Classifying Resting and Task State Brain Connectivity Matrices Using Graph Convolutional Networks

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Submitter Michael Craig

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Presentation Abstract Summary The past few years has seen an increase in use of graph theoretical measures to study brain connectivity during task execution. One thread of research in this area has focused on using these measures to identify graph characteristics associated with various cognitive states. Our work expands on previous findings by applying graph convolutional networks (GCN) to distinguish between whole brain graphs during resting state or during task execution. GCNs use tools from spectral graph theory to generalize traditional convolutional neural networks (CNN) to be applied to high-dimensional data represented by graphs such as brain connectomes. We found that GCNs were able to distinguish between two cognitive states, resting state and an attentionally demanding stop signal task, with a high degree of accuracy (mean = 73.59%). This work suggests that GCNs are capable of identifying the underlying features important for discriminating between resting and task states.

Co-author Information

* Presenting Author

First Name	Last Name	Affiliation	E-mail
Michael *	Craig *	University of Cambridge	mmc57@cam.ac.uk
Ioannis	Pappas	University of Cambridge	ip322@cam.ac.uk
Stefan	Winzeck	University of Cambridge	sw742@cam.ac.uk
Lydia	Vinals	University of Cambridge	lv288@cam.ac.uk
David	Menon	University of Cambridge	dkm13@cam.ac.uk
Emmanuel	Stamatakis	University of Cambridge	eas46@cam.ac.uk

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