Automatic Identification of Landmarks for Standard Slice Positioning in Brain MRI

Ali Iskurt 1 *, PhD, Yasar Becerikli 2, PhD, and Kamran Mahmutyazicioglu 3, MD

1 Department of Informatics, Yildiz Technical University, Istanbul, TURKEY

2 Wireless Communications and Information Systems Research Unit (WINS) Department of Computer Eng. Kocaeli University, Izmit, TURKEY

3 Department of Radiology, Private Sema Hospital, Maltepe, Istanbul, TURKEY

Purpose: To demonstrate a novel automatic slice-positioning technique based on three new anatomical landmarks and to standardize prospective scans by lowering rotational and translational variances.

Materials and Methods: After defining interpeduncular fossa corner and eyeball centers as landmarks, they are manually labeled on 25 different T1 MRI scans. New scans are produced according to the Eyeball centers-Mesencephalon (EM) plane. The comparison of angular deviations at EM and original scans is based on the comparison of rotational angles according to manually labeled Talairach points on both scans. The same variability comparison is also done with automatically captured landmarks to see the effects of segmentation errors.

Results: Analysis of variances proved significant lowering of intersubject variability for pitch and yaw angles ($P_{\text{pitch}}<0.005$, $P_{\text{yaw}}<0.001$) which are the two basic causes of misalignments. Automatic segmentation accuracy is proved by paired t-test and significance tests.

* Corresponding author.
Voice mobile: +90 554 834 89 63
E-mail address: aliiskurt@yildiz.edu.tr
aliiskurt@gmail.com (A. Iskurt)
Address reprint requests to: Yildiz Technical University Informatics Department Central Campus, A-507 Barbaros Bulvari 34349 Beşiktaş / Istanbul Tel: +90 212 383 20 81