Methods and algorithms for the structural description and identification of the human cortical folding and its variability

Abstract

The main theme of this thesis is to apply neural network algorithms for the structural description and identification of the human cortical folding and its variability, which is important in medical volumetric image analysis. The focus of this dissertation is to investigate several deformable models in 3D, automatic reconstruction of the human cortical surface from MRI based on these models and clustering human brain MRI data sets by some neural network algorithms from the image analysis results.

In this research, we make three main contributions to the area of volumetric image analysis. First, we developed a method for automatic reconstructing of the human cortical surface from MRI by which a one-to-one spherical map is immediately obtained. Second, we developed a method for the cortical surface segmentation. Third, we developed a clustering method based on the image analysis results and neural network algorithms.

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