Research Group Data and Web Science

Courses for Master Students

FSS 2015
Teaching Overview

The DWS Group offers the following courses for master students:

- Semantic Web Technologies
- Web Mining
- Text Analytics
- Data Mining and Matrices
- Web Data Integration
- Data Mining II
- Web Search and IR
- Process Mining
- Knowledge Management
- Decision Support
- Databases II
- Data Mining I

Offered this semester.
LEARNING GOALS

- Ability to assess the value knowledge has for organizations
- Overview of knowledge management strategies
- Acquaintance with technical foundations of knowledge management systems
  - Information Retrieval and Text Mining
  - Knowledge Representation: Repositories and Query Answering
  - Collective Intelligence: Web 2.0 and Wikis, Social Networks

Programming skills and IT competence: practical usage of technologies for knowledge acquisition and maintenance
CS 661: Knowledge Management

- Lecturer: Dr. Johanna Völker
- Date: Wednesday 12:00 am – 1:30 pm
- Location: B6, room A101,
- Passing the course: Written Exam
- Optional: ungraded weekly assignments and tutorial lessons to help you preparing for the written exam
CS 530: Database Systems II

- Main theme
  - Large-scale data management
  - Big Data
- Part I: Relational
  - Parallel and distributed database systems
  - Data Warehousing
- Part II: Non-Relational
  - MapReduce and its ecosystem
  - XML
  - NoSQL
  - Streams
  - Graphs
CS 530: Database Systems II

- For whom?
  - Master students, Ph.D. students
  - Business informatics, (business mathematics), …
  - 6 ECTS

- Who?
  - Prof. Dr. Rainer Gemulla, Marius Eich, Fisnik Kastrati

- When?
  - Lecture: Tuesday, 12:00-13:30, B6 - A 101
  - Tutorium: Wednesday, 13:45-15:15, B6 - A 104

- Website & news
IE 500: Data Mining 1

- „We are drowning in data, but starving for knowledge.“
  (John Naisbitt, 1982)

But how do we get from data to knowledge?

- „Data mining is nothing else than torturing the data until it confesses."
  (Fred Menger, year unknown)
IE 500: Data Mining 1

- Lecture contents – the basics of “torturing data”:
  - Classification: Will your bank grant you a loan?
  - Clustering: How to automatically organize your MP3 collection?
  - Frequent pattern mining: Which products to place together in a supermarket to maximize customer purchases?
  - Text Mining: Do students on Twitter like or dislike this lecture?

- Student project:
  - Torture some data of your choice.

- Teaching staff:
  - Prof. Christian Bizer (Lectures)
  - Dr. Volha Bryl, Oliver Lehmberg (Exercises)
IE672: Data Mining 2

- Lectures cover advanced Data Mining methods
  - *Regression and Forecasting*
  - *Dimensionality Reduction*
  - *Anomaly Detection*
  - *Time Series Analysis*
  - *Parameter Tuning*
  - *Ensemble Learning*
  - *Online Learning*

- **Organization:**
  - Lectures and Exercises
  - Participation in Data Mining Cup
  - Opportunity to become a certified RapidMiner Data Analyst

- **Teaching staff:**
  - Prof. Heiko Paulheim (Lectures), Robert Meusel (Exercises)
IE 671: Web Mining

- Cover specific methods for mining knowledge from Web content and Web usage data:
  1. Web Usage Mining
  2. Recommender Systems
  3. Web Structure Mining
  4. Social Network Analysis
  5. Web Content Mining
  6. Information Extraction
  7. Sentiment Analysis

- Organization:
  • Lectures and Exercises
  • Student projects (second half of semester)

- Tools:
IE 663: Web Search and Information Retrieval

- Understanding end-to-end search systems
IE 663: Web Search and Information Retrieval

Instructor: Prof. Dr. Simone Paolo Ponzetto

Main Topics:

1. Information Retrieval
   - Boolean and vector space retrieval models
   - Probabilistic information retrieval
   - Evaluation of retrieval systems

2. Web search
   - Crawling
   - Link-based algorithms

3. Multimedia Information Retrieval
XXX: Process Mining

- Lecturer: Prof. Dr. Josep Carmona
- Date: Wednesday 13:45 am – 17:00 pm
- Organization
  - Lectures, exercises, tools, applications!
  - *Process Mining Challenge!* (third half semester)
  - Passing the course: written exam + challenge
- **What is Process Mining??** (1m42s video)
- Tools:
  - ProM (TU/e, Eindhoven)
  - PMLAB (UPC, Barcelona)
  - Disco (Fluxicon, Eindhoven)
CS 703: Database Analytics Seminar

- **Topic**
  - Large-scale data management and data mining
  - Two tracks: systems and data mining
  - Example topic: Pregelix: Big(ger) Graph Analytics on A Dataflow Engine

- **For whom?**
  - Master students (4 ECTS)
  - Bachelor students (5 ECTS)
CS 703: Database Analytics Seminar

- **Organization**
  - Select a topic and register until Feb 10th (see website)
  - Explore literature, write report, present, peer-review
  - Block seminar at the end of semester

- **Who?**
  - [Prof. Dr. Rainer Gemulla](http://dws.informatik.uni-mannheim.de/en/teaching/courses-for-master-candidates/cs-703-data-analytics-seminar/), [Kaustubh Beedkar](http://dws.informatik.uni-mannheim.de/en/teaching/courses-for-master-candidates/cs-703-data-analytics-seminar/)

- **Website & news**
Team Project: Sequential Pattern Analytics

- Goals
  - Mine patterns from a large real-world datasets (e.g., Netflix, Amazon, New York Times)
  - Develop methods to explore and browse patterns
  - Build an interactive tool for pattern analytics

- Organization
  - Supervisors: Prof. Dr. Rainer Gemulla, Kaustubh Beedkar
  - Prerequisites: Programming, data mining I, motivation
  - Participants: 3-5
  - Language: English
The DWS group continuously hires good students.

- To work on:
  - Data and Web Mining projects
  - Information Extraction and Integration projects
  - Knowledge Representation and Reasoning projects
  - Implement open source tools

- 30-60 h/month contracts are possible.

- Contact PostDoc or Professor responsible for the project/area that you are interested in.
  - Include CV and overview about your marks.

- Good start for writing your master thesis within group.
Research Data Service Center

We support researchers in creating, using and manipulating data.

- Researchers ask for help for challenges that need programming skills they lack (e.g. political scientists)

- Our student assistants (you?) tackle the task
  - Programming (information extraction, web mining, data transformation, database design)

- The researchers can worry about their scientific analysis, while we deal with the technical stuff

- Contact:
  johannes@informatik.uni-mannheim.de
Writing your Master Thesis

- We accept about 15 Students per year
- Selection will be based on skills (typically acquired in our lectures)
- We frequently offer theses topics in cooperation with companies like Daimler, Roche or SAP (if you are interested, ask us)

- How to find a topic:
  - Open topics are listed on the DWS website
  - If you liked a lecture, ask the instructor for additional open topics
  - Bring your own ideas and discuss them with us
  - Work as Hiwi in one of our projects