

Oliveira, M. J., Ribeiro, P., & Rodrigues, P. M. (2024). *Alzheimer's detection through structural MRI texture analysis*. Abstract from The 1st International Online Conference on Bioengineering.

Introduction: Alzheimer's Disease (AD) is the most common cause of dementia. It affects mostly the elderly and is directly impacted by the observed growth of life expectancy. AD manifests as a chronic and progressive neurodegenerative disease, gradually deteriorating memory and cognitive abilities, and diminishing day-to-day quality of life. As the global population ages, understanding and addressing the challenges of AD becomes increasingly important for public health. Early detection enables treatment planning and symptom management, becoming an important study subject. In that sense, the present study aims to develop an automatic Structural MRI-based tool for the detection of AD and early stages of the disease (Mild Cognitive Impairment—MCI). **Methods:** 504 pre-processed sMRI images were decomposed into slices comprising the three anatomical planes (axial, coronal and sagittal) from where a set of 22 GLCM features were computed to feed 18 machine learning models, employing a hold-out method (80-20 train--test split). The analysis involved comparing three classes, HC (Healthy Controls), MCI and moderate AD in an All vs. All classification approach. **Results and Discussion:** A wide set of metrics was used to evaluate the model's performance. Combining the three anatomical planes, the All vs. All classification with a Linear Support Vector Machine yielded the following results: 82.2% for Accuracy, 82.2% for Recall, 83.0% for Precision, 89.9% Specificity, 81.9% for F1-Score and 89.8% for AUC. **Conclusions:** The results indicate that the proposed model distinguishes between AD, CN and MCI well. The methodology used provided a balanced performance across the seven metrics, highlighting the model's robustness and reliability in classifying the different groups. This approach shows significant potential for aiding in AD early detection and diagnosis and related cognitive impairments with an unusual approach.