

SenSIP Seminar Series

An L_2 -Normalized Spatial Attention Network For Accurate And Fast Classification Of Brain Tumors In 2D T1-Weighted CE-MRI Images

Presenter: Grace Billingsley, Undergraduate in BME

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Abstract

We propose an accurate and fast classification network for classification of brain tumors in MRI images that outperforms all lightweight methods investigated in terms of accuracy. We test our model on a challenging 2D T1-weighted CE-MRI dataset containing three types of brain tumors: Meningioma, Glioma and Pituitary. We introduce an l_2 -normalized spatial attention mechanism that acts as a regularizer against overfitting during training. We compare our results against the state-of-the-art on this dataset and show that by integrating l_2 -normalized spatial attention into a baseline network we achieve a performance gain of 1.79 percentage points. Even better accuracy can be attained by combining our model in an ensemble with the pretrained VGG16 at the expense of execution speed. Our code is publicly available at https://github.com/juliadietlmeier/MRI_image_classification.

Biography:



Grace Billingsley is currently an undergraduate honors student in Biomedical Engineering with a specialization in Biological Devices at Arizona State University. In addition to her engineering pathway, she is currently studying as a pre-medical student to become a Doctor of Osteopathic medicine and pursuing an undergraduate thesis focused on transforming healthcare models in the United States. Grace was a student in the 2022 NSF IRES program in conjunction with the ASU SenSIP Center and Insight SFI Research Centre for Data Analytics at Dublin City University. Her paper will be presented at the 2023 IEEE International Conference on Image Processing in October. Her research interests include medical image processing, machine learning, prosthetics, and regenerative medicine.

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