

Title: Hierarchical Conditional Random Fields for Outlier Detection: An Application to Detecting Epileptogenic Cortical Malformations

Presented by: Bilal Ahmed

Authors: Bilal Ahmed and Carla E. Brodley, Department of Computer Science, School of Engineering, Tufts University

Abstract:

We cast the problem of detecting and isolating regions of abnormal cortical tissue in the MRIs of epilepsy patients in an image segmentation framework. Employing a multiscale approach we divide the surface images into segments of different sizes and then classify each segment as being an outlier, by comparing it to the same region across a control population. The final classification is obtained by fusing the outlier probabilities obtained at multiple scales using a tree-structured hierarchical conditional random field (HCRF). The proposed method correctly detects abnormal regions in 90% of the patients whose abnormality was detected via routine visual inspection of their clinical MRI. But more importantly, it detects abnormalities in 80% of patients whose abnormality escaped visual inspection by expert radiologists.