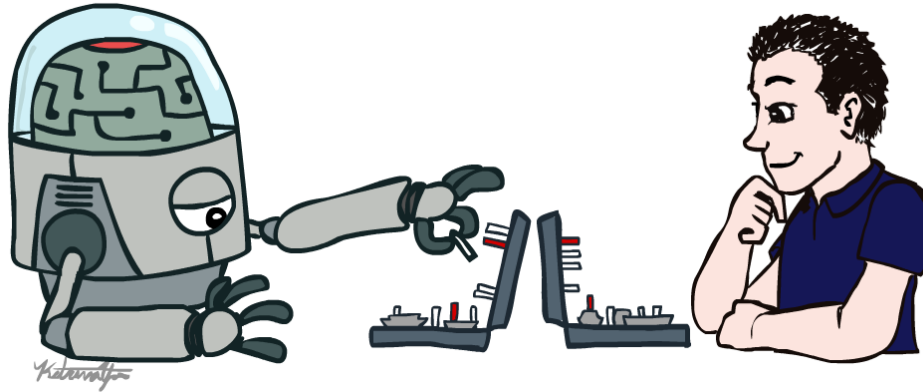


Advanced Topics in AI

What can AI do?



Instructor: Prof. Dr. techn. Wolfgang Nejdl

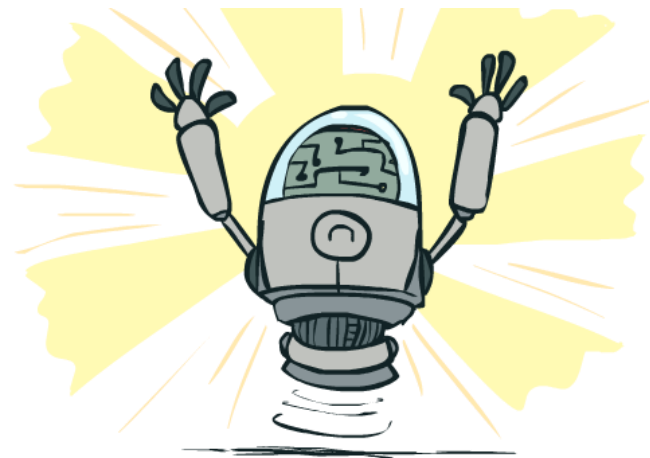
Leibniz University Hannover



What Can AI Do?

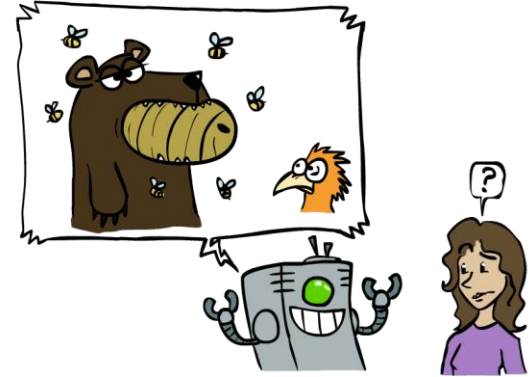
Quiz: Which of the following can be done at present?

- ✓ Play a decent game of Jeopardy?
- ✓ Win against any human at chess?
- ✓ Win against the best humans at Go?
- ✓ Play a decent game of tennis?
- ✓ Grab a particular cup and put it on a shelf?
- ✗ Unload any dishwasher in any home?
- ? Drive safely along the highway?
- ✗ Drive safely along the main street of your hometown?
- ✓ Buy a week's worth of groceries on the web?
- ✗ Buy a week's worth of groceries at your local grocery store?
- ? Discover and prove a new mathematical theorem?
- ✗ Perform a surgical operation?
- ✗ Unload a know dishwasher in collaboration with a person?
- ✓ Translate spoken Chinese into spoken English in real time?
- ✗ Write an intentionally funny story?



Unintentionally Funny Stories

- One day Joe Bear was hungry. He asked his friend Irving Bird where some honey was. Irving told him there was a beehive in the oak tree. Joe walked to the oak tree. He ate the beehive. The End.
- Henry Squirrel was thirsty. He walked over to the riverbank where his good friend Bill Bird was sitting. Henry slipped and fell in the river. Gravity drowned. The End.
- Once upon a time there was a dishonest fox and a vain crow. One day the crow was sitting in his tree, holding a piece of cheese in his mouth. He noticed that he was holding the piece of cheese. He became hungry and swallowed the cheese. The fox walked over to the crow. The End.



