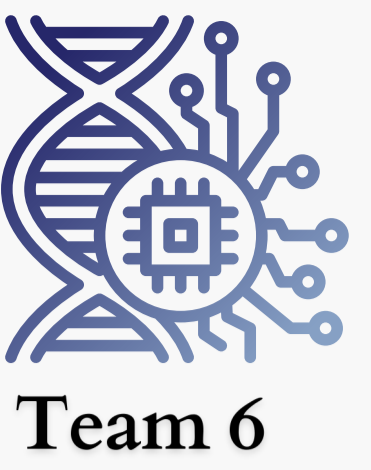


# Unveiling the Future of Parkinson's Detection



Harnessing the Power of Omics and Deep Learning for Early Biomarker Identification

Expert: Ali Mostafa, Dani Flinkman, Eleanor Coffey, Hergys Rexha, Sebastien Lafond, Ye Hong  
EDISS: Alaina Faisal, Ali Kaya, Ammara Asif, Joaquin Caballero, Umar Faruk Abdullahi

## Parkinson's Disease: A Silent Thief of Movement Without a Cure

Picture a world where movement is no longer fluid, where each step becomes a battle, and where the simple act of reaching for a loved one's hand becomes a Herculean task. This is the reality faced by millions of individuals living with Parkinson's disease every single day. And now, picture a world where we catch Parkinson's before it catches us, where its early detection preserves not just health, but also the promise of a brighter tomorrow for everyone.

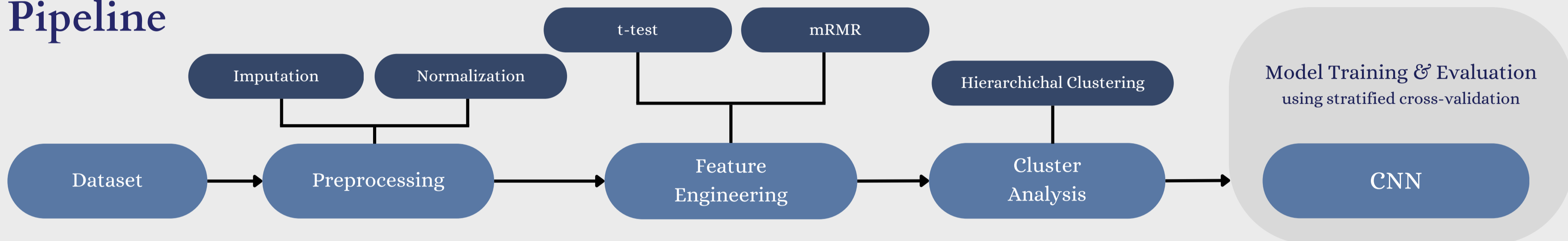


## Objectives

Leveraging machine learning techniques on omics data to identify disease biomarkers not only holds the potential to refine diagnostic capabilities but also to illuminate underlying pathophysiological mechanisms. We aim to:

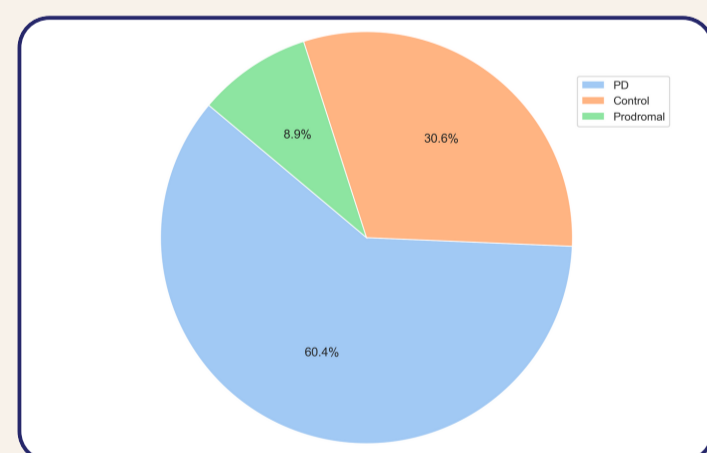
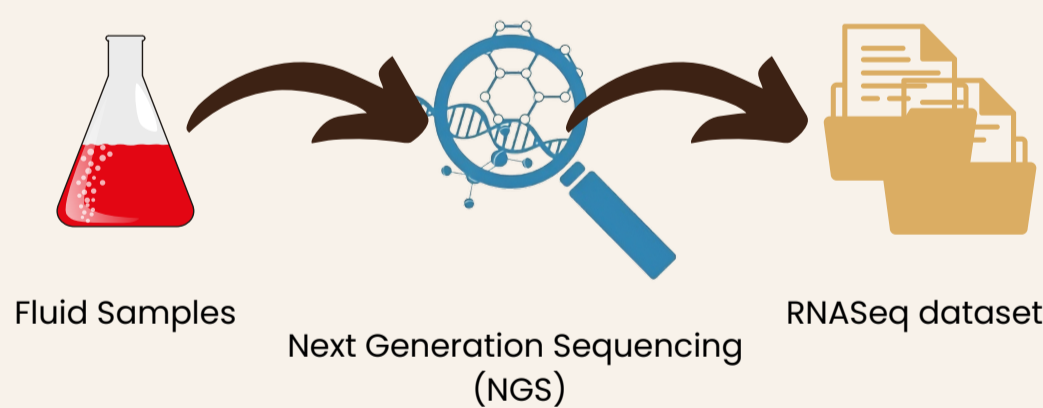
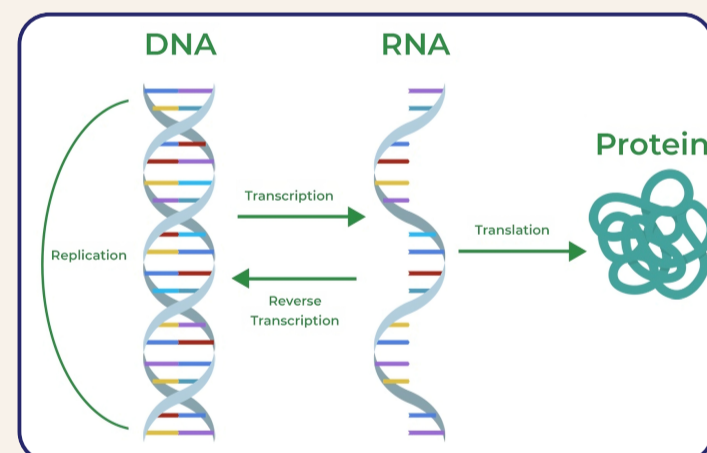
1. Develop a deep learning system for accurate Parkinson's disease diagnosis.
2. Utilize the created model to aid in identifying disease biomarkers, facilitating the understanding of underlying molecular signatures.
3. Establish a deep learning-based benchmark framework for proteomics research in Parkinson's disease detection.

