MARQUETTE UNIVERSITY

Electrical and Computer Engineering Department Colloquium

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Tuesday, October 25, 2022
2:00 – 3:00 p.m. Olin 202
Reception in Olin 204 3:00 – 3:30 p.m.

"Machine Learning and Healthcare Data Interoperability"

Abstract: Vast amounts of clinical and biomedical research data are generated in hospitals, clinics, laboratories, and research institutes. These are considered a primary force in enabling data-driven research toward advancing biomedical knowledge and present the potential for introducing new efficiencies in healthcare delivery. Data-driven research can have many goals, including but not limited to improved diagnostics processes, novel biomedical discoveries, epidemiology, and education. Finding and gaining access to relevant data and metadata across multiple datasets that is necessary to achieve these goals, however, remains elusive. Data re-usability is a highly desirable goal, both for advancing science and for replicating or validating results of previous studies. Recognizing this need, publishers and funding bodies often require researchers to submit data generated as a result of their work and make it available to the research community to ensure reproducibility. The National Institutes of Health (NIH) encourages researchers to provide access to their research data through the NIH Science and Technology Research Infrastructure for Discovery, Experimentation, and Sustainability (STRIDES) Initiative. However, in the healthcare domain, datasets are often not shared because of security concerns, geographic disconnect, different data governance policies, heterogeneous nature of the data, lack of integration across information systems, or limitations of retrieval models. From our survey of the research literature, we learned that current hospital systems and public search engines do not support integration of public and internal data and have limited natural language search capabilities. Moreover, data preparation (i.e., finding relevant data sources, extracting data, data cleaning, and data integration) accounts for 80% of a data scientist's work. Significant time and effort can be saved by developing techniques that provide integration and text-image-based search capability that addresses the current limitations. This research extensively investigates the problem of biomedical data integration, with a solution for data interoperability between unstructured biomedical data by considering semantical similarity of data elements, and domain-aware algorithms for text-image-based query search. Although we focus on the medical field, this work could also be transferred to other domains with heterogeneous data sources and domain-specific ontologies.

Bio: Dr. Priya Deshpande is currently working as an Assistant Professor at Electrical and Computer Engineering department at Marquette University. Priya Deshpande completed her PhD in Computer Science from DePaul University, Chicago. Priya is a senior member of the Institute of Electrical and Electronics Engineers (IEEE). Her research interests encompass machine learning, natural language processing, databases, big data analytics, and computer-aided diagnosis. Priya's previous research addressed big data analytics and load balancing in cloud computing. Her current research focuses on biomedical data integration. She integrates public clinical data sources and medical ontologies. She incorporates databases, natural language processing, information retrieval, and machine learning techniques to help clinical experts to find supplemental reference information and improve diagnostic accuracy.