Teaching at the Institute for Artificial Intelligence

SS 2015

see also:

http://ai.uni-bremen.de/teaching

Prof. Michael Beetz

Universität Bremen
Faculty 3 - Informatics

Research Area: AI (Cognition-enabled Technical Systems)

Artificial Intelligence, but

- System view (understanding by building)
- Physically embedded (sensors and actuators)
- “robotic agents”

Examples: smart phones, quality of life technology systems, supply chains, factory co-workers, ambient intelligent environments, (underwater-) robot scientists, human/robot rescue teams

Characteristics of our Research Field: Incredible Progress

Autonomous Driving

[Google]

Watson

[IBM]

Siri

[Siri/Apple]

Next years:

- Building 3D models with smartphones (objects, environments)
- Knowing everything about what you see (Google goggles, Google glasses)
- Computer systems reading medical research papers to generate diagnoses (Watson, big data)

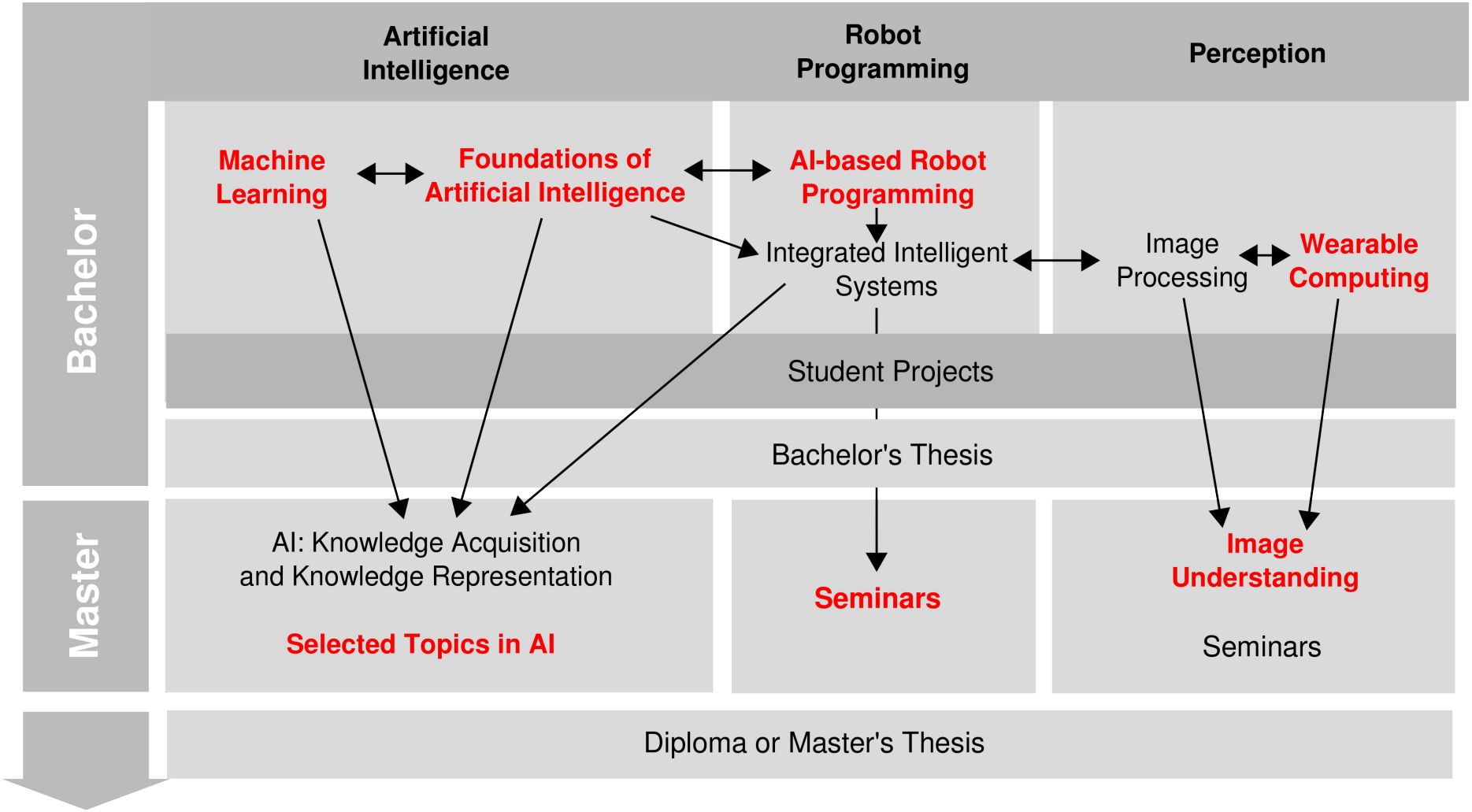
Characteristics of our Research Field: Disruptive Technologies

"Technologies that will transform life, business, and the global economy"

