

ECE PhD Seminar

Automatic segmentation and tracking of multiple sclerosis lesions on serial magnetic resonance images.

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Abstract

T2- lesion volume on magnetic resonance images is one of the surrogate markers that is routinely used for monitoring Multiple Sclerosis disease progression. Studies suggest that in addition to T2-lesion volume, individual lesion dynamics convey valuable information in monitoring disease modifying therapy. These lesion dynamics can predict conversion to permanent tissue damage, which can potentially improve repair capacity. Currently, lesion volume is delineated manually, which is subject to large inter-rater and intra-rater variability. Furthermore, manual techniques can be expensive and time consuming.

Automatic approaches to segment and track lesions on T2-w images have not been suggested. In this talk, we will present a lesion segmentation and tracking technique in serial MR data, consisting of twenty subjects scanned monthly for a year. Our technique uses a modified unified segmentation algorithm to delineate MS lesions. Manual tracing of lesions on any image from the longitudinal data are used to create lesion priors. Subtraction images are used to propagate these priors to all the other images in the longitudinal data. Eleven MRIs per subject are segmented and the total T2-lesion volume is computed. A lesion counting approach is used to identify individual lesions and assign a unique ID. The volumes of the individual lesions are estimated and their changes tracked over a year to understand individual T2-lesion dynamics.

