Learning Deep Neuroimaging Representation by Longitudinal Augmentations

Anonymous CVPR 2021 submission

Paper ID ****

Abstract

Alzheimer's Disease (AD) is a chronic neurodegenerative disease that severely causes problems on patient's thinking, memory, and behavior. As early diagnosis is important to prevent AD progression, many biomarker analysis models have been presented to predict clinical outcomes. However, these models often fail to integrate heterogeneous genotypic and phenotype biomarkers to improve diagnosis prediction and/or are not able to deal with the incomplete longitudinal biomarkers with missing entries/records. Thus we propose the semi-supervised augmentation learning method to learn a abstract vectorial representation of multimodal longitudinal biomarkers. We use a composite model of autoencoders based on Recurrent Neural Network. Our experiments show that our augmentation model improves the prediction performance on AD progression.

1. Introduction

2. Experiment

Our experiment consists of two parts; (1) we evaluate the prediction performance of our proposed method, and (2) we identify the biomarkers highly correlated to AD.

2.1. ADNI Dataset Description

We obtain the data used in this experiment from the ADNI database (adni.loni.usc.edu). We download 1.5 T MRI scans and demographic information for 821 ADNI-1 participants. We perform voxel-based morphometry (VBM) and FreeSurfer (FS) on the MRI data by following [1] and extracted mean modulated gray matter (GM) measure for 90 target regions of interest (ROI). In this analysis, the time points for both imaging records and AD diagnosis include baseline, M6, M12, M18, M24 and M36.

3. Conclusion

References

[1] Shannon L Risacher, Li Shen, John D West, Sungeun Kim, Brenna C McDonald, Laurel A Beckett, Danielle J Harvey, Clifford R Jack Jr, Michael W Weiner, Andrew J Saykin, et al. Longitudinal mri atrophy biomarkers: relationship to conversion in the adni cohort. *Neurobiology of aging*, 31(8):1401–1418, 2010. 1