

Accurate Cortical Reconstruction in Narrow Sulci with Zero-Non-Zero Distance (ZNZD) Vector Field

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Abstract : A new force field is designed for propagation of the parametric contour into deep narrow cortical fold in the application of knowledge based reconstruction of cerebral cortex from MR image of brain. Designing of this force field is highly inspired by the Generalized Gradient Vector Flow (GGVF) model and markedly differs in manipulation of image information in order to determine the direction of propagation of the contour. While GGVF uses edge map as its main driving force, the newly designed force field uses the map of distance between zero valued pixels and their nearest non-zero valued pixel as its main driving force. Hence, it is called Zero-Non-Zero Distance (ZNZD) force field. The objective of this force field is forceful propagation of the contour beyond spurious convergence due to partial volume effect (PVE) in to narrow sulcal fold. Being function of the corresponding non-zero pixel value, the force field has got an inherent property to determine spuriousness of the edge automatically. It is effectively applied along with some morphological processing in the application of cortical reconstruction to breach the hindrance of PVE in narrow sulci where conventional GGVF fails.

Keywords : deformable model, external force field, partial volume effect, cortical reconstruction, MR image of brain

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