

TITLE

Protocol Development and Performance Evaluation of a computer aided segmentation of the hippocampus anatomical structure related to Alzheimer's disease

ABSTRACT

Magnetic resonance imaging (MRI) has become a valuable tool for the study of brain disorders because of the advantages compared with other imaging methods, and because of the rich information it provides on the anatomy of the human soft tissues. The segmentation of brain structures, which show changes in pathology as in the case of the hippocampus, through analysis of MRI brain images is of major importance for the study of various disorders and the morphological and volumetric differences between healthy and sick. All these data could prove valuable biomarkers for a wide range of pathologies. On the other hand, the time required for manual segmentation due to the huge amount of data generated by MRI, and the costs are hampered effective morphological study of brain structures. Therefore the objective of this thesis is to develop a system for semiautomatic segmentation of the anatomical structure of the human hippocampus to study the disease Alzheimer. The study of the human brain constantly gathers the interest of scientists or the study and observation of the physiological functions and procedures, or for the analysis of the various diseases that attack. Neurodegenerative diseases much interest both on the track diagnosis and treatment, and for the prevention piece. Our aim was to study the pathogenesis of Alzheimer's disease in order to develop a system partition and titration of the anatomical structure of the hippocampus, through the design of a simple system using image analysis tools will not be complicated so it is not imperative for systems resolution demanding. Thus, image preprocessing techniques implemented, our next step was the manual segmentation to allow knowledge of the anatomical region of the brain and can be separated into three classes (Healthy, Mild Cognitive Impairment, Alzheimer), immediately after the system developed semiautomatic partition and then spent the scope of the analysis results by evaluating four classifiers preceded the calculation of volume. The results of the volume of the hippocampus, compared to the top image database MRI exclusively disease Alzheimer ADNI, and demonstrated the best accuracy and semi-automatic segmentation of the brain compared to the manual method.

SUBJECT AREA: Medical Imaging Segmentation, Image Processing, Image Analysis, Alzheimer Disease

KEYWORDS: MRI, Alzheimer Disease, Brain Segmentation, Classification, Image Findings, Level Set Algorithm, Watershed Algorithm, ADNI Database