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Classification of Alzheimer's disease and prediction of mild cognitive impairment-to-Alzheimer's conversion from structural magnetic resonance imaging using feature ranking and a genetic algorithm

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Abstract

We developed a novel computer-aided diagnosis (CAD) system that uses feature-ranking and a genetic algorithm to analyze structural magnetic resonance imaging data; using this system, we can predict conversion of mild cognitive impairment (MCI)-to-Alzheimer's disease (AD) at between one and three years before clinical diagnosis. The CAD system was developed in four stages. First, we used a voxel-based morphometry technique to investigate global and local gray matter (GM) atrophy in an AD group compared with healthy controls (HCs). Regions with significant GM volume reduction were segmented as volumes of interest (VOIs). Second, these VOIs were used to extract voxel values from the respective atrophy

[†] Data used in this article were obtained from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database (www.loni.ucla.edu/ADNI). ADNI investigators other than those listed above contributed to study design, implementation or data provision but did not participate in the analyses or writing of this report. The complete listing of ADNI investigators is available at http://www.loni.ucla.edu/ADNI/Data/ADNI_Authorship_List.pdf.

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