Introduction to Data Analytics and Artificial Intelligence

📅 December 21-23   💳 $ 1000   🏅 4 credits

The objective of the course is to learn analytical models and overview quantitative algorithms for solving data-driven and business problems. We will show how various data science and analytics techniques such as basic statistics, regressions, uncertainty modeling, simulation and optimization modeling, data mining and machine learning, text analytics, artificial intelligence, and visualizations can be implemented and applied using Python. Python and IBM Watson Analytics are modeling and visualization software used in this course.

The course consists of three phases: study sessions, project preparation, and project defense.

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In 2010 Oleksandr obtained a Ph.D. degree in Computer Science at the McMaster University, Hamilton, ON, Canada. Currently he works as an adjunct professor at the University of Toronto. Additionally, as a senior research analyst, Oleksandr conducts research on risk management, financial modeling and optimization; develop, implement and test risk management, portfolio optimization and insurance models.

In 2014 he received an IBM Outstanding Technical Achievement Award. And in 2012 – an Eminence and Excellence IBM Award to Quantitative Research Group Members of IBM Risk Analytics.

Preliminary Course Outline

Day 1 – Friday (9:00-20:00)

Lecture 1: Introduction to data science and analytics
- Data science concepts
- Application areas of quantitative modeling

Lecture 2: Python programming, data science software
- Introduction to Python
- Comparison of Python, R and Matlab usage in data science

Lecture 3: Basic statistics

Lecture 4: Overview of mathematics and linear algebra
- Linear algebra and matrix computations
- Functions, derivatives, convexity

Day 2 – Saturday (9:00-20:00)

Lecture 1: Optimization

Lecture 2 and 3: Modeling techniques, regression
- Mathematical modeling process
- Linear regression
- Logistic regression
- Regression case studies in IPython

Lecture 4: Simulation modeling
- Random number generation
- Monte Carlo simulations
- Simulation case studies in IPython

Lecture 5: Data visualization and visual analytics

Day 3 – Sunday (9:00-20:00)

Lecture 1 and 2: Data mining and machine learning
- Classification (decision trees)
- Clustering (K-means, Fuzzy C-means, Hierarchical Clustering, DBSCAN)
- Association rules
- Intro to advanced supervised machine learning algorithms (Naive Bayes, k-NN, SVM)
- Data mining case studies in IPython

Lecture 3 and 4: Cognitive computing and artificial intelligence

Lecture 5: Storytelling based on analytics, analytical decision making
- Validating analytics
- Storytelling based on analytics
- Decision-making based on analytics

Day 4 (to be announced) –
Project Defense