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Novel methods for integrative modeling of biomedical data

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Molecular profiling data from scientific studies aiming for early detection and better management of diseases such as cancer has accumulated at rates far beyond our abilities to efficiently extract knowledge of value to the practice of precision medicine. A major challenge is that these data are often generated using multiple high-throughput technologies giving rise to panomics data such as gene expression and DNA methylation for the same or related classification task. In this talk, I will present novel computational methods and tools that are being developed in my laboratory for the integrative modeling of panomics data to improve disease state classification from related molecular profiling studies. We are extending the novel Transfer Rule Learning (TRL) methods that were previously developed to deal with sparse data from biomarker profiling studies, by automatically learning classification rules from one dataset, transferring that knowledge and using it when learning rules from a related dataset. The extensions include methods for knowledge transfer using ontological or taxonomic hierarchies along with classification rule learning. Preliminary results from collaborative studies involving biomarker profiling data for the early detection of lung cancer and microbiome data for infectious disease classification will be presented.

Biography

Vanathi Gopalakrishnan is a tenured Associate Professor of Biomedical Informatics in the School of Medicine at the University of Pittsburgh and has a PhD in Computer Science. She has secondary appointments in the Intelligent Systems Program and the Department of Computational and Systems Biology. She directs the PRoBE Laboratory for Pattern Recognition from Biomedical Evidence. Her research involves predictive modeling from big biomedical datasets with a focus on transforming imaging and biomarker data into actionable knowledge to enable precision medicine and translational bioinformatics. She is a Guest Editor for a special edition on Biomedical Informatics in the journal data.

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