Identifying Connectivity Patterns for Brain Diseases via Multi-side-view Guided Deep Architectures

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1. Introduction

(1) Results of mining neuroimages are usually hard to interpret.
(II) Subgraph mining cannot capture the complicated interplay among patterns.
(III) Deep learning: limited subjects and the high costs of acquiring the data.
(IV) Multiple side views: clinical, serologic, immunologic, cognitive, etc.

2. Analysis of Multi-side-view Guidance

(I) Infer pairwise similarities from side views
(II) Learn connectivity patterns w.r.t the geometry of side views
(III) Investigate the consistency between side views and pre-specified labels
(IV) Similar instances under side views should have similar labels

3. MVAE: Multi-side-View guided AutoEncoder

(1) A shallow MVAE with one hidden layer

(2) The objective function

(3) The optimization

(4) A stacked MVAE with deep architectures

4. Experiments

(I) Performance for detection of brain disorders

(II) Performance with deep architectures

(III) Performance with each side view

(IV) Effect of the guiding parameter

(V) Visualization of connectivity patterns

2016 SIAM International Conference on Data Mining, May 5-7, 2016, Miami, Florida, USA