

Course Syllabus

SIE 554 Spatial Reasoning

Course Description

Qualitative representations of geographic space. Formalisms for topological, directional and metric relations; inference mechanisms to derive composition tables; geometric representations of natural language-like spatial predicates; formalizations of advanced cognitively motivated spatial concepts, such as image schemata; construction of relation algebras.

Prerequisites: SIE 550. Credits: 1 or 3

Slides of all lecture material will be available on a course web page.

Course Goals and Objectives

- To acquire an in-depth knowledge of qualitative spatial reasoning
- To learn the methods associated with qualitative reasoning
- To become fluent in the most popular models for topological relations
- To understand the deficiencies and shortcomings of current approaches

Expected Outcomes

- Understand in depth the qualitative spatial reasoning
- Understand the qualitative reasoning methods
- Understand the different approaches to qualitative spatial reasoning

Faculty Information

Max J. Egenhofer

School of Computing and Information Science, Boardman Hall

max@spatial.maine.edu

Course Goals and Objectives

- Introduce students to concepts of modern database systems
- Develop an understanding of using, designing, and programming database systems
- Expose students to practical work with database systems through a series of labs

Course Outline

- Class 1: Motivation for methods in spatial reasoning
Class 2: Naive Geography
Class 3: Quantitative vs. qualitative models of geographic space
Class 4: Representations of spatial objects
Class 5-8: Models of spatial relations
- topological relations between regions, lines, points
 - direction relations between points and regions
 - metric relations as refinements of topological relations
- Class 9: Dependencies of different types of spatial relations
Class 10: Constructing composition tables for spatial relations
Class 11: Compositions to eliminate inconsistent and underdetermined spatial information
Class 12: Conceptual neighborhoods to model relation similarity
Class 13: From quantitative to qualitative spatial representations
Scene similarity reasoning about qualitative spatial relations
Class 14: Qualitative reasoning about spatial image schemata
Class 15: Construction of relation algebras

Grading, Class Policies, and Course Expectations

Grading criteria:

- Final – 70%
- Class participation – 30%

For 3-credit course only:

Grading criteria:

- Research paper – 50%
- Final – 40%
- Class participation – 10%

Academic Honesty

Academic honesty is expected. Plagiarism is unacceptable in this course and will result in a failing grade.

Students with Disabilities

If you have a disability for which you may be requesting an accommodation, please contact Ann Smith, Coordinator of Services for Students with Disabilities (Onward Building, 581-2319), as early as possible in the term.

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

Extended Disruption

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

UMaine's Sexual Discrimination Reporting

The University of Maine is committed to making campus a safe place for students. Because of

this commitment, if you tell a teacher about an experience of sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination involving members of the campus, your teacher is required to report this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity. If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

- For confidential resources on campus: Counseling Center: 207-581-1392 or Cutler Health Center: 207-581-4000.
- For confidential resources on campus: Rape Response Services: 1-800-310-0000 or Spruce Run: 1-800-863-9909.
- The following resources on campus can offer support but may have to report the incident to others who can help: Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911.

See the OSAPV website for a complete list of services at <http://www.umaine.edu/osavp/>