

# **Brain tissue deformation and dislocation tracking using ultrasound for minimally invasive ablation application**

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## **Abstract:**

In image guided neurosurgery, a major source of concern is error due to brain tissue deformation and dislocation during Minimally Invasive Surgery (MIS). In this paper, we used phantom and medical images to investigate the accuracy of image registration based on rigid Normalised Mutual Information and non-rigid B Splines. A prerequisite for successful registration would be to obtain good quality images. Therefore experiments were performed using gel-balloon brain phantom to simulate “real-time” deformation and dislocation during MIS and the corresponding images were taken with Ultrasound and CCD Camera. Image processing, segmentation and registration were done using Matlab environment. Assessment of accuracy was determined from registration of images with reference to fiducial markers. Results obtained showed that error due to automatic segmentation was lesser when compared to manually segmented registration and non-rigid registration was within 60 seconds. The proposed algorithms for image registration show promising results.