Artificial Intelligence in Applications. Modeling, Machine Learning and Data Classifier Performance

Course number:	7540
Hours per week:	2
ECTS:	2
Scheduled:	Winter and Summer Term
Format:	Lectures / seminar presentations / lab practice
Examination:	60% oral exam (20 min.) & 40% active cooperation during the seminar
Lecturer:	Prof. Dr. Galia Weidl
Objectives:	Understanding the basics of analytical modeling for applications under heterogeneous (diverse) behavior of objects/humans. Machine learning of the model parameters from data and estimation of the Data Classifier Performance. Hands-on experience with lab practice on computer. Seminar-type lectures for all Students, including functionality demonstration of modelling and Hands-on exercises on own computer (or on available lab computer, in case of presence lectures/ seminars/ labs) Free software campus site license is available (as download link) for each participating student.
Contents:	• Basic terminology of Data Science: Data, Model, Features • Application concepts of Bayesian networks for Data Analytics, Root Cause Analysis, Classification and Decision Making • How is a model build/generated/learned? • Knowledge based modeling (encoding causal relations in the model structure) & Databased modeling and Learning (of model parameters from data) • Use of Software tools for "virtual prototyping" in SW-Design, Simulation und Testing of Bayesian networks • Modeling of heterogeneous (diverse) behavior of objects/humans as aspect of artificial intelligence in practical and technical applications. • Machine Learning in Bayesian Networks • Distinguish between Supervised and Unsupervised Learning • Preparation of data for machine learning (train, test, validate) • Interpretation of classification (decision) results • Practical applications of Bayesian Networks in areas of own choice

Pre-requisites	The first course in this series is named "Cognitive and object-oriented modeling - under uncertainties in knowledge and data - as aspects of artificial intelligence in practical applications" and it has bigger focus on Knowledge based modeling with some aspects of learning. This is the second course: "Artificial intelligence in applications. Modeling, Machine Learning and Data Classifier Performance" and it has bigger focus on learning of model and parameters from data, and evaluation of model performance.
Recommended Reading:	1) **eBook** (available from the Library of the University of Applied Sciences Aschaffenburg): Bayesian Networks and Influence Diagrams: A Guide to Construction and Analysis, 2013 Authors: Kjærulff, Uffe B., Madsen, Anders L. Tutorials and examples: http://download.hugin.com/webdocs/manuals/8.9/ 2) **eBook: Bayesian Networks & BayesiaLab — A Practical Introduction for Researchers** Authors: Stefan Conrady and Lionel Jouffe **eBook** as a free PDF: https://www.bayesia.com/articles/#!bayesialab-knowledge-hub/book