

سمینار هفتگی گروه آمار

Statistical Analysis of fMRI data: challenges, pitfalls, and prospects

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Abstract

In the last twenty years, functional magnetic resonance imaging (fMRI) has become a popular tool for understanding the human brain. Neuroscientists and physicians carry out fMRI experiments to precisely determine which parts of the brain is active for critical functions such as thinking, speech, motion, sensation, and/or attention. This is usually done to assess the effects of stroke, trauma or degenerative diseases (such as Alzheimer's Disease) on brain function, and to monitor the growth and the activity of brain tumor regions for pre-surgical planning, radiotherapy or other surgical treatments of the brain.

After designing an fMRI paradigm, running the experiment, and collecting the data, various analysis steps must be applied on the resulting data before answering the questions of neuroscientists and physicians about the brain activities corresponding to the stimuli. A standard fMRI study gives rise to massive amounts of noisy data with a complicated spatio-temporal correlation structure. Statistics plays a crucial role in understanding the nature of the data and obtaining relevant results that can be used and interpreted by neuroscientists. In this talk, I will discuss the analysis of fMRI data, from the initial acquisition of the raw data to its use in locating brain activity, making inference about brain connectivity and predictions about psychological or disease states