

Classification of ADHD with Bi-objective Optimization

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Abstract

Attention Deficit Hyperactive Disorder (ADHD) is one of the most common diseases in school aged children. In this paper, we consider using fMRI data with classification techniques to aid the diagnosis of ADHD and propose a bi-objective ADHD classification scheme based on L1-norm support vector machine (SVM). In our classification model, two objectives, namely, the margin of separation and the empirical error are considered at the same time. Then the normal boundary intersection (NBI) method of Das and Dennis is used to solve the bi-objective optimization problem. A representative nondominated set which reflects the entire trade-off information between the two objectives is obtained. Each representative nondominated point in the set corresponds to an efficient classifier. Finally, a decision maker can choose a final efficient classifier from the set according to the performance of each classifier. Our scheme avoids the trial and error process for regularization hyper-parameter selection. Experimental results show that our bi-objective optimization classification scheme for ADHD diagnosis performs considerably better than some traditional classification methods.