

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

Course number	7540
Hours per week:	2
ECTS:	3
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:	<p>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.</p> <p>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)</p> <p>Free software campus site license is available (as download link) for each participating student.</p>
Contents:	<ul style="list-style-type: none"> • 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	Logical thinking, high school mathematics, University Mathematics I/II are of advantage, but not a requirement

	<p>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.</p>
Recommended Reading:	<p>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.</p> <p>Tutorials and examples: http://download.hugin.com/webdocs/manuals/8.9/</p> <p>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</p>