Influence of Maturation, Pathology and Functional Lateralization on 3D Sulcal Morphology using MRI - DTU Orbit (21/10/2019)

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The folding of the cortex results in a characteristic pattern of folds called sulci and ridges called gyri. The cortical folding varies greatly both within and between individuals. Despite a century of sustained research, the mechanisms underlying the observed variation in folding is still largely unknown. The shape of cortical sulci and gyri are determined in part by forces exerted by white matter fiber connections between various cortical regions. Studying the shape of the cortical sulci hence contributes to the understanding of the variation in the folding.

This thesis concerns sulcal morphometry using Magnetic Resonance Imaging (MRI) and spatial statistical methods. The sulcal morphology has been studied with respect to: the normal development of a central sulcus; in relation to functional lateralization of the motor hand area in central sulcus and, finally, in relation to a pathological condition, anosmia, in the olfactory sulcus. This thesis describes and uses methods for sulci segmentation, sulci registration, sulci representation, and statistics for modeling sulci shape and testing sulcal morphology.

This thesis describes methods to analyze sulcal morphology and show how sulci variability are influenced under normal development, by a functional ability, and by pathological conditions.

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