

Artificial Intelligence for Alzheimer's Disease Detection: Enhancing Biomarker Analysis and Diagnostic Precision

¹Dr. Richa Gupta,²Zoya Iftexhar

^{1,2}Department of Computer Science and Engineering, Jamia Hamdard, India

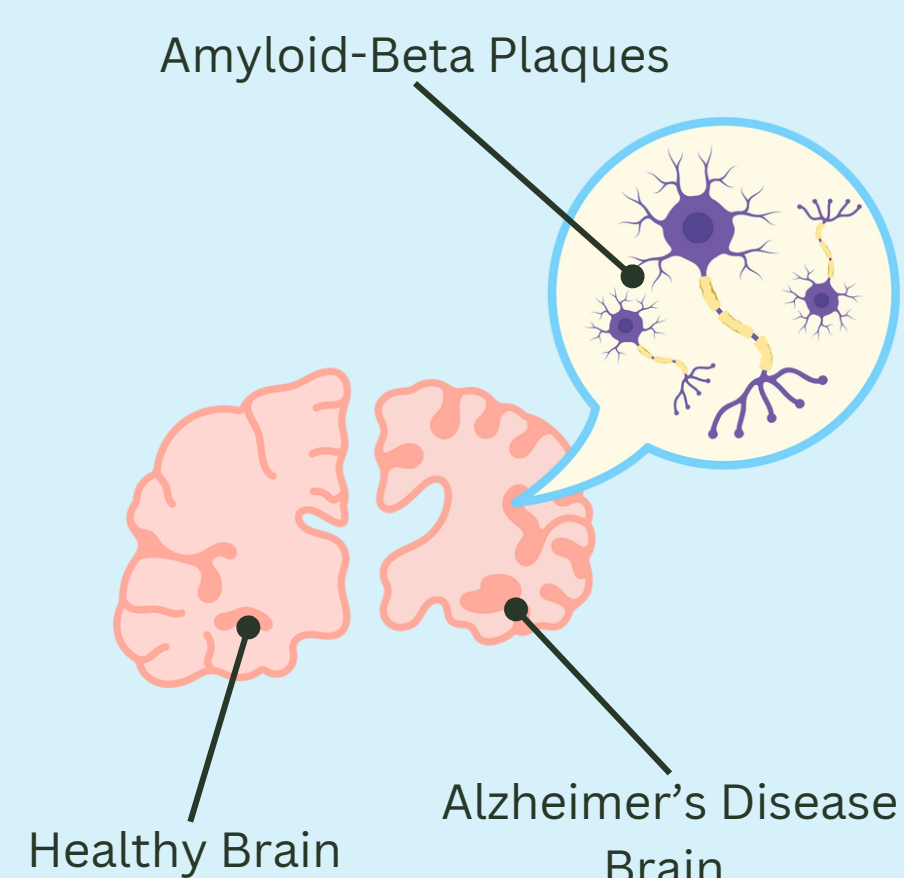
INTRODUCTION & AIM

Traditional biomarker: relies on invasive procedures, biomarker complexity and variability and often results in delayed or inaccurate diagnoses.