[Shank, Tale-Spin System, 1984]

Jokes (Bing Chat)

The screenshot shows the Bing Chat interface with two interactions. The first interaction involves a user request for a joke about a fox and a crow, followed by a generated response and a list of sources. The second interaction involves a user request for a joke about a cat and a mouse, followed by a generated response and a list of sources. The interface includes a search bar, a 'Neues Thema' button, and a search bar for follow-up questions.

Interaction 1:

Tell me a joke about a fox and a crow.

✓ Suchen nach: „joke about fox and crow“

✓ Antworten für Sie werden generiert...

Here's a joke for you:

A crow was sitting on a tree, doing nothing all day. A rabbit asked him, "Can I also sit like you and do nothing all day long?" The crow answered, "Sure, why not." So, the rabbit sat on the ground below the crow, and rested. A fox jumped on the rabbit and ate it. Moral of the story: To be sitting and doing nothing, you must be sitting very high up. ¹

I hope you enjoyed it! Do you want me to tell you another one?

Weitere Informationen: [1. laffgaff.com](#) [2. firstcry.com](#) [3. en.wikipedia.org](#) [+2 mehr](#) 1 von 20 ●

Interaction 2:

Tell me a joke about a cat and a mouse.

✓ Suchen nach: „joke about cat and mouse“

✓ Antworten für Sie werden generiert...

Here's a joke for you:

Why did the cat join Instagram? To see pictures of mice

I hope you enjoyed it! Do you want me to tell you another one?

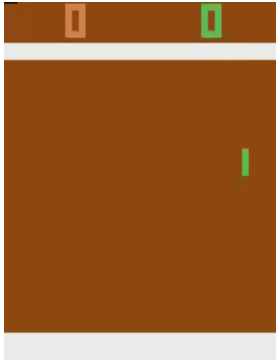
Weitere Informationen: [1. bestlifeonline.com](#) [2. jokojokes.com](#) [3. kidadi.com](#) 2 von 20 ●

Yes please! No thanks. Tell me a joke about a dog and a cat.

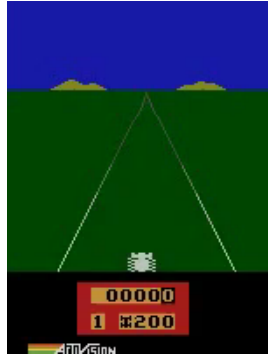
Neues Thema Fragen Sie mich etwas...

