

# 3<sup>rd</sup> Annual Research Symposium

## HFMG Academic Affairs

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# Abstract Deadline: March 24, 2006

3-D Deformable Surface Model for Automatic Segmentation of Hippocampus-Amygdala Complex  
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**Background:** In the coronal views of the brain images the boundary between the hippocampus and amygdala is often indistinct. The amygdala and hippocampus are separated just with the landmarks of temporal horn of lateral ventricle. These landmarks usually are so vague and tolerable that even for an expert, it is impossible to determine where the exact boundary between amygdala and hippocampus is.

**Experimental Approaches:** A digital brain atlas was registered on the subjects' MRI. Then, the structural segmentation of the complex in the atlas was used to construct an initial surface for the hippocampus-amygdala complex of each subject. A possibility approach was introduced for the segmentation process. Two different kinds of deformation based on edges and information obtained from tissue segmentation were used to find different parts of the complex. A new energy was defined to use tissue information. This energy was adopted to expand the model such that it encompasses gray matter pixels and excludes white matter and CSF pixels. The initial shape was divided into several parts. In the normal direction in the middle of each part, we constructed a profile to search for the best point that maximized the new energy.

**Result:** We implemented this method and applied it on volumetric MRI of 5 subjects whose manual expert segmentations of hippocampus and amygdala were also available. This data was obtained from Internet Brain Segmentation Repository (IBSR). The segmentation results were validated using two different validation methods. The possibility factors for all of the results were above 90%.

**Conclusions:** We proposed a knowledge-based deformable surface model for the segmentation of brain structures like hippocampus and amygdala. The advantage of the proposed model is that because it uses tissue and edges information simultaneously, it generates reliable segmentation results.

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