Snigdha Sen

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PRINCIPAL INTERESTS

Deep learning, with a particular interest in self-supervised learning. Computational image analysis, mathematical modelling and wider healthcare applications of machine learning.

ACADEMIC BACKGROUND

Ph.D. AI-Enabled Medical Imaging 2021 - Present
Department of Computer Science, University College London

- Supervised by Dr. Laura Panagiotaki
- Working thesis title: Non-invasive Microstructural Parameter Estimation with Deep Learning for Prostate Cancer

MRes Medical Imaging 2020 - 2021
Department of Medical Physics and Biomedical Engineering, University College London

- Supervised by Dr. Laura Panagiotaki
- Thesis: An Investigation into False Positive Cases of Prostate Cancer using VERDICT-MRI and Deep Learning
- Grade: Distinction

MPhys Physics with Theoretical Physics 2016 - 2020
Department of Physics, Imperial College London

- Supervised by Prof. Kim Christensen
- Thesis: A Complexity Science Approach to Epilepsy
- Grade: 2.1

PROJECTS

Automated Cancer Grade Detection Current
University College London

- Developing a two-fold deep learning approach using convolutional neural networks (CNNs) to fit a diffusion MRI signal model and predict Gleason grades from the resulting parameter maps

Deep Learning Model Selection Current
University College London

- Creating diffusion MRI signal models to describe cancers in kidney and breast, using deep-learning based model selection to find the best fit to the data
- Preliminary work on kidney submitted to *International Society for Magnetic Resonance in Medicine (ISMRM)* 2024

Self-Supervised Model Fitting 2022 - 2023
University College London

- Developed a method to fit diffusion MRI signal models to data using self-supervised learning, to reduce bias in model predictions
- Work presented at *ISMRM* 2023 and submitted to a journal, with a preprint on arXiv, and extending to a full software package to flexibly fit any signal model with a range of network architectures

QuaD22 Challenge, MICCAI: White Matter Focused Diffusion MRI Reconstruction with Deep Learning 2022
University College London

- Trained a voxelwise neural network to learn a subset of a full dataset by progressive subsampling, to investigate differences between chronic and episodic migraine patients
- Work presented at *ISMRM* 2023 and published in *Neuroimage Clinical*

False Positive Cases of Prostate Cancer on Mp-MRI 2021 - 2022
University College London

- Used a voxelwise neural network to differentiate between healthy tissue, benign prostatic diseases and clinically-significant cancer with a range of diffusion MRI models
- Work presented at *ISMRM* 2022 and published in *Diagnostics*

Segmentation of Prostate Ultrasound using CNNs 2021
University College London

- Built a U-Net neural network to predict a class probability map for binary segmentation of prostate ultrasound images

EMPLOYMENT HISTORY

Postgraduate Teaching Assistant 2021 - Present
University College London

- Teaching assistant for Department of Computer Science Masters modules: Introduction to Machine Learning, AI for Biomedicine and Healthcare and Computational Modelling for Biomedical Imaging

Cloud Infrastructure Intern 2019
Macquarie Group

- Member of the infrastructure automation team. Used a variety of DevOps tools such as Ansible, Packer, Bamboo and Git, as well as learning Golang

SELECTED PUBLICATIONS

1. Sen, S et al. ssVERDICT: Self-Supervised VERDICT-MRI for Enhanced Prostate Tumour Characterisation *arXiv*, September 2023
2. Sen, S et al. Self-Supervised Model Fitting of VERDICT MRI in the Prostate *ISMRM*, June 2023
3. Sen, S et al. Differentiating False Positive Lesions from Clinically Significant Cancer and Normal Prostate Tissue Using VERDICT MRI and Other Diffusion Models, *Diagnostics*, July 2022
4. Sen, S et al. VERDICT-MRI Analysis of False Positives in Prostate Mp-MRI *ISMRM*, May 2022

PRESENTATIONS, AWARDS AND ACTIVITIES

1. UCL Cancer Symposium 2023 ECR Invited Speaker: *Deep Learning with MRI for Prostate Cancer*
2. ISMRM Trainee (Educational) Stipend recipient 2022, 2023
3. Instigator and lead organiser of a department-wide Hackathon in 2022 and 2023
4. CUBRIC Cardiff Hackathon 2022 participant

SKILLS

1. Coding languages: Python, MATLAB, Golang, C++
2. Software: PyTorch, Tensorflow, Linux, GitHub