Report from McKinsey Global Institute, May 2013

Disruptive Technologies 1-6	Disruptive Technologies 7-12
1. Mobile Internet	7. Next generation genomics
2. Automation of knowledge work	8. Enery storage
3. The "internet of things"	9. 3D printing
4. Cloud technology	10. Advances materials
5. Advanced robotics	11. Advances oil/gas exploration
6. (Near-) autonomous vehicles	12. Renewable energy

Teaching at AGKI: Overview



Grundlagen der Künstlichen Intelligenz

Foundations of Artificial Intelligence

Inhalte:

- Problemlösen durch Suche
  - Uninformierte Suche
  - Informierte Suche
  - Constraint Satisfaction Problems
- Wissensrepäsentation & Logisches Schlussfolgern
  - Aussagenlogik
  - Prädikatenlogik
- Schließen unter Unsicherheit
  - Wahrscheinlichkeitstheorie
  - Bayes'sche Netze
- Lernende Agenten
  - Entscheidungsbaum Lernen
  - Reinforcement Learning

Formales:

- V: 2 SWS Di 10:00 – 12:00 Uhr
  Raum: MZH 1090
- Ü: 2 SWS Mi 16:00 – 18:00 Uhr
  Raum: MZH 1380/1400

- Dozent: Prof. Michael Beetz
- Übungsleitung: Daniel Nyga

- ECTS: 6

- Vorlesung und Übung in Deutsch
- V-Start: 14.04.2015
- Ü-Start: 22.04.2015

Machine Learning

Decision Trees, Bayes' Nets, Regression

Graphical Models

Classification 1: Neuronal Nets, Backprop & Co.

Classification 2: Support/Bit Vector Machines & Co.

Clustering: k-means & Co.

Rules: Words, Macros, Association Rules & Co.

Reinforcement Learning: Value Iteration & Co.

Recommender Systems: Collaborative Filtering & Co.

Regular Languages: Automata Learning, ID & Co.

Evolutionary Learning: GAs & Co.

Monte-Carlo (Tree) Search: Bandits, UCT, NMCS, NRPA, & Co.

Learning Theory: PAC & Co.

Deep Learning: Deep Mind & Co.

Formales:

Prof. Stefan Edelkamp

- V: 2 SWS Di 12-14 Uhr
- V+Ü: 2 SWS Do 12-14 Uhr
- Ort: ECO5 (TAB) 2.63
- VAK: 03-BE-799.01
- ECTS: 6
- empf. Voraussetzung: KI 1
- Prüfungen: Mündliche Prüfung oder Übungen & Fachgespräch,
- Vorlesung in Deutsch/Englisch
- Start: 14.4.2015

Artificial Intelligence

KI-basierte Robotersteuerung

Inhalte:

- Einführung in:
  - Robotersteuerung mittels ROS
  - Roboter-Plan-Systeme und dynamische Planausführung
  - Gelenksteuerung und Objektmanipulation
  - Künstliche Wahrnehmungs-systeme und Bild-Interpretation
  - Wissensbasierte Systeme

Formales:

- V: 2 SWS Di. 14-16 Uhr
- Ort: ECO5 (TAB) 2.63
- VAK: 03-BE-710.98c
- ECTS: 4
- Prüfungen: Ausarbeitung und Vortrag
- Vorlesung in Deutsch
- Start: 14.04.2015

The **Wearable Computing** lecture is held interactively with you and the main focus on experiencing and developing real wearable computing applications

Credits	**6 ECTS VAK– 03-MB-799.01** **Lecture with exercise for computer science and digital media students**
Semester	**SS 2015**
Presenter	**Prof. Dr. Michael Lawo** mlawo@tzi.de Tel: 64002, TAB, 1.90 **Dr. Hendrik Witt** hendrik.witt@ubimax.de
Tutor	**Stefan Brending** brending@tzi.de, **Alexej Wagner** spirit@tzi.de
Language	**English/German only if all participants are native speakers**
Fixed dates	**Lecture: 13.4. (1 h Introduction), 20.4., 11.5. and 18.5.2015** **Instructions/Tutorials: 1.6., 29.6. and 17.7.2015 (Friday!)** **Mo. 14:00 - 18:00, Place: TAB/ECO5 room 0.31**
Notice	**Final exam with presentation and report: 17.7.2015** **Prerequisite: PI, SWP** **Organizational Issues and Materials at the Stud.IP page**

Summary & Additional Courses

- Lectures:
  - Grundlagen der Künstlichen Intelligenz
  - Machine Learning
  - Wearable Computing
  - Selected Topics in AI: Wissensakquise und Wissensmanagement
  - Einführung in die Computerlinguistik für FB10
- Practical Course:
  - AI-based Robot Programming
- Seminars:
  - Image Understanding
  - Reading Group in AI
  - Graduiertenseminar KI

Visit http://ai.uni-bremen.de/teaching