Spatio-temporal Data Modelling

General Information

Module Code

Spatio-temporal Data Modelling (GEO_StDatMod)

Module Category

Specialization

Lessons

3 lecture periods per week

Number of ECTS Credits

3

Module Language

Taught in German or English

Materials in German or English

Projects can be completed in German or English

Module Description

Traditional modelling of geodata and implementaion thereof in geographic information systems focuses on most appropriate and efficient representation of single states of spatial phenomena. In this sense, today's geoinformation systems can be regarded as a digital development of the traditional map paradigm. With regard to current and future requirements for geoinformation solutions, this traditional paradigm has a number of weaknesses:

- The semantics of maps and the many heterogeneous geodata usually require human interpretation and can only be read with difficulty by machines and at best can only be interpreted incompletely.
- Phenomena and processes that change over time cannot be modelled and analysed, or only in a very complicated way.
- Dynamic phenomena and moving objects are difficult or impossible to model and analyse.

This module focuses extends traditional geodata modelling approaches by the dimensions semantics, time and dynamics and their application to real applications and tasks in the geoinformation domain. For each of these new dimensions or concepts, this module deals with the corresponding theories, methods and tools, most of which originate from the area of database and web technologies.

Learning Objectives, Contents, Methods

Learning Objectives and Acquired Competences

Professional Goals:

- Students explain the most important concepts and methods applied to extended spatio-temporal data modelling.
- They assess the possible applications of concepts and methods for extended semantic-spatio-temporal data modelling and show suitable approaches for specific problems.
- They read, interpret and explain simple data or data model descriptions that have been created using the description languages covered.
- They assess the requirements and suitability of modelling tools.
- Students create simple semantic, spatio-temporal data schemata using selected modelling tools.

Methodical Goals:

- Independent research, development, presentation and discussion of selected contents in addition to the lecture contents.

Contents of the Module

- Introduction
- Part 1: Semantics
  - Semantic Web
  - Geospatial Semantic Web
  - Ontologies
  - Ontology description languages RDF and OWL
  - SPARQL – Query language for RDF

- Part 2: Time
  - Time in GIS
  - Spatio-Temporal Representations
  - Temporal DBMS
- Part 3: Dynamics
  - Moving Objects in GIS
  - Concepts and data structures
  - Architectures
- Selected topics / Outlook

Teaching and Learning Methods

- Lectures (approx. 2 lessons per week)
- Exercises (approx.. 1 lesson per week)
- Self-study and short presentation of selected supplementary contents

Requirements

None

Assessment

Assessment and Testat Requirements

Final module exam

Duration	90 min
Permitted tools	Written summaries (max. 7 pages A4, single-sided, handwritten)

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