

空间独立成分分析实现fMRI信号的盲分离

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独立成分分析(ICA)在功能核磁共振成像(fMRI)技术中的应用是近年来人们关注的一个热点。简要介绍了空间独立成分分析(SICA)的模型和方法,将fMRI信号分析看作是一种盲源分离问题,用快速算法实现fMRI信号的盲源分离。对fMRI信号的研究大多是在假定已知事件相关时间过程曲线的情况下,利用相关性分析得到脑的激活区域。在不清楚有哪几种因素对fMRI信号有贡献、也不清楚其时间过程曲线的情况下,用SICA可以对fMRI信号进行盲源分离,提取不同独立成分得到任务相关成分、头动成分、瞬时任务相关成分、噪声干扰、以及其它产生fMRI信号的多种源信号。

BLIND SOURCE SEPARATION FOR FMRI SIGNALS USING SPATIAL INDEPENDENT COMPONENT ANALYSIS

The analysis of functional magnetic resonance imaging (fMRI) signals using independent component analysis (ICA) has been a hotspot in the recent years. The main principle of performing the blind source separation (BSS) using spatial independent component analysis (SICA) is described. Since the fMRI signals from the experiments can be seen as a specific problem of BSS, the FastICA can be used to realize the BSS. Current analytical techniques, which are applied to fMRI signals, require a prior knowledge or specific assumptions about the time courses of processes contributing to the measured signals. Without any prior knowledge about the time courses of processes contributing to the measured signals, the FastICA is used to separate fMRI signals into task-related independent components, head movement independent components, transient task-related independent components, noisy independent components and other independent component signals.

关键词

功能核磁共振成像(Functional magnetic resonance imaging); 盲源分离(Blind source separation); 独立成分分析(Independent component analysis)