# ALZHEIMER'S DISEASE

## Diagnosis Prediction

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# Scientific Problem

## Background

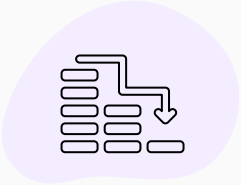
**Alzheimer's Disease**

- progressive neurological disorder
- severely impacts cognitive and functional abilities
- leading cause of disability and dependency in the elderly
- early and accurate diagnosis is crucial
- Traditional diagnostics – resource-intensive and subjective

# Our RESEARCH QUESTIONS/OBJECTIVES

## Predictive models for accurately diagnosing Alzheimer’s disease

ML techniques to develop a predictive model that was capable of accurately diagnosing Alzheimer’s based on a range of predictors

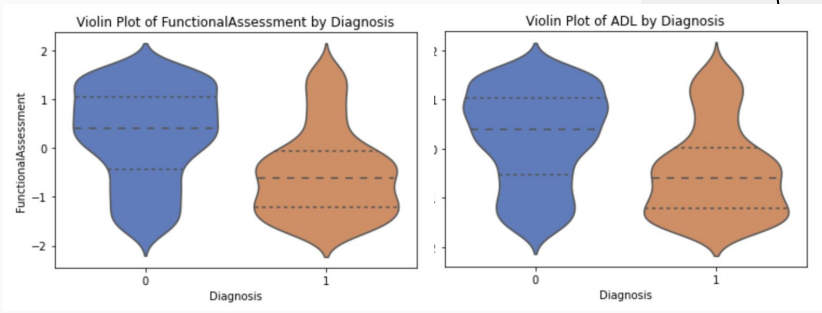


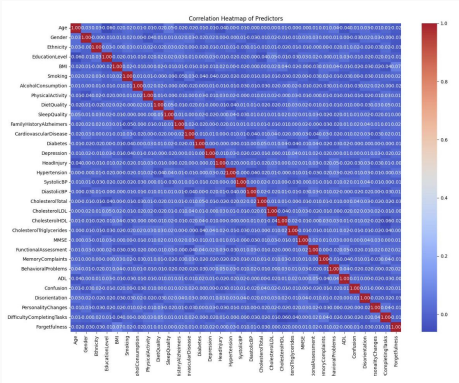
## Correlations between patient attributes and diagnostic outcomes

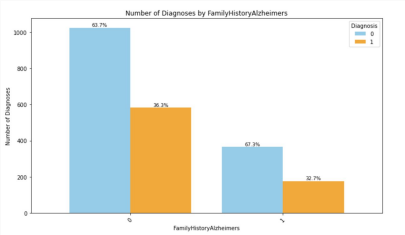
Investigate the relationships between patient attributes and Alzheimer’s diagnosis, to streamline the diagnostic process for Healthcare Professionals

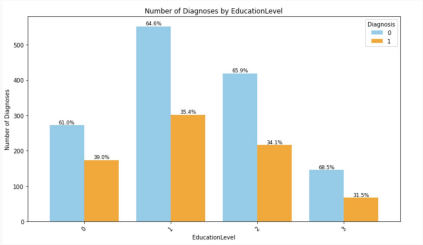
# Data

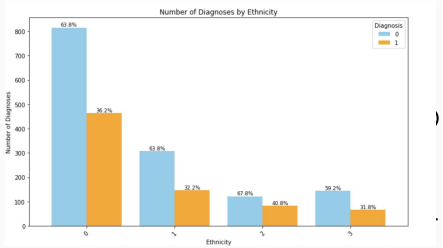
- **Dataset Size:** 2,149 patients with detailed health information
- **Predictors (32 Informative):**
  - Demographic details
  - Lifestyle factors
  - Medical history
  - Clinical measurements
  - Cognitive and functional assessments
  - Symptoms
- **Response Variable:** Binary Alzheimer's Disease diagnosis
- **Data Quality:**
  - No missing values
  - No multicollinearity (verified via heat map)
  - No abnormalities or outliers detected



