

<b>Thesis Title</b>	Extra Trees Model with Minority Target Oversampling for Classification of Dementia and Heart Failure in Adults
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## ABSTRACT

Recent advancements in medical technology have led to increased longevity, resulting in aging populations across many nations. Research indicates that experiencing coronary heart disease at a young age can have a significantly negative impact on brain health. Specifically, individuals who suffer from heart failure are found to be 60% more likely to develop dementia. This study proposes a new early detection method for dementia by distinguishing it from the associated disease of heart failure using blood testing data. In particular, this study uses extra trees (ETs) to create a classification model for identifying individuals with dementia and heart failure based on personal and clinical data collected during their routine health checkups. The study utilizes a dataset comprising 4,297 records from Chiang Rai Prachanukroh Hospital in Chiang Rai Province, Thailand. The performance of the proposed model is evaluated and compared with other methods, including decision tree, K-nearest neighbors, support vector machine, random forest, gradient boosting, and adaptive boosting. The results demonstrate that the proposed ET model outperforms other methods in terms of accuracy (89.11%), precision (94.92%), recall (92.50%), F-measure (93.70%), and ROC AUC score (78.88%).

**Keywords:** Dementia, Heart Failure, Prediction, Machine Learning, Extra Trees, Classification