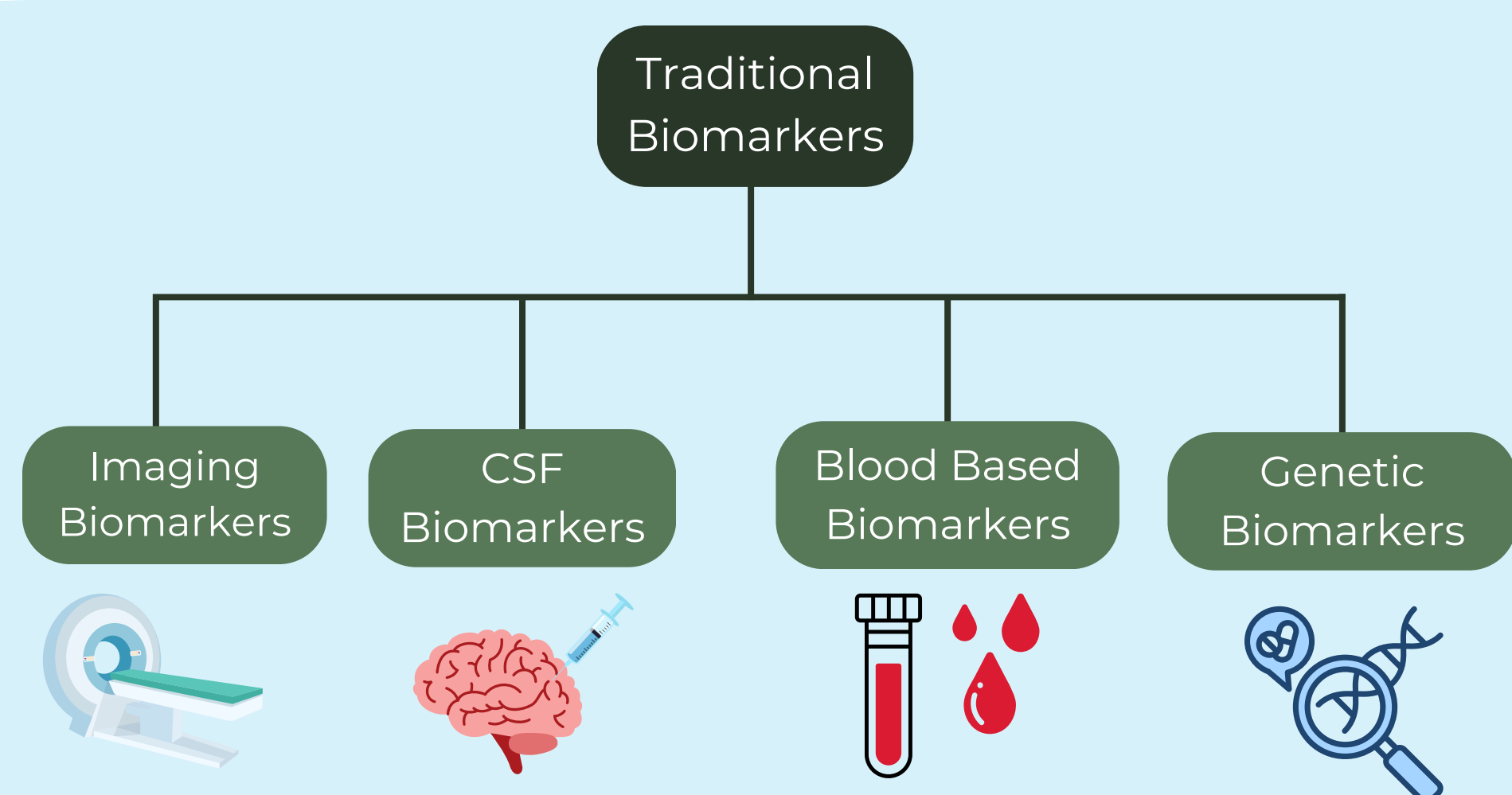
AI in biomarker analysis: analyze large, complex datasets efficiently and detect subtle patterns and correlations missed by traditional methods, can be used to improve biomarker analysis for earlier and more accurate AD diagnosis

