FAG3104 Spatial Data Mining 7.5 credits

Rumslig informationsutvinning

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FAG3104 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

- Proficient knowledge of linear algebra, calculus, probability theory and statistics
- Basic knowledge of GIS and and geovisualization: AG2412 Geovisualisation or an equivalent course
- Basic knowledge of spatial analysis: AG2414 Spatial Analysis or an equivalent course
- Basic knowledge of relational and spatial databases: AG2425 Spatial Databases or an equivalent course
- Proficient knowledge in programming (Python, Java, Matlab, etc)

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

With the widespread use of communication-, computing-, mobile positioning- (or sensor) technologies the large and exponentially growing spatial datasets that are collected has quickly made spatial data mining an important skill in scientific and industrial endeavors. Spatial data mining, which is the focus of this course, is the algorithmic part of a larger, iterative knowledge discovery process that aims at discovering interesting, useful, non-trivial, spatial patterns ((ir)regularities / relationships) from large spatial datasets. The main objective of this course is to teach students about the core data mining tasks, concepts, methods and tools. Students will apply these to real-world problems using large datasets in individual student term projects. Students will have the opportunity to 1) learn and discuss well-established spatial data mining methods and tools (in lectures), 2) present and discuss state-of-the-art research in the field of spatial data mining (in seminars), and 3) present (both orally and in writing) and discuss how they have applied a chosen spatial data mining method / tool to solve a real-world problem (as part of an individual student term project). In case of too low student enrollments (below 5 students), the course will be in the form of individual self-studies based on literature studies and individual student term projects.

On the completion of this course, students should be able to:

- define and characterize the unique aspects of spatial data mining
- describe and differentiate between key data mining tasks (regression, classification, clustering, association mining, outlier detection)
- describe and critically evaluate the strength and weaknesses of different data mining methods for a given data mining task
- select an existing- or devise and implement a novel data mining method that is suitable for a selected real-world data mining problem
- apply the selected / devised method to the selected problem in an individual student term project and present the research findings both orally and in writing in the form of a short paper or poster that meets international scientific publication standards in the field of spatial data mining

Course contents

Characteristics of spatial data

Spatial data bases and data warehouses

Knowledge discover in databases

Pattern visualization

Spatial prediction (classification and regression)

Spatial segmentation and clustering

Spatial trends

Spatial associations

Spatial outliers

Spatio-temporal and moving object databases

Spatio-temporal and trajectory data mining

Emerging trends in spatial data mining: architectures and paradigms

Course literature

Geographic Data Mining and Knowledge Discovery, Second Edition, Harvey J. Miller and Jiawei Han, 2009, CRC Press, ISBN: 9781420073973

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Examination

- PRO1 - Project work, 7.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.