

عنوان مقاله:

Machine Learning Methods on Resting State fMRI Network in Parkinson's disease

محل انتشار:

پنجمین همایش بین المللی نقشه برداری مغز ایران (سال: 1397)

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خلاصه مقاله:

BackgroundThe study of the brain network on magnetic resonance imaging (RS-fMRI) has yielded significant results in evaluating functional changes in different regions of the brain in pathologic and psychological illnesses. In this study, we employ the resting state network with machine learning methods to examine changes in the functional networks of the brain in Parkinson's disease[1].
2. MethodOur data included 25 Parkinson's patients: 11 women and 14 men, mean age 61.6 ± 10.4 years, the age range of 40-77 years and 18 healthy group 4 women and 14 men, mean age 64.2 ± 9.8 years, range Age 45-83 years old have been recorded in the Siemens 3T MRI system. The data used in this article is derived from the PPMI database[2]. All clinical patients were treated according to the Hoehn and Yahr scale. Pre-processing of functional images includes: removal of five primary frames, time filtering, head movement correction, skull removal, scan time correction, spatial filtering, normalization of the intensity of images, register to structural images, register to MNI atlas have done. Independent component analysis (ICA) was applied using melodic[3]. To extract Resting State Networks (RSNs), we spatially correlated ICs with 70 reference maps introduced by [4] with threshold 0.3. Afterwards, the temporal correlation between the time series of ROIs was calculated. Then, a t-test was used for statistical analysis and the significant correlation parameters with P-value < 0.05 were selected. The algorithm for selecting a fisher property and support vector machine (SVM) and kmeans were used to discover the ability to graph actions to detect PDs[5].
3. Results We extracted 137 ICs for the PD group and 99 ICs for the NC group. By comparing with resting networks, for each group, 41 resting networks (RSN) were extracted. The anatomical regions of the extracted RSNs in PD and NC has shown in Table 1 and 2, respectively. The correlation matrix showed in Fig. 1. We extracted $(41 * 40) / 2 = 820$ parameters from correlation matrix. The optimized feature was derived by ttest and corrected p-value < 0.05 . Finally the result of classification by selected feature using SVM and kmeans classifiers, represented in table 3. As the results showed, because of limitations in training data set, kmeans classifier had the better result than SVM.
4. Conclusions Differences between PD and NC groups are very significant with machine learning methods in resting state data. In this study, it was shown that the RSNs time series ... has the most significant connectivity parameters rather than the usual ROI time se

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