## Pipeline



## Dataset

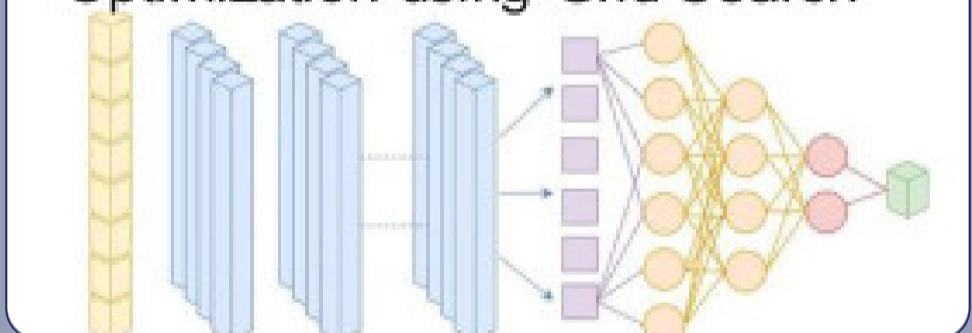
RNASeq data contains abundance values of RNA molecules from patient's biological samples. This enables researchers to profile the entire transcriptome of a cell or tissue at a given moment, providing information about the types and abundance of RNA molecules present.



