Cognify

Cloud-Based System for Detection of Alzheimer's Disease using Deep Learning on MRI Images

Josh Crotty

BSc (Hons) Software Systems Development

Bernard Butler | Bernard.Butler@setu.ie

Department of Computing and Mathematics

Abstract

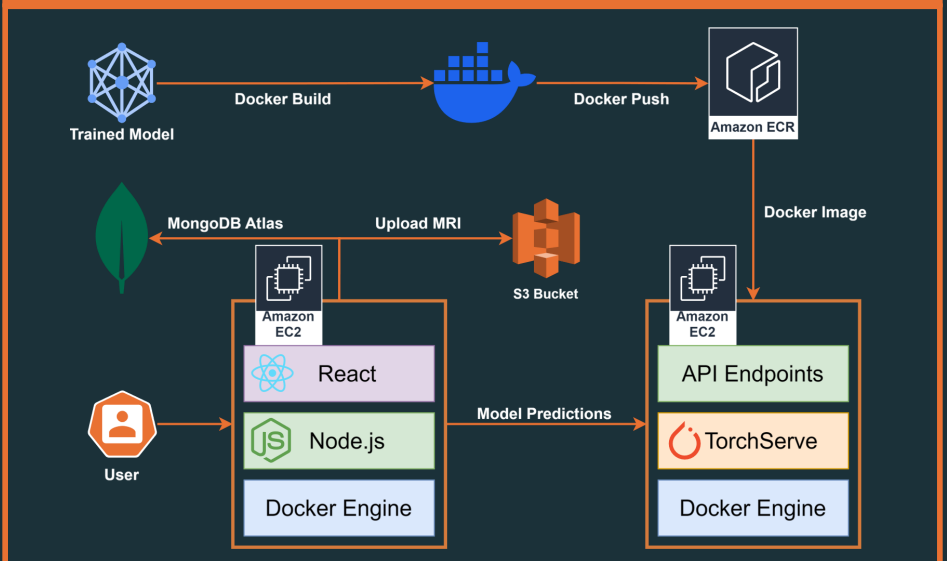
Cognify is a cloud-based AI system designed to analyse MRI images and detect signs of Alzheimer's Disease (AD) using deep learning. This system leverages Magnetic Resonance Imaging (MRI) to provide a diagnostic tool for researchers and healthcare professionals. Multiple models are trained, compared, and optimised using hyperparameter tuning. This project includes a web application that allows users to create patient profiles, upload MRI scans, and receive AI-driven analysis. The platform aims to assist in diagnosis, and enhance accessibility to deep learning models for professionals.

Methodology

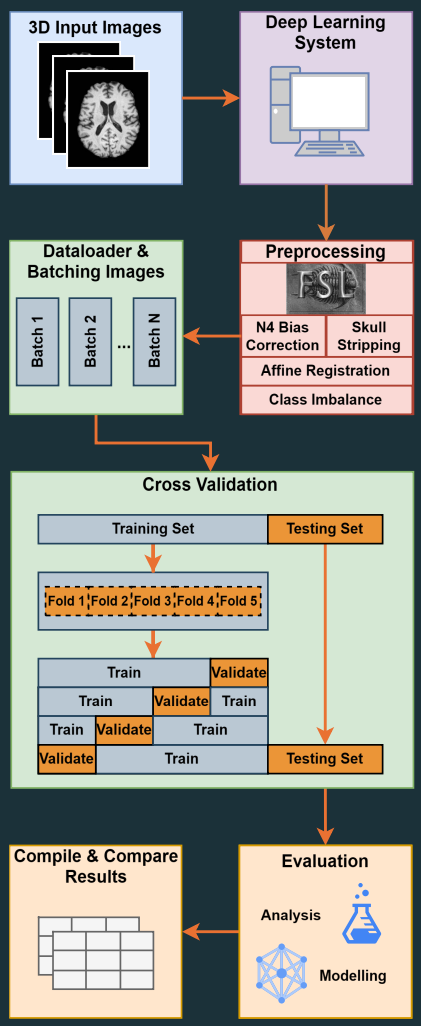
Cognify utilises the ADNI1 dataset from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database. A proper data preparation workflow was implemented to ensure fair comparisons between different deep learning models and configurations.

- **Data Access**: Request submitted in January 2024; access granted in May 2024
- **Preprocessing**: Applied Registration, N4 bias correction, skull stripping
- **Models**: Implemented ResNet, DenseNet, and SENet architectures
- **Resolution Analysis**: Compared performance across different input image resolutions
- **Evaluation**: Metrics include accuracy, precision, recall, AUC score

Platform Architecture



Workflow



Architecture	Accuracy	Precision	Recall	AUC Score
DenseNet-201	82.22	80.86	72.28	88.61
SENet	80.28	85.13	62.11	86.76
ResNet-50	76.25	75.63	61.05	79.76
ResNet-34	76.11	74.96	64.56	82.29

Technologies

PyTorch, Node.js, MONAI, matplotlib, MongoDB, jupyter, React, aws

Project

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