

Data Completion for MRI Tumour Segmentation

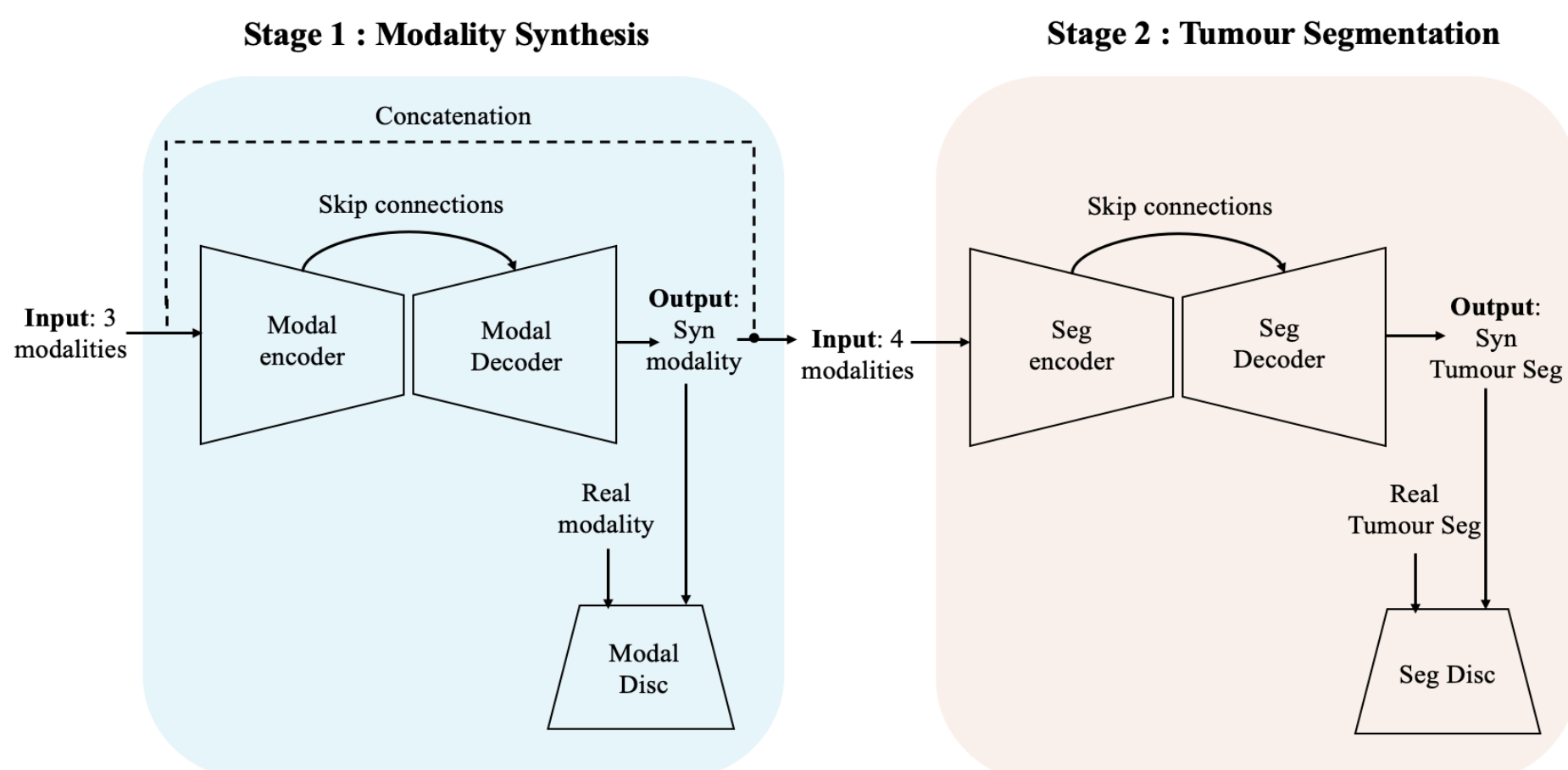
3D Cascaded GAN for modality synthesis & tumour segmentation

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Project Objectives

Multiple MRI modalities are extensively used for tumour segmentation as they provide information variability and image diversity. However, in practice, it is frequent that some modalities are missing due to varying imaging protocols and image corruption. Rather than re-acquiring all patient modality images as a complete set, it is more feasible to use the patients' existing modalities to synthesise the missing modalities and use the complete data for tumour segmentation. We propose a novel 2-stage generative adversarial network for missing modality synthesis and tumour segmentation.

