using different metric parameters. Also, the proposed algorithm had been applied to the images with intensity level. The obtained results indicate that the metric parameters increase from 60% without using the proposed algorithm to 100% using the proposed algorithm.

Alzheimer's disease is a degenerative brain disease and the most common cause of dementia. The most common initial symptom is a gradually worsening ability to remember new information, planning or solving problems, completing familiar tasks at home or work, Confusion with time or place, and problems with words in speaking or writing. Alzheimer's disease is a progressive disease, which means that it gets worse over time. There is no cure, specific blood or imaging test for Alzheimer's disease. However, some drugs are available which may help slow the progression of Alzheimer's symptoms for a limited time. Diagnosis of the Alzheimer's disease (AD) still a challenge and difficult, especially in the early stages. The early detection will be key to prevent, slow and stop Alzheimer's disease. The last 10 years have seen a tremendous growth in research on early detection. Statistical analysis method is one of the important methods for feature extraction in digital images. There are different previous approaches that depends on extracting statistical, textural, and structural features from digital images in different application.

The statistical analysis of 3D and 2D images of AD had been presented in this paper. Different important statistical, structural and textural features that had been extracted from different AD MRI images (normal, very mild AD and mild AD). The 3D images had been analyzed in three plans and the features had been extracted from each plane. Studying and analyzing these extracted features may help the medical doctors to diagnose the Alzheimer's disease.

Biography

Mohamed M. Dessouky was born in Egypt, 27 April 1984. Graduated from department of Computer Science and Engineering, Faculty of Electronic Engineering, Menoufiya University, Egypt at 2006. Demonstrator at 2007, Assistant Lecturer at 2011. Now he is a PhD student.   The major field of study is image processing and artificial intelligence. Mohamed has More than six years of teaching experience as an assistant lecturer, and Teaching Assistant for a variety of undergraduate courses in different Computer science and Engineering fields. Dr. Mohamed is CISCO Certified Instructor and got award from CISCO as a best instructor for more than 5 years.

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J Bioengineer & Biomedical Sci 2015
ISSN: 2155-9538, JBBS an open access journal

Biomedical 2015
November 30-December 01, 2015

Volume 5 Issue 3

Page 33