Course Information

Graph ML

Department of Computer Science
University of Massachusetts, Lowell

Hadi Amiri
hadi@cs.uml.edu

Introduction

- Computational and modeling challenges in real world graphs (networks).
- Graph representation and its applications
- Prior exposure to ML, (statistical) NLP or AI is recommended but not strictly required.

Target Students

1. Junior graduate students.

2. Senior undergraduate students who have background in ML and are interested in conducting/learning how to conduct research.

Course Homepage

https://amirieb.github.io/MLGraph_F21/

Please read all details on class webpage! The subsequent slides are not comprehensive.

Textbooks

- **[GRL] Graph Representation Learning**
  William L. Hamilton

- **[NCM] Networks, Crowds, and Markets: Reasoning About a Highly Connected World**
  David Easley and Jon Kleinberg

Syllabus

Week		Lecture
W1		Course Overview and Basics
W2	T	Graph Properties and Features
W3	T	Node Embeddings 1
W4		Node Embeddings 2
W5	T	Graph Neural Networks 1
W6		Graph Neural Networks 2
W7		`Midterm exam`
W8	T	Link Prediction
W9		Cascade Prediction
W10		Power Laws and Popularity
W11		`No class`
W12	T	Meta Learning with Graphs 1
W13		`No class`
W14		Meta Learning with Graphs 2
W15		`Project presentation`

Grading

- 5 Assignments (50%)
- Midterm Exam (25%)
- Final project (25%)

- Optional
  - Extra credit

- Grades to be returned within 3 weeks of due dates:
  - You can question the grading within 3 days of the return of the preliminary grades by email.

Policies & Requirments

- Attendance
  - Please come to class prepared and be on time.
- Collaboration
  - Always follow Facebook Rule & UML's honor code.
  - Write name(s) of your collaborators on submissions.
- Academic Accommodation
  - Provide a letter from DS office during W01-W03.
- Religious Observance
  - Let me know, no due dates during these times.
- Anti-Harassment
  - In any form is unwelcome in this course.

Homework Assignments

- Focus: scientific articles
- Should be completed individually
- Specific submission format (see course page)

Method Assignments

- Focus: Practical aspects of implementing, training, and evaluating ML systems.

- Should be completed individually
- Specific submission format (see course page)

- Grading based on:
  - code correctness
  - model performance on *unseen* test data.

Final Project

- A ML problem formulated and evaluated on real or synthetic graph datasets.
- Individual or Team of 2 students.
- 2-page proposal in provided template.
- Class discussion and feedback.
- Final report in provided template.
- Class presentation.

- Final project is a substantial part of this course!
  - Start working on ideas *now*!
  - Talk to advisor or me for ideas, help, advice, etc.

Peer Evaluation

- Peer evaluation for final project
  - After proposals are submitted.
  - Each student should:
    - clearly report his/her duties in the project
    - actively contribute to the project, and
    - if group, try to help the other team members.
  - Report dysfunctional group situations ASAP.

Important Dates

- Check the course page, Assignments in the menu.

Late-ness!

- Late homework asst. is not allowed
  - late after due date/time: zero mark
- Late method asst. and projects are allowed
  - late within 3 days: 30% reduction in grade
  - after that: zero mark.

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Note: Submit Early.
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Exam

- Open-book.

- Format: in-person.

Extra Credit

- Can be earned by relevant contributions to the course:
  - Concisely summarize a CS Colloquium:
    - Research problems addressed,
    - Draw connections to class materials,
    - Email report within 1 week of the talk.
  - Effective participation on Blackboard
  - Code and dataset contributions,
  - etc.

`https://cs.uml.edu/~hadi/cstalks.html`

Blackboard

- Link on course page
- All announcements and important updates will be will be posted on Blackboard.

Course Evaluation

- 1-2 surveys
  - I try to take student comments seriously.

Course Evaluation

- 1-2 surveys
  - I try to take student comments seriously.
    - Well, most of them – won't change a few things!

Student comments

- very interesting and highly scientific course that has undoubtedly contributed to my learning
- constant interaction with students
- professor provided important insight to understanding concepts
- learned how to objectively critique a paper. That was very different and useful.
- all of topics are covered with enough depth
- course was extremely useful
- what taught in class and homework are highly related and useful
- theoretical topics were related to real-world problems through references to papers

Student comments

- the teaching and tutorial session didn't match the level of difficulty of assignments/exam!
- lack of details of the programming assignments
- we may need more info related to AST, really struggled, though devoted a lot of effort to it
- too many options to try for open ended projects like ast1 and 2.
- need some flexibility in assignment submissions deadlines
- need more student interaction, example 1 method assignment as group assignment may help.

Questions?