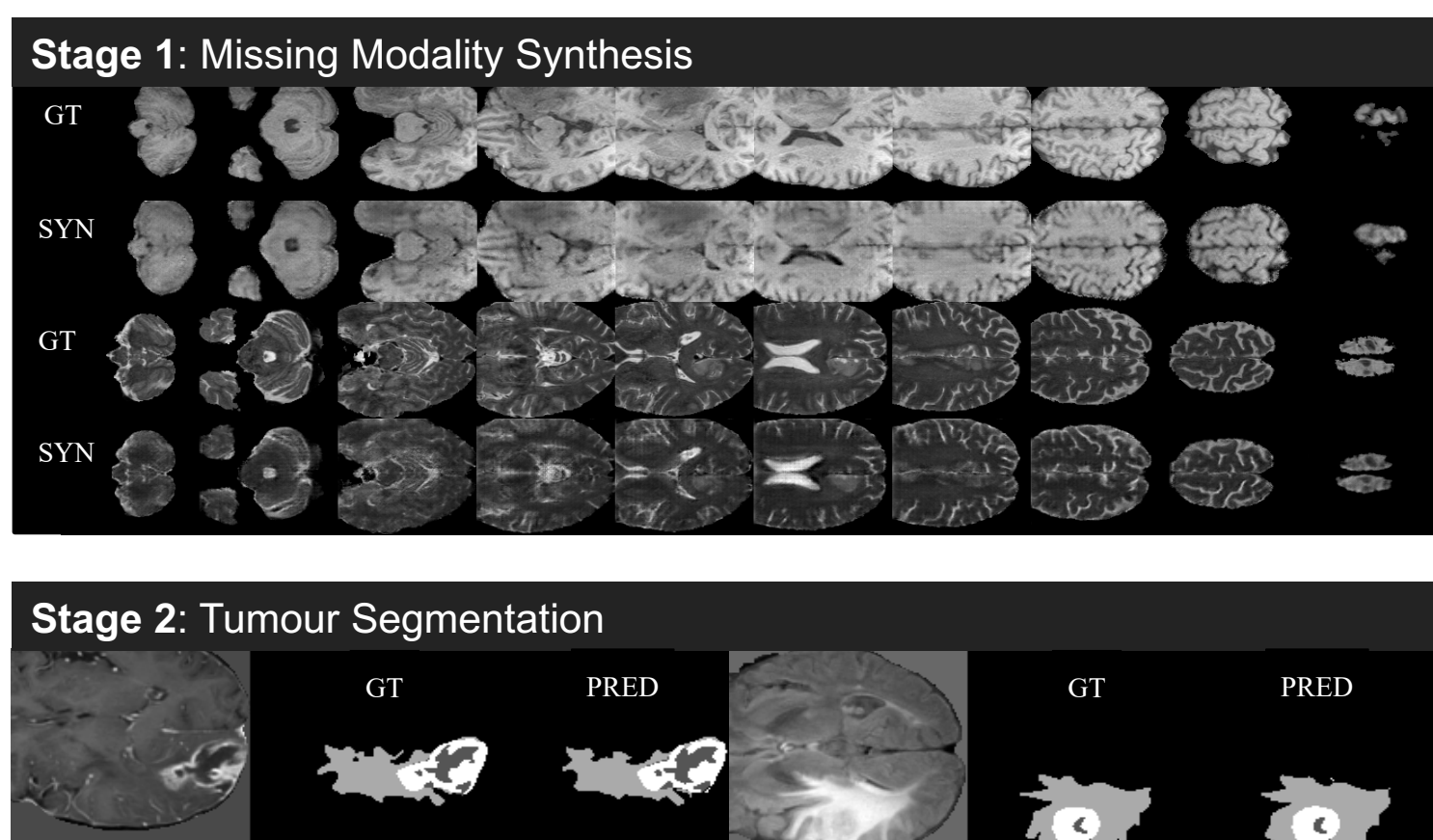


Novelty

- Proposed tumour segmentation model can handle missing modalities
- Multimodal (3-to-1) image translation for missing modality synthesis
- 3D images as input data

Experiments and Results

Experiments with missing modalities were run with the proposed model and comparison experiments with the same missing modality were run using existing CNN and Pix2Pix models. The proposed model achieves significantly higher dice scores than both comparison models for all experiments proving the success of the 2-stage proposed network in tumour segmentation.



Missing Modality	Experiments		
	3-to-1 CNN	3-to-1 Pix2Pix	Proposed Model
T1	0.4946	0.7945	0.8431
T2	0.6844	0.8134	0.8505
T1ce	0.5426	0.6487	0.6804
FLAIR	0.4372	0.8242	0.8432