Topological constraints in a computational anatomy model of embryonic human brains

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Abstract

Nested structures are observed in a human body, such as ventricles that covers chorioid plexuses. Topological constraints are useful to construct a computational anatomy model that describes statistical variation under nested constraint. Diffeomorphism is a typical approach to handle such constraints. However, it is not able to explain creation and disappearance of anatomical structures of embryonic human brains, such as chorioid plexuses that appears after Carnegie stage 19. This talk presents a method that describes statistical variation of anatomical structures under nested and neighboring constraints. Signed distance based approach allows to explain creation and disappearance of anatomical structures under the constraints. The proposed method is applied to construct a spatio-temporal statistical model of surfaces of brain, ventricles and chorioid plexuses of human embryos.

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