2024 Summer Research Project

Project title:	**Whole brain MRI features for Alzheimer's disease diagnosis using machine learning**
Project duration, hours of engagement & delivery mode	Duration of the project: 6 weeks Hours of engagement: 36 hrs per week Applicant will be required on-site for the project.
Description:	Our group recently developed NeuroMorphix, which is a machine learning based tool for evaluation of brain changes in diseases and disorders affecting the central nervous system. The tool takes as input brain parameters obtained using FreeSurfer, an MRI-based tool used commonly in neuroscience studies, and coverts them to whole brain features via the seven NeuroMorphix equations. Machine learning methods are then applied to establish the relevance of each of the whole brain features with respect to the disease based on NeuroMorphix feature ranking. This summer project will use the NeuroMorphix framework and evaluate it in Alzheimer's disease. The goal of the project is to identify the whole brain markers relevant to diagnosis, and those which can establish the severity of the disease. The dataset needed for this project is publicly available through the Alzheimer's Disease Neuroimaging Initiative (ADNI).
Expected outcomes and deliverables:	The primary expected outcome of this project is the evaluation of NeuroMorphix for use in Alzheimer's disease. Findings from the research may eventually be presented at a conference, and/or published as part of a manuscript. The student will be expected to implement methods, analyse their data, and present their work as a written report and oral presentation.
Suitable for:	This project is open to applications from students with a background in machine learning and computer vision or pattern recognition. Experience in programming is essential for this project. Participants should be familiar with Python syntax, data structures, and common libraries used for data preparation, such as Pandas and NumPy. Prior exposure to popular deep learning frameworks (TensorFlow or Pytorch) would be helpful.
Primary Supervisor:	Associate Prof Viktor Vegh
Further info:	Please contact Viktor Vegh (v.vegh@uq.net.au) from the Centre for Advanced Imaging (AIBN, UQ) if you would like to discuss this project in detail and whether you meet the project requirements.