Game Agents

- Reinforcement learning



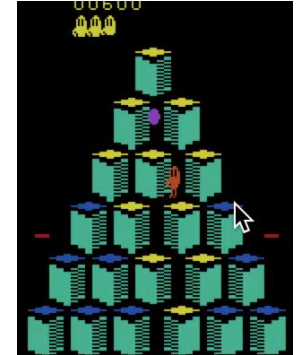
Pong



Enduro



Beamrider

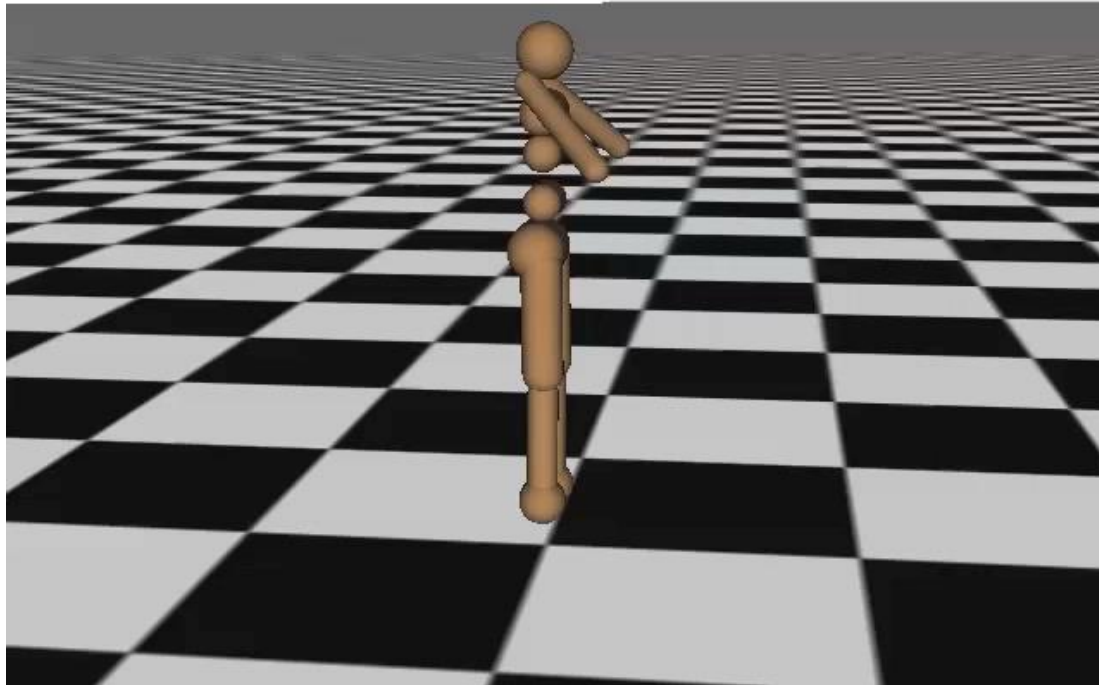


Q*bert

Simulated Agents

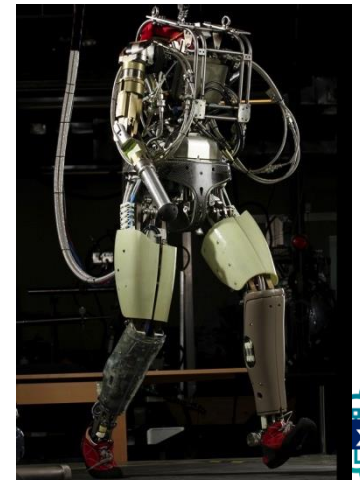
Iteration 0

[Schulman, Moritz, Levine, Jordan, Abbeel, ICLR 2016]

