Abstract

In this work we introduce the Wishart Distributed Matrices Multiple Order Classification (WISDoM) method.

The WISDoM Classification method consists of a pipeline for single feature analysis, supervised learning, cross validation and classification for any problems whose elements can be tied to a symmetric positive-definite matrix representation.

The general idea is for information about properties of a certain system contained in a symmetric positive-definite matrix representation (i.e covariance and correlation matrices) to be extracted by modelling an estimated distribution for the expected classes of a given problem.

The application to fMRI data classification and clustering processing follows naturally: the WISDoM classification method has been tested on the ADNI2 (Alzheimer's Disease Neuroimaging Initiative) database.

The goal was to achieve good classification performances between Alzheimer's Disease diagnosed patients (AD) and Normal Control (NC) subjects, while retaining information on which features were the most informative decision-wise.

In our work, the information about topological properties contained in ADNI2 functional correlation matrices are extracted by modelling an estimated Wishart distribution for the expected diagnostical groups AD and NC, and allowed a complete separation between the two groups.