



BUSINESS INTELLIGENCE (425)

Prof. Abraham Bernstein, Ph. D.



Lecturer:

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Office: Uni Irchel, 27-K-30
Office hours: Tuesday afternoon, contact E. Suter

Time: Monday 10-12

Start: 18.10.2004

Place: 27-H-46

Prerequisites: Required:

- Finished Grundstudium

Advantage:

- KV Datenbanksysteme
- KV Global verteilte und dynamische Anwendungssysteme

Requirements:

Sufficient quality of handed in homework assignments during the term is a prerequisite for participating at the final, which will be on 7.2.2004, from 10 - 12h .

Betreuende Christoph Kiefer Jiwen Li

Assistenten:

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Sprechstunden: TBA TBA

INTRODUCTION

Over the past years, the appearance of applications requiring or benefiting from (classical) artificial intelligence has accelerated. For example, electronic markets for the buying and selling of goods and services over the Web is a fast-growing, multi-billion-dollar segment of the world economy. Knowledge-based techniques for product recommendation, auctions, need identification, vendor selection, negotiation, agent communication, ontologies, business rules, and information integration are of rising interest and have started having practical impact on real Web e-markets.

This class covers the foundational theories (mostly) from the field of (classical) artificial intelligence that have made it possible to evolve to more “intelligent” applications. It will cover areas such as knowledge representation and reasoning (increasingly important through the semantic web effort of the w3c), problem solving, planning, natural language processing, and reasoning under uncertainty. For each of the subjects it will cover the underlying theories and provide an insight into practical applications using those techniques.

Please note that though this class does *not* attempt to answer the grand old question of artificial intelligence: How to build an artificial intelligence? Its goal is to present methods found during this quest that have been surprisingly useful in practical applications.

LITERATURE

Russel, S., & Norvig, P. (1995). Artificial Intelligence: A Modern Approach. Upper Saddle River, NJ: Prentice-Hall.

Please Note: There is a newer and much improved second edition (published 2003) with some relevant new chapters. I will try to make those chapters available in some form. Copies of the book should be available in the IfI library.

Additional articles (maybe even book chapters) will be published on-line and in the IfI library.

SLIDES

I will try to post the slides on the web-site (<http://www.ifi.unizh.ch/ddis/bi2004.0.html>) one day before class.

ASSIGNMENTS

We have planned three assignments for this class (although the number might change. The assignments are usually a combination of on-line exercises to improve the understanding of the material (which we will not check/grade), some pencil and paper calculations/exercises (to be handed in), and some programming assignment (also to be handed in).

The assignments (with both the on-line exercises and the available programming libraries) will be posted on the course web-site. You can implement the solutions in any programming language you want, we will, however, only support you in the language of the assignment (usually Java, maybe some Prolog).

SUBJECTS ADDRESSED

The following subjects will be covered in class:

- Searching
 - Heuristic search methods, Constraint satisfaction, Alpha-Beta Min-Max
 - *Applications*: Scheduling (airplanes, time-tables), Routing (trains, circuit boards)
- Knowledge representation and reasoning, business rules
 - Why logic and reasoning?, building a knowledge base, inference, semantic translation, inference in First Order Logic
 - *Applications*: Expert Systems (Loan Approvals), Semantics (for data interchange/integration)
- Learning
 - Bayesian methods (naïve Bayes), Tree inducers
 - *Applications*: Spam filtering, Credit scoring, House price estimation (hedonic pricing)
- Probabilistic reasoning & learning
 - (Bayesian) Belief Networks, Hidden Markov Models
 - *Applications*: Clippy, Speech recognition
- Natural language processing
 - Information extraction, question answering etc.
 - *Applications*: Event monitoring, automated question answering

TIMETABLE

Time	Subject	Readings (Chapters)	Assignment
Mo	18.10.	Introduction	
		<i>Intelligent search</i>	
		Heuristic Methods, Constraint Satisfaction	
Mo	25.10.	Scheduling, Routing and Games	A1 out
		<i>Knowledge intensive processing</i>	
Mo	1.11.	Logic review (Propositional Logic, First Order Logic)	
Mo	8.11.	Building a knowledge base, Ontologies	A1 back
Mo	15.11.	Inference, Expert Systems	A2 out
Mo	22.11.		
		<i>Learning</i>	
Mo	29.11.	Tree inducers	
Mo	6.12.	Bayesian Methods	
Mo	13.12.	Spam filtering, fraud detection, house price estimation	A2 back
		<i>Probabilistic learning & reasoning</i>	
Mo	20.12.	Bayesian Belief Networks – Clippy and Co.	A3 out
		14 (in particular beginning < 14.5)	
		X-Mass break	
		<i>Probabilistic learning & reasoning</i>	
Mo	10.1.	Hidden Markov Models – Speech Recognition	
		<i>Natural Language Processing</i>	
Mo	17.1.	Text mining, Information extraction, Question answering	A3 back
Mo	24.1.	Event monitoring, Automated question answering	
Mo	31.1.	Summary session	
Mo	7.2.	Final exam	

Real world applications shown in *courier font*.