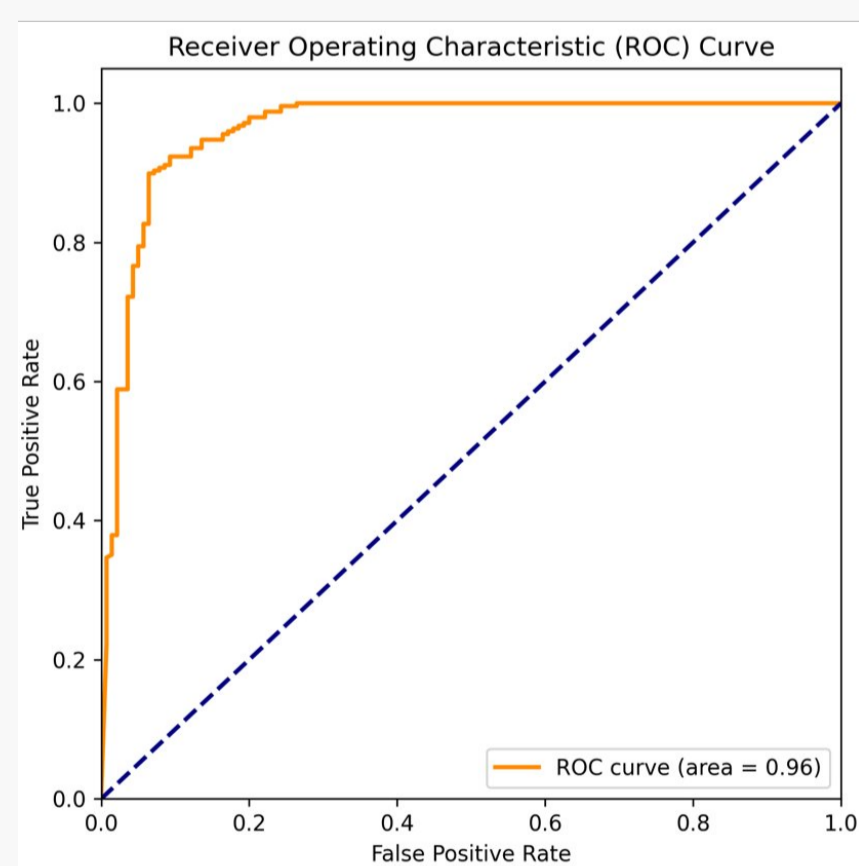
## Methodology

- Utilized a 1D CNN model with varied Conv1D layers for omics data decoding.
- Convolutional layers learn and extract hierarchical features from clustered biological input data.
- Fully connected dense layers integrate these extracted features to perform classification.

1D Convolutional Neural Networks Training and Parameter Optimization using Grid Search

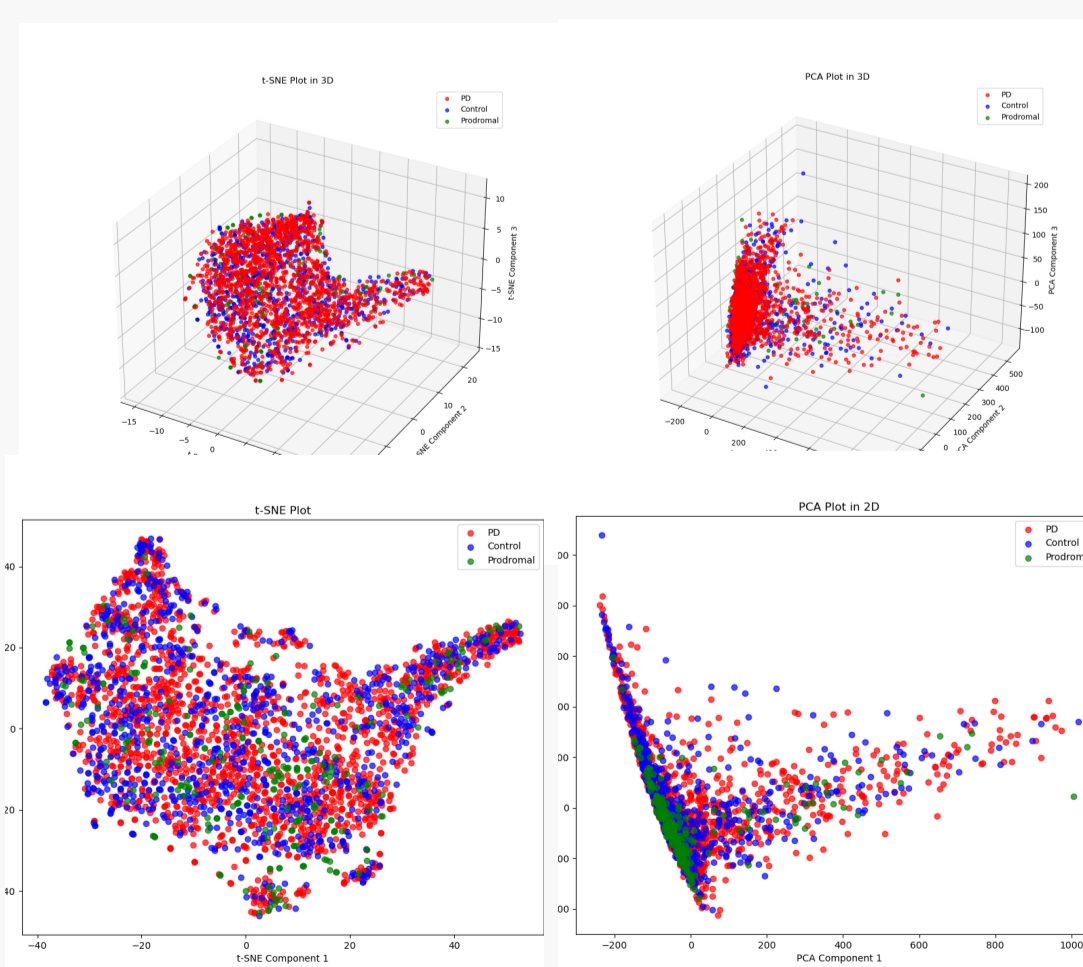


## Results



1D CNN with 93% accuracy employing this pipeline

## PCA & t-SNE



## Biomarker Identification

This study aims to unveil the molecular signatures unique to Parkinson's Disease, offering insight into its underlying mechanisms. Subsequent analysis of the results could elucidate potential biomarkers, contributing to diagnostic and therapeutic advancements.

