Dimension reduction techniques in the field of brain imaging

**Supervisors:** Simon White

**Location:** MRC Biostatistics Unit, University of Cambridge

**Detailed description:** Modern brain scanning technologies, such as functional magnetic resonance imaging (fMRI), generate extremely detailed images of each individual. A growing area of research concerns linking neuro-imaging data with cognitive and behavioural measures to better understand how changes in the brain relate to cognitive changes.

The high dimensionality of the imaging data presents many issues for analysis, not least the large computational burden. Although there is a large amount of variability between subjects it is believed that the variability of interest can be considered in a smaller sub-space with a much lower dimension. Dimension reduction techniques transform the original data on to a lower dimension space, our question of interest is then what information and features are lost or preserved under these transformations.

Using imaging data from a large collaborative study (Cam-CAN, http://cam-can.org/), this project will build on existing dimension reduction techniques currently used in the field of neuro-imaging, such as principal component analysis (PCA) and independent component analysis (ICA). The project will then proceed to consider extensions to include cognitive outcomes, addressing issues of computation and complexity of interpretation, and develop generalisable implementations for application in the neuro-imaging field.

**Start date:** Michaelmas Term 2018

All application queries regarding eligibility should be directed to phdstudy@mrc-bsu.cam.ac.uk

**How to Apply:** Applications should be made on-line via www.graduate.study.cam.ac.uk/applicant-portal selecting course details MDBI22 PhD in Biostatistics

**Deadline for applications:** 4th January 2018