Master Specialization in "Knowledge Engineering"

Pavel Kordík, Ph.D.

Department of Computer Science
Faculty of Information Technology
Czech Technical University in Prague

Prague, Czech Republic

http://www.fit.cvut.cz/en
Content

- Business intelligence job market
- Education of BI specialists, data scientists and engineers
- New Knowledge Engineering master specialization
  - Prerequisites
  - Core modules
  - Optional and supplementary modules
- Basic research and open source projects
- Cooperation with Industry and Applied Research
- Conclusion
The need for BI specialists, data scientists and engineers

Big Data Jobs

There will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions.

- McKinsey Global Institute, Big data: The next frontier for innovation, competition, and productivity (2011)

Not enough data scientists, MIT expert tells Computing journal

There are too few data scientists in the world and education needs to change in order to maximise the true potential of data science, one of the leading authorities in the field has told Computing. Data revolution will dwarf the internet revolution.
Data Science Education Opportunities

Data Science master programs at major universities

- University of Washington
- Berkley University
- New York University
- Columbia University
- Stanford University
- Oklahoma State University
- Illinois Institute of Technology

91% of marketing leaders believe successful brands use customer data to drive business decisions *(Source: BRITE/NYAMA)*

65% of companies deploy Big Data technology to boost the speed and quality of business decisions *(Source: CIO)*

Knowledge Engineering Master Specialization

Due to the strong demand from industry, we are opening new master specialization on Knowledge Engineering. A successful graduate of our specialization will predominate with **strong programming background** and **deep theoretical insight**.

**Keywords**

- Data Mining, Analysis, Integration, Preparation, Reporting, Visualization
- Pattern Recognition, Statistics and Probability
- Computational Intelligence Methods, Neural Networks, Evolutionary Algorithms, Swarms, Nature Inspired Methods
- Knowledge Discovery from Databases, Deployment, Business Intelligence
- Functional and Logical Programming, Lisp, Prolog
- Information Systems, Database Systems
Prerequisites and Related Bachelor Programs

Enrolling students should be familiar with the basic statistic which is obligatory for majority of bachelor programmes worldwide. We prefer students with excellent algoritmization skills and programming background in Java or C++ and basic knowledge of databases and artificial intelligence.

Absolvents of bachelor programs @ FIT CTU acquired extensive theoretical knowledge of

- math (mathematical analysis, mathematical logic, linear algebra, discrete mathematics, probability and statistics)
- theoretical informatics (algorithmics, data structures, theory of languages and automata)
- HW and SW architecture (digital and analog circuits, processors and HW architecture, operating systems, databases, computer networks, security, software engineering).
Core modules

- Data Preprocessing **MI-PDD**
- Pattern Recognition **MI-ROZ**
- Computational Intelligence Methods **MI-MVI**
- Knowledge discovery from databases **MI-KDD**
- Functional and Logical Programming
- Advanced Information Systems
- Advanced Database Systems
- Statistics for Informatics

And several individual project modules ...
Optional and Supplementary Modules

Related modules in the Informatics master program @ FIT CTU

- Data Mining Algorithms
- Big Data
- Web Data Mining
- Retrieval of Multimedia Content on the Web
- Web 2.0
- Semantic Web
- Integration in Information Systems
- Management of Business Informatics
- User Interface Design
- Advanced Algorithms
- Modern Internet Technologies
- Web Services and Middleware
- Modelling of Business Processes
- Security and Secure Programming
# Students involvement in research and open source projects

## Selected research projects
- Automated knowledge extraction
- Metalearning and metaoptimization
- Big data infrastructures
- New ensemble methods for predictive models, recommender systems and clustering

## Selected open source projects
- FAKE GAME - automated data mining
- JCOOL and JCOP - java optimization libraries
- SOM and ModViz - Rapidminer extensions
- CLUEMINER - data clustering framework

## New startup company
- Modgen - precise predictive models
Cooperation with Industry and Applied Research

We have running projects with industrial partners (anomaly detection, fraud detection, movies recommendation, cell response clustering, mastitis prediction, pattern recognition etc).

Important!

- Visit **Data Science Laboratory** at FIT CTU. Website: http://datalab.fit.cvut.cz/
- **System for cooperation of students with industry** offers several data science projects with sponsored by companies. Website: http://is.fit.cvut.cz/ (you’ll need to sign NDA to log in)

Students of the knowledge engineering specialization can be funded from these projects (when approved) gain practical skills and elaborate their theses at the same time.
Conclusion

The flexibility of the public education is increasingly important as job markets change rapidly. Our faculty offers modern specializations designed for future informatics positions.

Join the program Cooperation with industry @ FIT CTU.

Contact us:
Tomáš Borovička, borovto1@fit.cvut.cz, Pavel Kordík, kordikp@fit.cvut.cz