# Cognitive Profiling and Personalized Therapy Recommendation for Dementia Through a Language-Aware Multi-Model Artificially Intelligent System

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Over 55 million people currently have dementia with an expected rise to 135 million cases by 2050. Despite having over 82% of primary care physicians in the frontlines of dementia care, only 13% have undergone the proper training to profile dementia. Current dementia profiling methods are required to be administered by a healthcare professional multiple times annually; costing families up to 18 billion dollars making millions of families experience large financial, social, and emotional burdens. Despite the high cost, these tests often result in incorrect categorization due to low sensitivities. A solution using natural language processing (NLP), a neural network, and clustering proved to be an effective profiler and therapy recommender for dementia. 200 patients' data was refined into input vectors for recall, reasoning, and executive function through NLP models. Accuracy and speed of response were further extracted through similar NLP models and cosine similarity. A neural network applied profiling with a peak accuracy of 92% while clustering algorithms made therapy recommendations with a Fowlkes-Mallows Score of 0.91 (91%). Paired with a small run time of 4.21 minutes, these findings proved that the system was robust, accurate, and accessible in both profiling and therapy recommendations; with the potential to serve as an alternative to current mainstream profiling tests and eliminate the dependency on healthcare experts. Providing such a low-cost, personalized system to dementia patients will not only enable in-home care but also reduce the financial burden on family members. This solution has the potential to eliminate healthcare spending by 337.5 billion dollars by 2050.

**Awards Won:**

Third Award of $1,000

American Psychological Association: Third Award of $500