Seminar

Of pipelines, networks and solutions: analysis methods to understand imaging data from the human brain

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The advent and use of imaging technologies – functional Magnetic Resonance Imaging (fMRI), Magnetoencephalography (MEG), Electroencephalography (EEG) - has made it possible to non-invasively observe human brain cognitive function, particularly over the last two decades. These developments in instrumentation have also stimulated development of analysis methods to understand the data. However, while the fMRI community has established standardised pipelines/procedures to analyse the data, this has not yet been the case for the EEG/MEG community. In response to this need, we have developed three pipelines to address different types of EEG/MEG analysis:

1. Cluster analysis of ensembles of ERP (event-related potentials) single-trials
2. Revealing functional networks in MEG resting-state data
3. Modelling of time-varying functional networks defined from EEG task-related data

These pipelines will be introduced and their validation on simulated and experimental data will be described. Next, I will draw out some limitations of the above pipelines due to their data-driven nature and argue for the use of model-based methods as a more informative way to analyse EEG/MEG data. However, currently available model-based methods also do suffer from some limitations. Hence, to conclude, I will mention some directions in which model-based method development should proceed, and chart the beginning of a roadmap to be completed before these methods might clearly reveal the neural implementation of cognition.

Tuesday, Dec 16th 2014

11:30 AM (Tea/Coffee at 11:15 AM)

Seminar Hall, TCIS