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A Review on Alzheimer Disease based on Segmentation

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Abstract:
Alzheimer's disease (AD) plays an important role in the medical image processing. It is an irreversible neurodegenerative dementia that often occurs at the age of 65. It is a kind of memory loss that related with thinking and behavior of people's day to day lives. Therefore, the researchers are taking more efforts to find proper treatment and improve the quality of patient's life. Besides, this paper represents the review based on segmentation during early detection of AD and MRI classification using ADNI datasets. Further, it concluded with different approaches for better detection of AD.

Keywords: *Alzheimer's disease (AD), Magnetic Resonance Imaging (MRI), Hippocampal Unified Multi Atlas Network (HUMAN).*

1. Introduction

Brain is one of the important and complex organs in our human body which is located at the centre of the nervous system. It consists of several billons of cells to communicate trillion connections like synapses. The brain includes some major task such as visualization, thinking, language processing, emotional response and learning. As it locates at the centre of the nervous system, is there any abnormal behavior inside the cells it may affect our entire functionalities of the body which leads to Alzheimer's disease (AD). It is otherwise known as dementia that occurs often at the age of 65. It is a kind of memory loss with improper thinking and behavior, also in current progress there is no treatment for dementia. Thus, the experts are taking more effort to find the proper treatment and improve the quality of patient's life. To achieve this, some of the automatic development was progressed for the early detection of AD. It is one of the top 10 diseases in America that affects more than 5 million people of Americans and it may exceed up to 16 million people in 2050. The Alzheimer's disease was developed in the plaques and tangles of the brain, which leads to block the communication among the nerve cells, reduce its function and respective cells will die. Hence, the death of the nerve cells and distraction may cause memory failure and problem of changes in personal and daily activities [1].

In recent years, the testing of neuro imaging data has supported many researches for early detection and accurate analysis of an Alzheimer's disease. It is studied from Magnetic Resonance Imaging (MRI) which taken by MRI scanner and produce the image in the form of scanner tissue, but it is time consumption process. Hence, several

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software programs are available for an automatic classification of grey matter. Following, the detection of gray matter possible which is highly viewed in the study of MRI data based on fractal measurement [2, 3], independent component analysis [4] and advanced local binary pattern of brain [5]. Thus the early detection of MRI data is highly possible in AD [6]. Further, this paper contributes different reviews on segmentation using Magnetic Resonance Imaging (MRI) data which produces a high contrast, good resolution for segmentation and prediction algorithms.

Review based on Alzheimer Segmentation

In recent reviews, the segmentation based on different methods of aspects and it can be concluded in different ways. Following that, Pier rick Coupe, et.al proposes methods of segmentation in life span analysis of brain trajectory using inferred models in AD that exhibits the early divergence between normal and pathological models. The detection of Alzheimer's disease using MRI images with Neuroimaging Initiative (ADNI) dataset that obtains high accuracy with new biomarker images . Then the limitations of previous analysis of neuroimaging in biomarkers were concluded in . As, the evaluation on ADNI dataset shows promising results and demonstrates the efficacy of the proposed biomarker with SVM algorithm for better results [7]

Jose Vicente Manjon, et.al, contributes some segmentation results using tissue classification in TMS method. It highlights the temporal lobe atrophy, a key biomarker in AD, is a very early path physiological event potentially associated with early life exposures to risk factors . The evolution of brain Atrophy subtypes includes all types of segmentation methods that predict long-term cognitive decline and future Alzheimer's clinical syndrome . Frank de Vos, et.al, proposes anatomical MRI Measures to improve the AD classification into two different methods for combining the features of different measures[8] . The weighted combination of all measures discriminates is better than the concatenated combination. These results might also be relevant to studies of early AD diagnosis and other neurodegenerative diseases studies.

Kilian Hett, et.al, proposes a classification of Alzheimer's disease using Multimodal Hippocampal Subfield Grading based on patch-based grading (PBG) methods. It supports Multi modal patch-based grading (MPBG) applied on T1w and MD, it obtains similar results compared to the best performances of both modalities. Then the classifier performances are obtained by each feature separately using SVM algorithm . Further, the voxel-based morphometry (VBM) is the similarity of pattern analysis estimated with patch-based grading strategy, while the graph modeling based on intra-subject variability between the structures grading [9].

Jorge Samper- Gonzalez, et.al, describe the results which accessed by applying classifiers to trained ADNI to AIBL&ASIS datasets using Machine learning and feature extraction . The diagnosis of Alzheimer's disease based on Hippocampal Unified Multi Atlas Network (HUMAN) algorithm with ADNI database. It results showed the (specificity $\sim 0.75 \pm 0.04$) greater than (sensitivity 0.52 ± 0.07) with the help of hippocampal volumes and the segmentation algorithm is stable and precise to identify the disease [10]. Further, the symptoms of modeling and prediction of Alzheimer's disease was proposed using ADNI database .

Diana Lorena Giraldo Franco , et.al, proposes the Morphometric Data Fusion for Early Detection of Alzheimer's Disease using Nonnegative Matrix Factorization (NMF) method . The olfactory and cognitive behavioral tests for 27 cognitively normal (CN), 21 MCI, and 15 AD

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subjects was implemented . This is the prominent atrophy in the POC and hippocampus which is used to found in both AD and MCI subjects, and then it correlated with behavioral measurements
without significant differences in cognitive and olfactory performance, hippocampal, POC volume and POC activation. Following, the inter neurons olfactory tests can be related with Alzheimer's disease using ADNI database and this results are obtained from these olfactory tests through AD progression [11].

