CMPT 983 - G100 Spec. Top. in Art Intelligence

Instructor(s): Oliver Schulte

SFU Burnaby

Calendar Objective/Description:
Spec. Top. in Art Intelligence

Instructor's Objectives:
Graph data represent relationships between entities in a domain. They are a common data type, which makes them important for many applications. Domains with major graph datasets include the following: enterprise data management through relational databases, social networks, bioinformatics (e.g. protein-protein interactions), information extraction in natural language processing, where knowledge graphs represent a large amount of information that can be extended through on-line sources.

While graph data are powerful and widely available, they are a challenge for standard machine learning methods that are designed for independent data points. The goal of this course is to introduce students to the special challenges of learning from graph data, and to the machine learning methods that have been developed to address them. Many recent approaches are based on deep learning, because neural methods provide accurate predictions and are relatively easy to implement. The course will therefore emphasize graph neural networks.

The course is an in-person seminar course, which means that I expect strong participation from students. I will give lectures to fill in background but as much as possible classes will be interactive. About half the class will be devoted to background on previous machine learning methods for graph data, and about half to discussing advanced topics, current research papers, and project ideas.

Prerequisites:
see go.sfu.ca

Topics:
- Types of Graph Data: Homogeneous, Heterogeneous, Multi-Relational
- Traditional Methods: Node Features, Graph Kernels, Spectral Analysis, Exponential Random Graph Model
- Node Embeddings
- Graph Neural Networks
- Graph Generative Models
- Advanced Topics from current research (methodology and applications)

Grading:
* Exercises/Quizzes: 10% • Background/Topic Presentation: 30% • Project Presentation 15% • Final Project 45%

Required Books:

Academic Honesty Statement:
Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).