NANYANG TECHNOLOGICAL UNIVERSITY
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School of Computer Science and Engineering
College of Engineering

Deep Learning for Segmentation

of Ischemic Stroke Lesions from MRI scans

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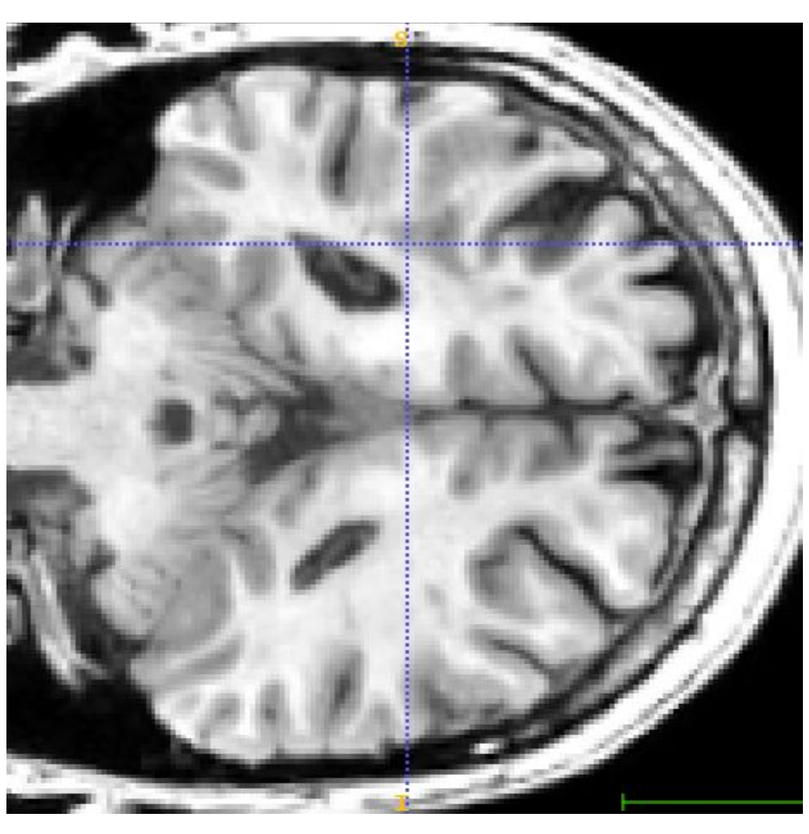

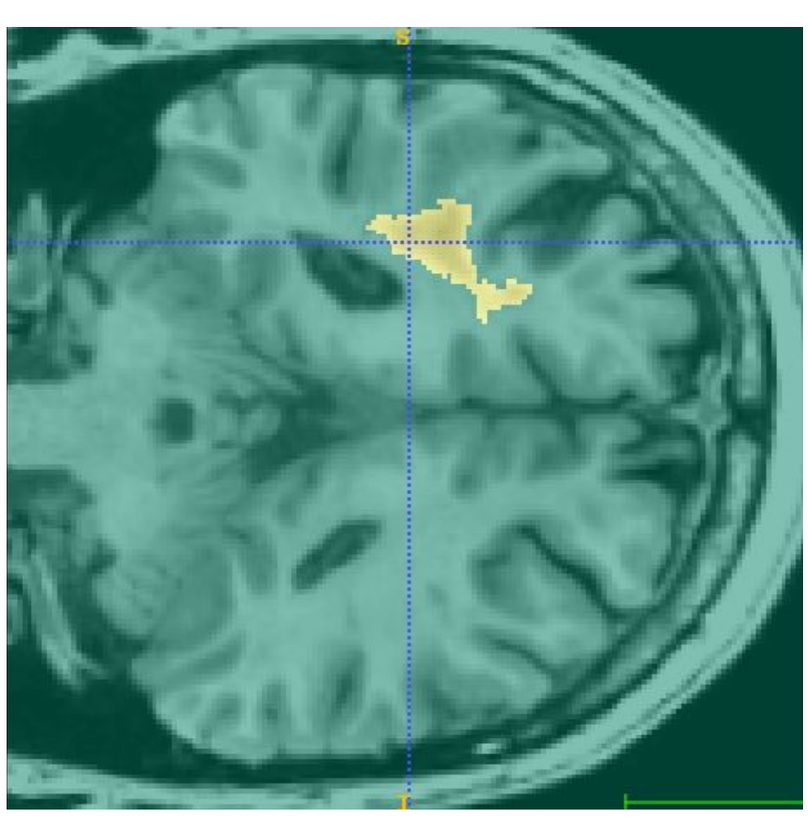

Project Objectives:

Ischemic strokes could be life threatening and magnetic resonance imaging (MRI) scans are widely used by doctors to diagnose them. However, manual segmentation of MRI images of ischemic stroke lesions is an arduous and time-consuming task which, thus far, can only be accomplished by professional neuroradiologists. Therefore, an automatic and robust ischemic stroke lesion segmentation using deep learning will have a significant impact on ischemic stroke diagnosis and treatment.

Convolutional Neural Networks (CNN) such as U-Net have been extensively used for medical image segmentation tasks. However, CNNs have limitations in learning global feature representations in images due to their local receptive fields. This prompted researchers to look at other methods to improve the modelling of global dependencies. In recent years, transformer-like architectures with self-attention mechanisms for modelling long-range dependencies have shown better performance than CNN-based architectures in computer vision applications.

In this project, we will explore using transformer-like architectures in U-Net for ischemic stroke lesion segmentation. However, transformers need large labelled datasets for training to perform well and therefore, we will explore self-supervised network pre-training to tackle this issue.