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An Experimental Study on Evaluating Alzheimer's Disease Features using Data Mining Techniques

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The most prevalent form of dementia is AD, and a major healthcare concern, as its projected global cost, along with other dementia conditions, at approximately \$305 billion impacts healthcare resources (Alzheimer's Association, 2020) significantly. Symptoms of AD include using confusing words, forgetting personal history, feeling down or sad, and being unable to recall events or memorise faces (Schelke et al., 2018). Although AD is incurable, intervention can be sought to manage progression of the disease. Currently, approximately 520,000 individuals in the UK have AD, and this number is projected to rise (Alzheimer's Society, 2020).

Extensive research studies including cognitive tests and pathological assessments using biomarkers have investigated dementia-related conditions to develop early detection techniques (Arbizu et al., 2018; Bruun et al., 2019; Zetterberg et al., 2019). However, clinicians mainly use cognitive tests such as the Alzheimer's Disease Assessment Scale — Cognitive Subscale (ADAS-Cog), Montreal Cognitive Assessment (MoCA), Rey's Auditory Verbal Learning Test (RAVLT,) and others (Rey, 1941; Rosen and Davis, 1984; Nasreddine et al., 2005) to diagnose individuals with AD. Using these tests, individuals undergo a set of questions and activities to assess cognition related to dementia. Other studies, i.e. (Ding et al., 2019; Franzmeier et al., 2020; Younan et al., 2020), have shown features related to magnetic resonance imaging (MRI) — positron emission tomography (PET) scans can also determine AD. Recent studies, such as those by Hansson et al. (2018) and Saddiki et al. (2020) showed that biological marker (biomarkers) tauopathy or beta-amyloid can be helpful in detecting dementia.

While the cognitive tests detect dementia symptoms, there is no clear agreement where these tests fit into the dementia diagnosis process. Apart from recent research via the Alzheimer's Disease Neuroimaging Initiative (ADNI) data repository (Veitch et al., 2019) such as by Weiner et al. (2017) and Weiner et al. (2015), little research has been done on identifying the smallest combination of attributes that can lead to the development of a dementia prediction system (Dimitriadis et al., 2018; Das et al., 2019). More importantly, a dementia prediction system that is able to offer clinicians information approximathom to not only make the appropriate diagnosis but also