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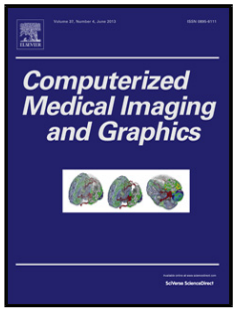

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PII: S0895-6111(17)30107-6
DOI: https://doi.org/doi:10.1016/j.compmedimag.2017.11.001
Reference: CMIG 1533

To appear in: *Computerized Medical Imaging and Graphics*

Received date: 29-10-2016
Revised date: 10-6-2017
Accepted date: 14-11-2017

Please cite this article as: Xiaoli Liu, André R. Goncalves, Peng Cao, Dazhe Zhao, Arindam Banerjee, <ce:text>Alzheimer's Disease Neuroimaging Initiative</ce:text>, Modeling Alzheimer's Disease Cognitive Scores using Multi-task Sparse Group Lasso, *<![CDATA[Computerized Medical Imaging and Graphics]]>* (2017), https://doi.org/10.1016/j.compmedimag.2017.11.001

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Modeling Alzheimer's Disease Cognitive Scores using Multi-task Sparse Group Lasso

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Abstract

Alzheimer's disease (AD) is a severe neurodegenerative disorder characterized by loss of memory and reduction in cognitive functions due to progressive degeneration of neurons and their connections, eventually leading to death. In this paper, we consider the problem of simultaneously predicting several different cognitive scores associated with categorizing subjects as normal, mild cognitive impairment (MCI), or Alzheimer's disease (AD) in a multi-task learning framework using features extracted from brain images obtained from ADNI (Alzheimer's Disease Neuroimaging Initiative). To solve the problem, we present a multi-task sparse group lasso (MT-SGL) framework, which estimates sparse features coupled across tasks, and can work with loss functions associated with any Generalized Linear Models. Through comparisons with a variety of baseline models using multiple evaluation metrics, we illustrate the promising predictive performance of MT-SGL on ADNI along with its ability to identify brain regions more likely to help the characterization Alzheimer's disease progression.

Keywords: Alzheimer's disease, multi-task learning, sparse group lasso.

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