

# Fuzzy classifier for microelectrode recording-based target navigation in deep brain stimulation

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## **Abstract:**

*This study describes novel methods for supporting navigation and placement of electrodes during surgeries for deep brain stimulation (DBS). Critical to these procedures in neurosurgery is the localization and identification of different target structures along the electrode's trajectory in the brain such as the subthalamic nucleus (STN), and finding the best position for the stimulating electrode.*

*Typically, neurosurgeons use microelectrode recordings (MER) of local neural activity for detecting the target region intra-operatively. We developed specific methods using wavelet transformation for feature extraction from MER signals and generated a fuzzy inference system for automatic classification between STN and non-STN signals. The classifier will support the surgeon and make the decision process for the final electrode position more reliable and less time consuming. It can be adapted easily for the classification of other functional neural areas than the STN also.*

*Key words: Fuzzy classifier, wavelet transformation, microelectrode recordings (MER), target navigation, deep brain stimulation (DBS), stereotactic neurosurgery, Dystonia, Parkinson's Disease*