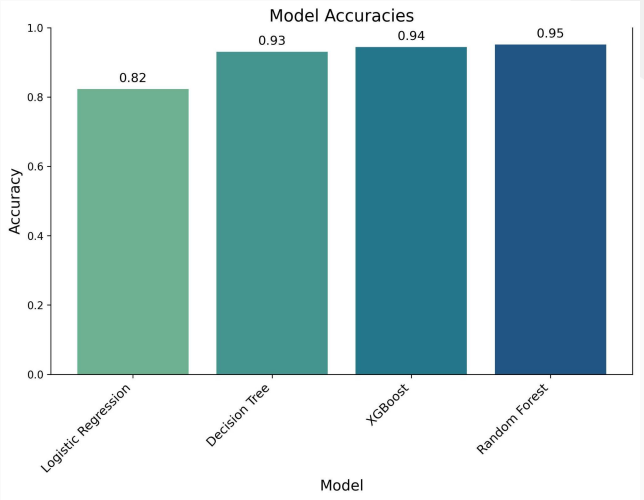



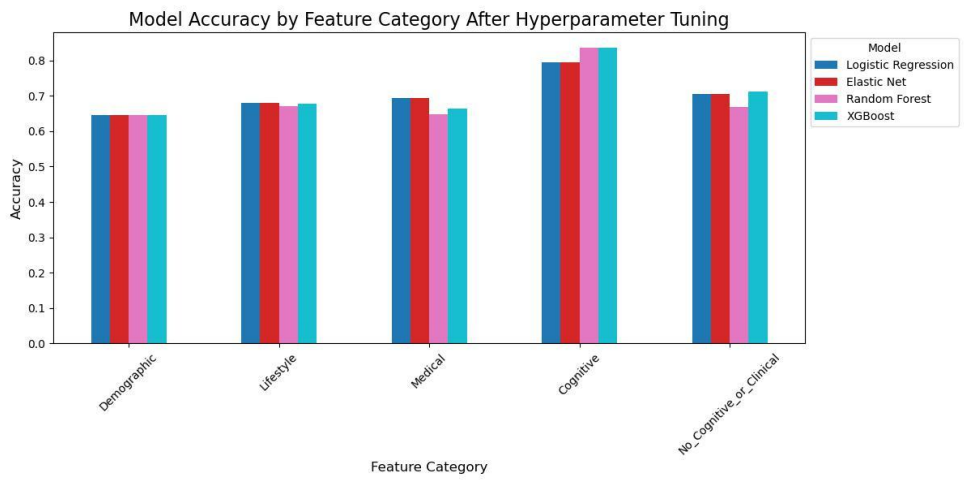



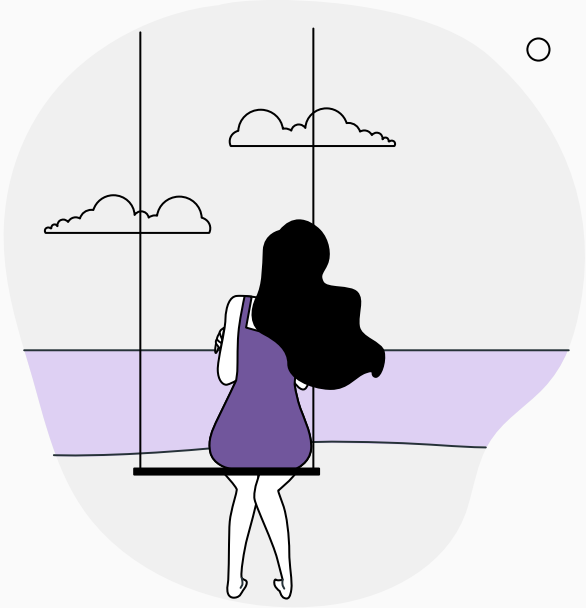
# ML Experiments

- **4 models:**
  - Logistic Regression
  - Decision Tree
  - XGBoost
  - Random Forest
- **Highest accuracy:** Random Forest had accuracy of 0.95
- **Categorized features into 4 buckets:** demographic, lifestyle, medical, and cognitive
  - Cognitive features had best prediction ability with an accuracy score of 0.8372 in XGBoost and Random Forest
  - Demographic, lifestyle, and medical had very similar predictive powers
- **Pre-diagnosis features:** only demographic, medical history, lifestyle, and symptoms
  - Accuracy score of 0.7116



# CONCLUSIONS



## 01. Alzheimer's Disease Diagnosis

Best model: Random Forest, 0.9535 accuracy

## 02. Early Alzheimer's Disease Detection

Pre-diagnosis model: XGBoost, 0.7116 accuracy

## 03. Furture Work and Prospects

Real-world validation using diverse populations over extended periods
Models with higher precision
Improved patient care and reduced societal and economic burden of Alzheimer's disease

## 04. What we learned

Collaboration and communication
Ethical considerations
A counterintuitive result: Age is not a significant factor

# Thank You!

## Questions?