Alzheimer's Disease

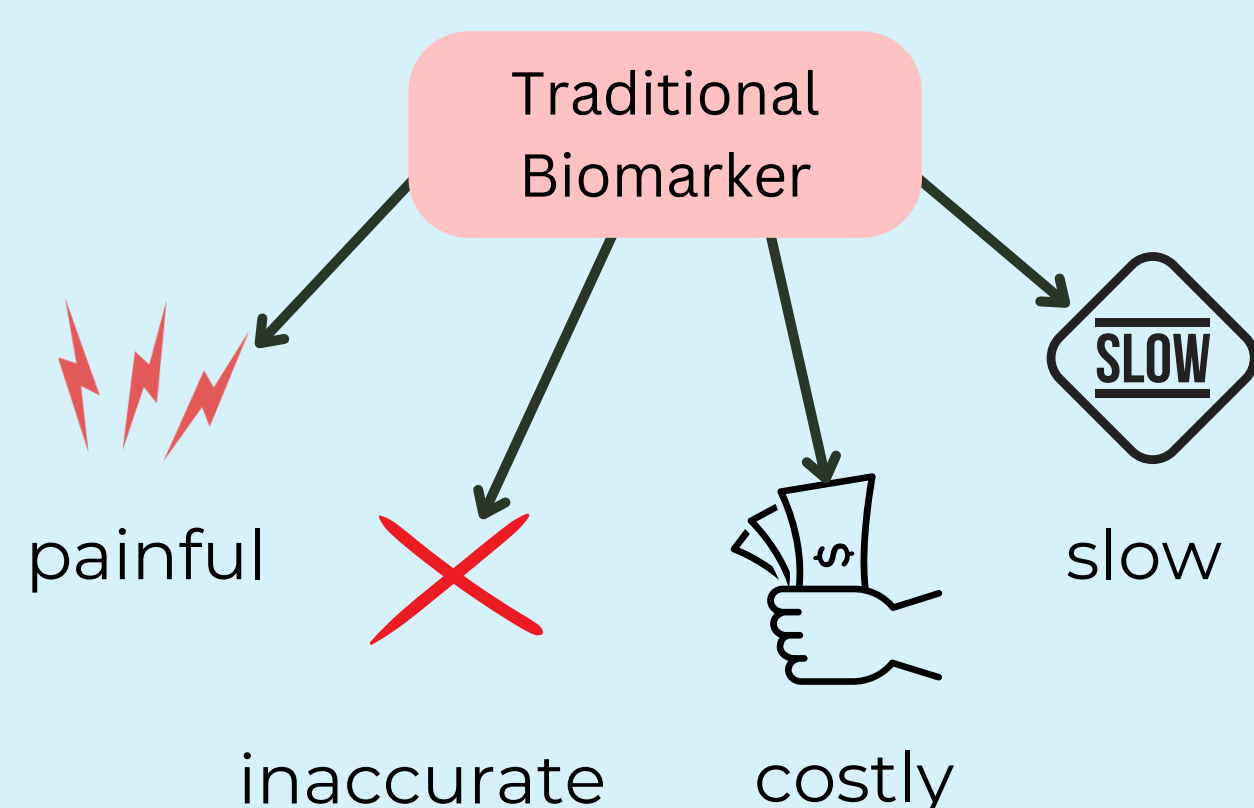
Progressive neurodegenerative disorder characterized by the gradual decline in cognitive functions, including memory, thinking, and reasoning.