Odor identification Screening improves the diagnostic classification in Incipient Alzheimer's disease. It is used for screening tool that provides additional information relevant for clinical categorization of AD and MCI, including those who are at highest risk to convert to AD . Weihao Zhang, et.al, proposes a Identification of Alzheimer's Disease and mild cognitive impairment using networks constructed based on multiple morphological brain features in ADNI database. This shows the significant improvement for identifying patients with AD (or) MCI from NC subjects with accurate results of 96.42 % &96.37%

Anja Soldan, et.al, compares the relationship of Medial Temporal Lobe Atrophy, APOE Genotype, and Cognitive Reserve in Preclinical Alzheimer's Disease was contributed using ADNI database. The relation between the MRI measures of MTL atrophy, APOE genotype, and level of CR are time to onset of clinical symptoms with large sample of individuals who were cognitively normal at baseline. The pre symptomatic atrophy of autosomal dominant was proposed using MRI datasets in AD. Here, the Genotyping was performed to determine the presence of an AD mutation for each at risk participant.

Kilian Hett, et.al, proposed the Adaptive Fusion of Texture-Based Grading in the application of AD detection with regions of interest (ROI). In order to validate the improvement the results are compared and obtained with our framework using raw intensities (T1-w grading). Then the classification step involves the distribution of weak classifiers to get a better discriminate pathology stages. Further, the classification of Parkinson's disease (PD) was proposed which involve three types of classifiers using frequency domain analysis for proper classification to PD patients[12]. After, the classification of emotional status in Parkinson's disease was proposed using machine learning algorithms. This method used to detect the accurate results for further investigation . Rejith, Kamalraj Subramaniam, et.al, suggested the analysis of emotional states in Parkinson's disease using some feature extraction techniques like Entropy, Energy-Entropy and Teager Energy-Entropy Features for PD classification in accurate manner

CONCLUSION:

Alzheimer's disease (AD) is otherwise known as Dementia which is most vulnerable disease in our human brain. It is a kind of memory loss that includes regular thinking and behavior of the patients. It is an irreversible neurodegenerative dementia that occurs at the age of 65 and there is no proper treatment for dementia. In order to achieve that, some of the automatic classifications are proposed for an early detection of AD. Further, this paper contributes the review and performance of different methods of segmentation, early detection of AD using MRI classification and genome type of Alzheimer disease.

REFERENCES

1. Biju K Sa, *, Alfa S Sa , Kavya Lala , Alvia Antonya , Akhil M Kurupa, 'Alzheimer's Detection Based on Segmentation of MRI Image', 7th International Conference on Advances in Computing & Communications, Vol. 22-24, 2017.
2. Y. Kaewaramsri ,S A. Alfarozi, K. Woraratpanya, Y. Kuroki, 'Fractal dimension for classifying 3D brain MRI using improved triangle box counting method', In Information Technology and

Electrical Engineering (ICITEE), 8th International Conference, pp. 1-6, 2016.

3. S. Lahmiri, M. Boukadoum, 'Automatic detection of Alzheimer disease in brain magnetic resonance images using fractal features', In Neural Engineering (NER), 6th International IEEE/E Conference 2013; pp. 1505-1508.
4. W. Yang, H. Xia, B. Xia, L M. Lui, X. Huang, 'ICA-based feature extraction and automatic classification of AD-related MRI data', In Natural Computation (ICNC), Sixth International Conference, Vol. 3, pp. 1261-1265, 2010.
5. Kamalraj S, Rejith K N and Prasanna Venkatesan G K D, 'Frequency domain analysis for the classification of Parkinson's disease patients', IOP Conference Series: Materials Science and Engineering, 2019.
6. **Rejith K N, Kamalraj Subramaniam, '**Classification of Emotional States in Parkinson's disease Patients using Machine Learning Algorithms', Biomedical and pharmacology journal, 2018.
7. Rejith KN, Kamalraj Subramaniam,'Analysis of Emotional States in Parkinson's Disease using Entropy, Energy-Entropy and Teager Energy-Entropy Features', Indian Journal of Public Health Research & Development, 2018.
8. Srinivasan, V., Kaur, C., Pandi-Perumal, S., Brown, G. M., & Cardinali, D. P. (2011). Melatonin and its agonist ramelteon in Alzheimer's disease: possible therapeutic value. International Journal of Alzheimer's Disease, 2011.
9. Kumar, R. S., Ali, M. A., Osman, H., Ismail, R., Choon, T. S., Yoon, Y. K., ... & Manogaran, E. (2011). Synthesis and discovery of novel hexacyclic cage compounds as inhibitors of acetylcholinesterase. Bioorganic & medicinal chemistry letters, 21(13), 3997-4000.
10. Ali, M. A., Ismail, R., Choon, T. S., Yoon, Y. K., Wei, A. C., Pandian, S., ... & Manogaran, E. (2010). Substituted spiro [2.3′] oxindolespiro [3.2 ″]-5, 6-dimethoxy-indane-1 ″-one-pyrrolidine analogue as inhibitors of acetylcholinesterase. Bioorganic & medicinal chemistry letters, 20(23), 7064-7066.
11. Revathi, P., & Hemalatha, M. (2012, December). Classification of cotton leaf spot diseases using image processing edge detection techniques. In 2012 International Conference on Emerging Trends in Science, Engineering and Technology (INCOSET) (pp. 169-173). IEEE.
12. Revathi, P., & Hemalatha, M. (2012, July). Advance computing enrichment evaluation of cotton leaf spot disease detection using Image Edge detection. In 2012 Third International Conference on Computing, Communication and Networking Technologies (ICCCNT'12) (pp. 1-5). IEEE.