# Early Recognition of Alzheimer's Disease using Brain MRI

Rania Ahmed Kadry Abdel GawadBirry
College of Engineering and Technology, Computer Engineering Department
Arab Academy for Science, Technology and Maritime Transport
Alexandria, Egypt
rania_kadry2012@yahoo.com

***Abstract*—Alzheimer's disease (AD) is a brain disease that causes a slow decline in memory, thinking and reasoning skills. It represents a major public health problem. Magnetic Resonance Imaging (MRI) have shown that the brains of people with (AD) shrink significantly as the disease progresses. This shrinkage appears in specific brain regions such as the hippocampus which is a small, curved formation in the brain that plays an important role in the limbic system also involved in the formation of new memories and is also associated with learning and emotions. Medical information on brain MRI is used in detecting the abnormalities in physiological structures. Structural MRI measurements can detect and follow the evolution of brain atrophy which is a marker of the disease progression; therefore, it allows diagnosis and prediction of AD. The research's main target is the early recognition of Alzheimer's disease automatically, which will thereby avoid deterioration of the case resulting in complete brain damage stage. Alzheimer's disease yields visible changes in the brain structures. The aim is to recognize if the patient belongs to Alzheimer's disease category or a normal healthy person at an early stage.**

**Initially, image pre-processing and features extraction techniques are applied including data reduction using Discrete Cosine Transform (DCT) and Cropping, then traditional classification techniques like Euclidean Distance, Chebyshev Distance, Cosine Distance, City Block Distance, and Black pixel counter, were applied on the resulting vectors for classification. Image pre-processing includes noise reduction, Gray-scale conversion and binary scale conversion were applied for the MRI images. Feature extraction techniques follow including cropping and low spatial frequency components (DCT). This paper aims to automatically recognize and detect Alzheimer's infected brain using MRI, without the need of clinical expert. This early recognition would be helpful to postpone the disease progression and maintain it at an almost steady stage. It was concluded after collecting a dataset of 50 MRI , 25 for normal MRI and 25 for AD MRI that Chebyshev Distance classifier yielded the highest success rate in the recognition of Alzheimer's disease with accuracy 94% compared to other classification techniques used where, Euclidean Distance is 91.6%, Cosine Distance is 86.8%, City block Distance is 89.6%, Correlation Distance is 86.4% and Black pixels counter is 90%.**

***Keywords*: AD, MRI, DCT, Chebyshev Distance classifier, Euclidean Distance, Correlation Distance and feature extraction.**

IJHM