

2024 Summer Research Project

Project title:	Developing a deep learning model for brain magnetic resonance image harmonisation
Project duration, hours of engagement & delivery mode	Duration of the project: 6 weeks Hours of engagement: 36hrs per week <i>The applicant should be on-site for the project.</i>
Description:	<p>The aim of this project is to employ deep learning methods for harmonisation of brain magnetic resonance images collected from multiple sites using different scanners.</p> <p>Magnetic resonance imaging (MRI) is a non-invasive tool for visualisation of the soft tissue and is being widely used in range of applications including neurological disease diagnosis, structural abnormality detection, tumour segmentation, etc. Advances in deep learning models demonstrate a great potential for improving the detection of mild structural abnormalities in the brain in early stages of different types of neurological diseases. However, application of existing deep learning-based lesion detection models in real clinical settings across multiple sites has been hindered by the large degree of differences in scanner and acquisition dependent texture in the acquired MRI scans from multiple sites using different scanners. In this project, the student will develop a deep learning model to eliminate scanner dependent texture in MRI scans collected across multi-sites.</p> <p>The data for this study would be available through the Alzheimer's Disease Neuroimaging Initiative (ADNI), which is an open data repository collecting multi-site MRI scans from healthy volunteers and patients.</p>
Expected outcomes and deliverables:	<p>Scholars will have the opportunity to:</p> <ul style="list-style-type: none"> • engage and interact with a multidisciplinary team of researchers with expertise in developing machine learning models, medical image analysis and computational neuroscience. • gain skills in medical image analysis and applied machine learning in medical imaging. • potentially generate publications from their research. • learn about a wide range of other research projects that are undergoing at the Centre for Advanced imaging and identify the field of research they might be interested to follow. <p>Students may also be asked to produce a report and present their work at the Centre for Advanced Imaging (CAI) at the end of their project.</p>
Suitable for:	<p>This project is open to applications from students with a background in machine/deep learning.</p> <p>Experience in programming is essential for this project. Participants should be familiar with Python programming, 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.</p>

Primary Supervisor:	Dr Shahrzad Moinian
Further info:	Please contact Shahrzad Moinian (s.moinian@uq.edu.au) from the Centre for Advanced Imaging (AIBN, UQ) if you would like to discuss this project in detail and whether you meet project requirements.