Advanced Topics in Graph Mining

This course introduces advanced techniques for graph mining. Topics to be covered include, but are not limited to: graph classification, graph clustering, community detection, influence maximization, dense subgraph finding, frequent subgraph mining, correlated subgraph mining, subgraph matching, subgraph motif enumeration, graph centralities, and other important and emerging topics in graph mining. The course will cover both classic and the state-of-the-art algorithms and systems for the topics to be studied.

Grade Descriptor:

A

EXCELLENT - exceptionally good performance and far exceeding expectation in all or most of the course learning outcomes; demonstration of superior understanding of the subject matter, the ability to analyze problems and apply extensive knowledge, and skillful use of concepts and materials to derive proper solutions.

B

GOOD - good performance in all course learning outcomes and exceeding expectation in some of them; demonstration of good understanding of the subject matter and the ability to use proper concepts and materials to solve most of the problems encountered.

C

FAIR - adequate performance and meeting expectation in all course learning outcomes; demonstration of adequate understanding of the subject matter and the ability to solve simple problems.

D
MARGINAL - performance barely meets the expectation in the essential course learning outcomes; demonstration of partial understanding of the subject matter and the ability to solve simple problems.

F

FAILURE - performance does not meet the expectation in the essential course learning outcomes; demonstration of serious deficiencies and the need to retake the course.

Equivalent Offering:
Units: 3 (Min) / 3 (Max) / 3 (Acad Progress)
Grading Basis: Graded
Repeat for Credit: N
Multiple Enroll: N
Course Attributes: MSc Computer Science, MPhil-PhD Computer Sci & Erg

Topics:

COURSE OUTCOMES

Learning Outcomes:
At the end of the course of studies, students will have acquired the ability to

1. master the basic skills and techniques of a broad range of important topics in graph mining;
2. understand the key ideas in the design and implementation of some representative algorithms of each topic introduced in the course;
3. understand the key ideas in the design and implementation of the state-of-the-art systems of each topic introduced in the course;
4. relate the algorithms and systems learnt in the course to real-world applications.

Course Syllabus:
This course introduces advanced techniques for graph mining. In the course of studies, students will learn
1. the state-of-the-art algorithms for graph classification, graph clustering, and community detection, and their implementations in modern dataflow systems;
2. the state-of-the-art algorithms for influence maximization and their implementations in modern dataflow systems;
3. the classic and latest algorithms for dense subgraph finding, frequent subgraph mining, correlated subgraph mining, and their distributed implementations;
4. the classic and latest algorithms for subgraph matching and subgraph motif enumeration, and their distributed implementations;
5. the classic and latest algorithms for graph centralities, and their scalable implementations;
6. other important and emerging topics in graph mining.

Assessment Type:

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<tr>
<th>Assessment Type</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Presentation</td>
<td>30%</td>
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<tr>
<td>Project</td>
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<tr>
<td>Report</td>
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Feedback for Evaluation:

1. Quiz and examinations
2. Course evaluation and questionnaire
3. Question-and-answer sessions during class
4. Student consultation during office hours or online

Required Readings:

To be provided by course instructor.

Recommended Readings:


OFFERINGS

1. CSCI5630 Acad Organization=CSEGV; Acad Career=RPG

COMPONENTS

LEC : Size=30; Final Exam=N; Contact=3
ENROLMENT REQUIREMENTS

1. CSCI5630

   Enrollment Requirement Group:
   For students in MSc Computer Science; or
   For students in MPhil-PhD Computer Science & Engineering; or
   For undergraduate students in Computer Science (CSCIU & CSCIN) or Computer Engineering (CENGU & CENGN)

CAF

<E N D  O F  R E P O R T>