NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

3D Multi-Modality Medical Image Registration

with Synthetic Data Augmentation Using CycleGAN

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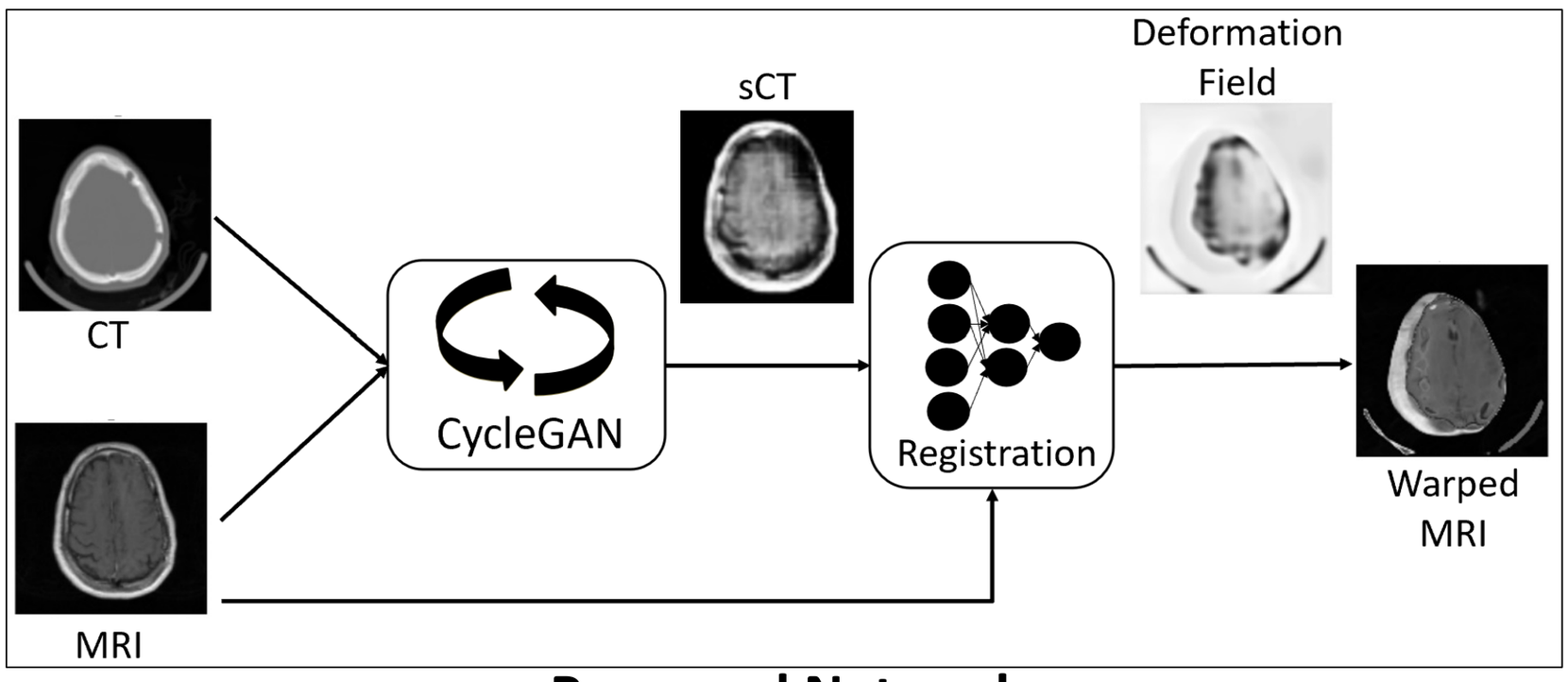
Background and Project Objective

Medical Image registration is an essential task that has many applications in diagnosis and treatment. The principal objective of this project is to perform unsupervised 3D multi-modality image registration on a given pair of MRI and CT volumes.



Proposed Network

Approach

The registration is carried out by learning a deformation field which represents the displacement between voxels of the fixed and moving images. Data augmentation using CycleGAN is used to generate synthetic data that aims to promote the deformation field learning process. An auxiliary Mutual Information loss is also added to be jointly optimized with the Mean Squared Error loss to improve the learned deformation field.

Results

The proposed network achieved better results in terms of Mutual Information than current state-of-the-art methods such as VoxelMorph and Synthetic Normalisation (SyN) registration.