

Joint intensity fusion

Brian B. Avants^{1†}, Nicholas J. Tustison², ...³

¹Department of Radiology, University of Pennsylvania, Philadelphia, PA

²Department of Radiology and Medical Imaging, University of Virginia, Charlottesville, VA

³Some other institution

Corresponding author:

Brian B. Avants

Cambridge, MA XXXXX

stnava@gmail.com

† Currently employed by Biogen (Cambridge, MA).

Abstract

Consensus techniques have demonstrated remarkable utility in various medical imaging segmentation tasks. Joint label fusion (JLF) employs spatially normalized atlas sets—gray-scale intensity images with corresponding segmentation labels—to segment unlabeled images using various weighting schemes. The technique of [1, 2] avoids informational redundancy in the atlas voting scheme by considering the atlas set as a whole versus individually in determining the optimal weights. In this work we extend this methodology to the estimation of intensity information in multi-modal image data sets, which we denote as *joint intensity fusion (JIF)*. JIF has several potential applications including removal of imaging artifacts (e.g., motion), removal of pathologies (e.g., tumour, lesions), imputation of missing modality data, and template enhancement. Evaluation is performed on a variety of data [...need more here](#). We provide an open-source implementation in the the well-known Advanced Normalization Tools (ANTs) software package which subsumes the functionality reported in [2] in addition to offering further enhancements such as multi-threading and a non-negative least-squares calculation of the atlas weights.

Keywords: ANTs, atlases, denoising, motion correction, non-negative least squares.

Introduction

Methods

Results

Discussion

1. Wang, H. and Yushkevich, P. A. “**Multi-Atlas Segmentation with Joint Label Fusion and Corrective Learning-an Open Source Implementation**” *Front Neuroinform* 7, (2013): 27. doi:10.3389/fninf.2013.00027
2. Wang, H., Suh, J. W., Das, S. R., Pluta, J. B., Craige, C., and Yushkevich, P. A. “**Multi-Atlas Segmentation with Joint Label Fusion**” *IEEE Trans Pattern Anal Mach Intell* 35, no. 3 (2013): 611–23. doi:10.1109/TPAMI.2012.143