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Deep-Learning-Based Open-Source Tools Support Detection of Anomalies in Brain MRI Scans

Over the past decades, morphometric analysis of brain MRI has contributed substantially to the understanding of healthy brain structure, development and aging as well as to improved characterisation of disease related pathologies. Certified commercial tools based on normative modeling of these metrics are meanwhile available for diagnostic purposes, but they are cost intensive and their clinical evaluation is still in its infancy. Here we present two research-level open-source tools. DL+DiReCT and CortexMorph are deep-learning-based tools for brain segmentation and measurement of the thickness of the human cortex. ScanOMetrics is a tool for detection of statistical anomalies in individual MRI scans by normative modeling. We will explain the concepts and showcase applications at the examples of Alzheimer’s and Parkinson's disease, Multiple Sclerosis and epilepsy.