Idaho State University

Mathematics and Statistics

Undergraduate Colloquium

Semi-supervised manifold alignment with diffusion and optimal transport

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The integration of multimodal data presents a challenge in cases where the study of a given phenomenon by different instruments or conditions generates distinct but related domains. The integration of distinct data-views can be used for exploratory data analysis, and benefit downstream analysis including machine learning related tasks. Many existing data integration methods assume a known one-to-one correspondence between domains of the entire dataset, which may be unrealistic. Furthermore, existing manifold alignment methods are not suited for cases where the data contains domain-specific regions, i.e., there is not a counterpart for a certain portion of the data in the other domain. In this talk, I will present two manifold alignment methods for different semi-supervised settings. The first, Diffusion Transport Alignment (DTA), exploits known correspondence between only a few points to align the domains. The second, Manifold Alignment with Label Information (MALI), leverages discrete class labels in both domains to guide the alignment. Both methods use the diffusion process from Diffusion Maps and PHATE to learn the manifold structure, and then use optimal transport to align the data points. We show that both DTA and MALI outperform competing methods in their respective settings.

Refreshments for colloquium guests begin at 3:30 pm in PS 308

4:00 pm
Friday, Nov. 17
PS 307

Zoom Meeting ID: 83918530990