BACKGROUND

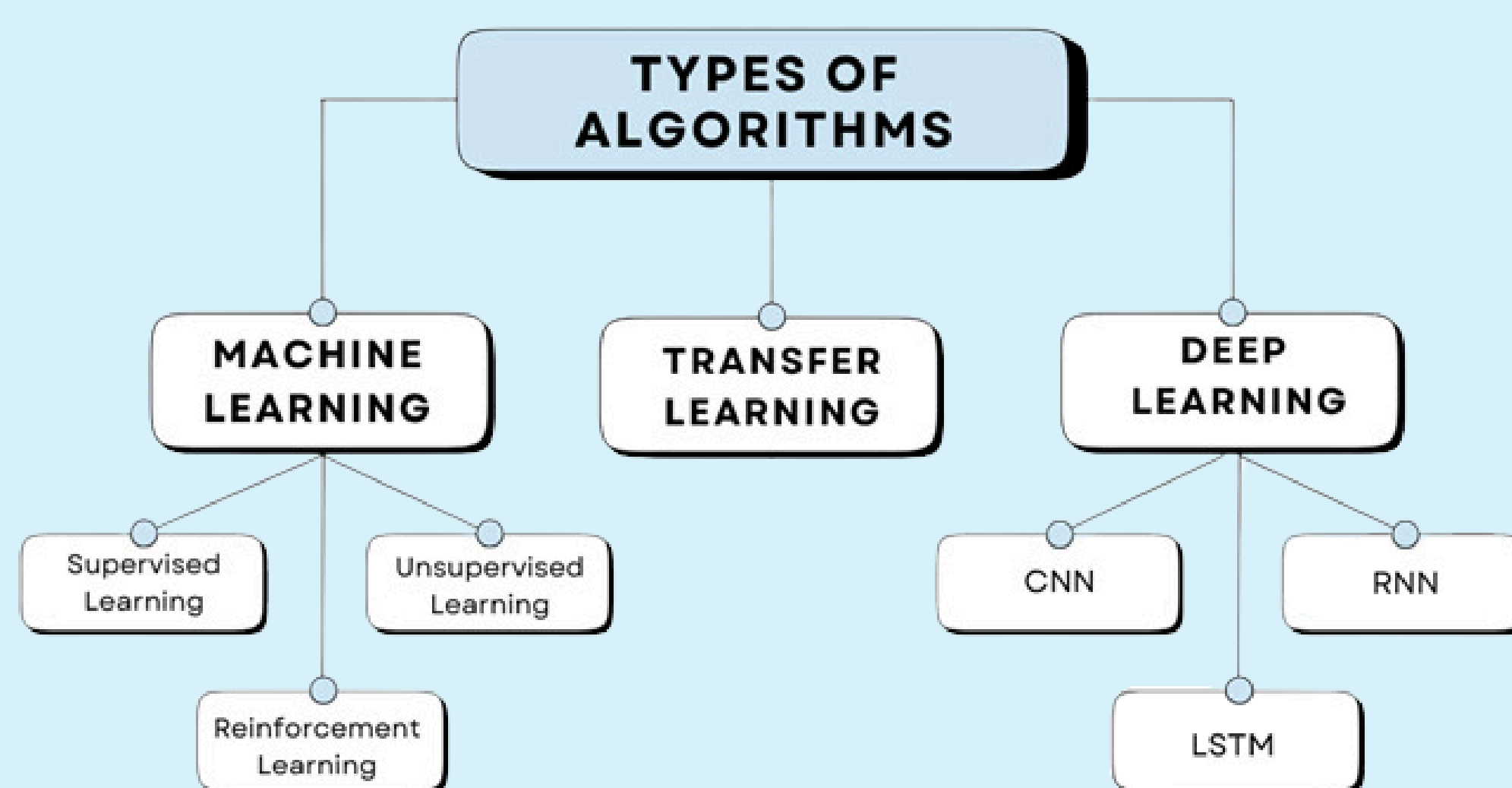


Biomarkers play a critical role in the diagnosis, prognosis, and management of AD. They provide measurable indicators of biological processes, enabling early detection and monitoring of disease progression.



RESULTS & DISCUSSION

AI has emerged as a transformative tool in healthcare, offering innovative computational techniques to analyze complex biomarker data with enhanced precision. AI algorithms can be used to improve biomarker analysis for earlier and more accurate Alzheimer's Disease diagnosis.



Imaging Modalities

MRI: VGG CNN; GMM and CNN Model; XGBoost and SVM ; Novel Biomarker based on MRI
PET: (InceptionV3) CNN; Ensemble Model; Imaging Analysis using CNN

CSF Biomarker

Amyloid-Beta (A β 42), Total Tau (t-tau), Phosphorylated Tau (p-tau)
Gaussian Mixture Models; Combination of Automated Assays and Unsupervised Learning

Blood-Based Biomarker

Amyloid-Beta (A β 42 and A β 40), Tau Proteins (t-tau and p-tau), Neurofilament Light Chain (NFL)
CNN on imaging blood samples; VGG-16 and InceptionV3; Regression models; Ensemble methods

Genetic Biomarker

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CNN; Supervised Learning Methods; Image Analysis using DL methods

CONCLUSION

Advancement of non-invasive technologies and generation of more data necessitates integration of AI in AD diagnosis. By combining AI techniques with non-invasive and invasive biomarker approaches, we can expect significant improvements in the early detection and diagnosis of AD.