Univ.AI

Predicting the Risk of Alzheimer's Disease

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Motivation and About the Project

Our aim was to use neuroimaging data sets along with corresponding clinical & cognitive investigation findings from The Open Access Series of Imaging Studies (OASIS) to predict the CDR (Clinical Dementia Rating) for a given individual.

In addition we wanted to experiment with Ensemble Learning methods from our current module to leverage insights from more than one model.

Data and Labels

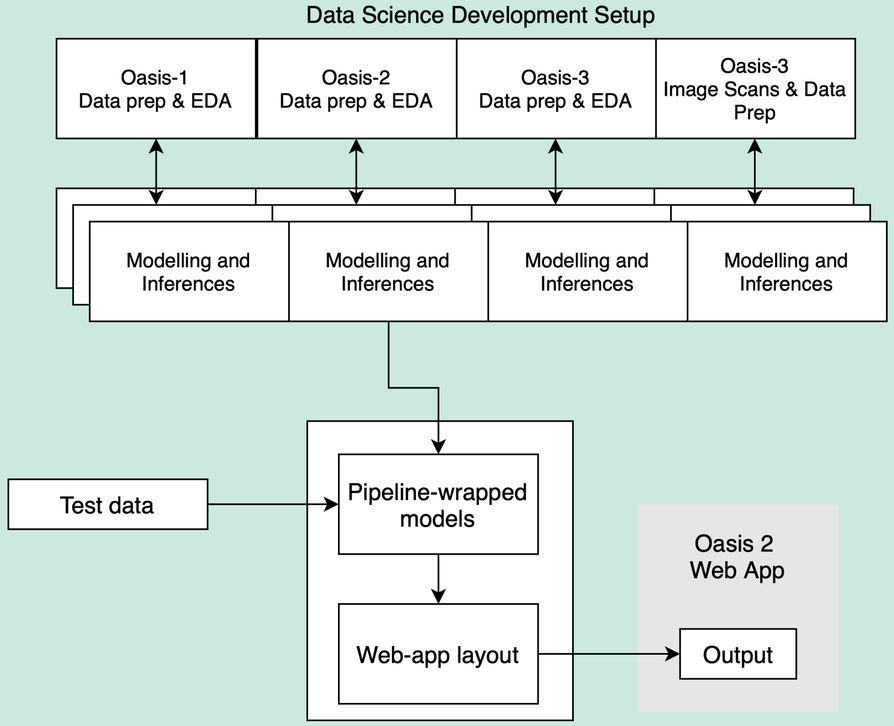
Between Oasis 1,2, and 3 we had access to : Cross-sectional MRI Data for control and affected groups,Longitudinal MRI Data and Longitudinal Neuro-imaging, Clinical, and Cognitive Dataset for Normal Ageing and Alzheimer's Diseases.

CDR was our target variable throughout.We tried to use pre processed MRI images (Snapshots from the PUP pipeline provided)

References

1. OASIS Datasets
2. XNAT Preprocessing Pipelines
3. ADRC Overall Specific Aims

Project Flow



Different Model architectures including but not limited to Decision Trees, AdaBoost, Neural Networks.

Results

We found that Neural Networks seem to weigh different parameters as more important than the other models (namely SES, Education and Race)

However our most interseting finding was that there is scope for leveraging demographic and cognitive testing information (paper pen tests) to predict CDR without relying on image data or numbers derived from them. This can be highly valuable as MRIs are time, money and resource expensive. Medical Imaging also reuires SMEs to label them correctly.

Conclusions and Future Work

Considering the complex nature of our data our Neural Networks (83% accuracy) did out perform other models in general but employing the Ensemble setup , our Web app allows our users to weigh different models separetely based on their specifc feature importance and ascertain a more well rounded prediction.

Future Scope includes leveraging 4d MRI information, expanding the scope by incorporating more datasets and using RNNs to account for temporal information. Both the longitudinal nature of the data and the temporal aspect of MRIs and FMRIs.