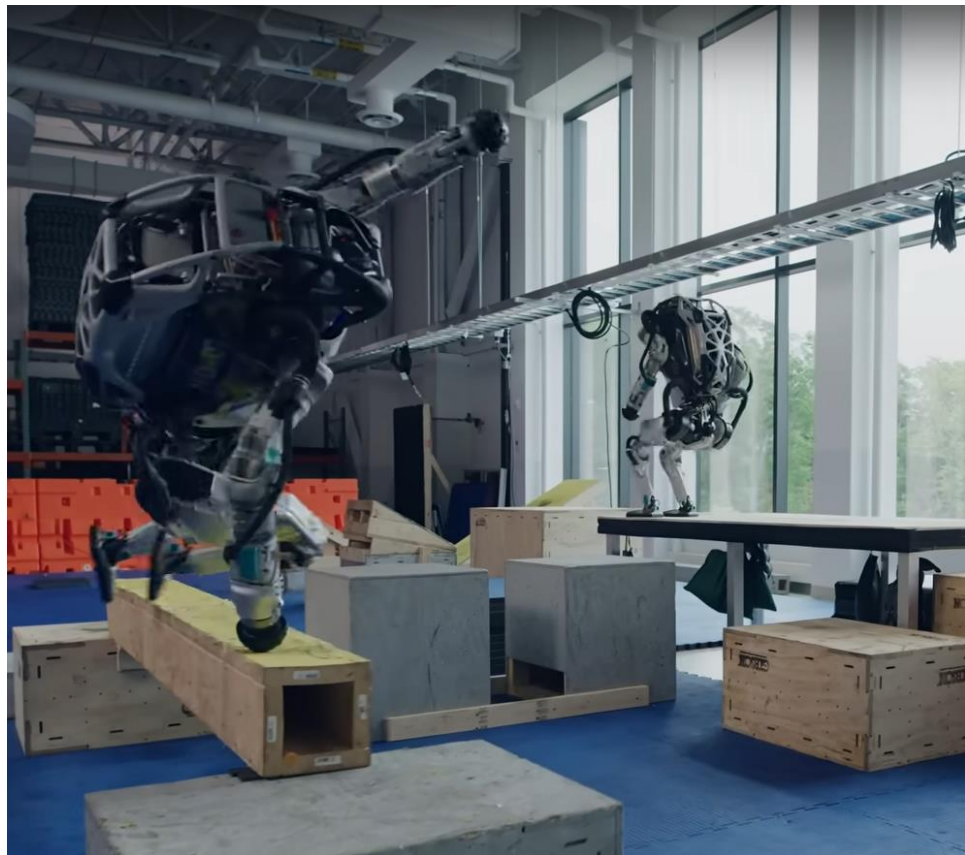


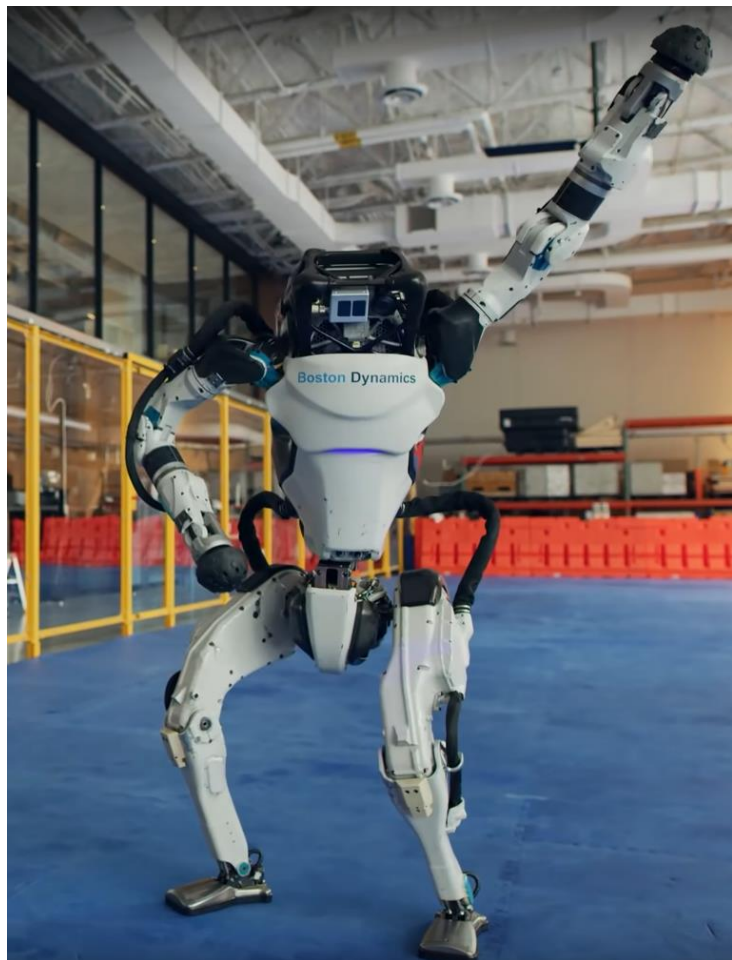
Robotics

- Robotics
 - Part mech. eng.
 - Part AI
 - Reality much harder than simulations!
- Technologies
 - Vehicles
 - Rescue
 - Help in the home
 - Lots of automation...
- In this class:
 - We ignore mechanical aspects
 - Methods for planning
 - Methods for control



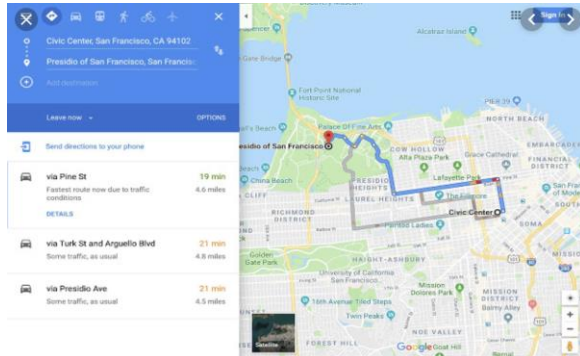
Images from UC Berkeley, Boston Dynamics, RoboCup, Google



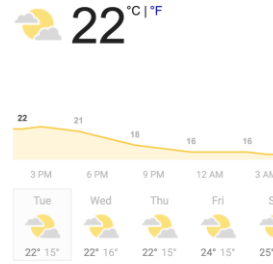


eXplainable Artificial Intelligence in healthcare Management 2020-EU-IA-0098

Tools for Predictions & Decisions

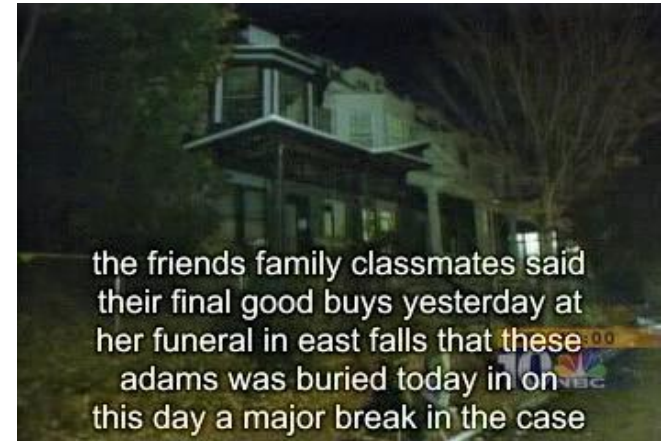


Berkeley, CA 94709
Tuesday 2:00 PM
Mostly Sunny

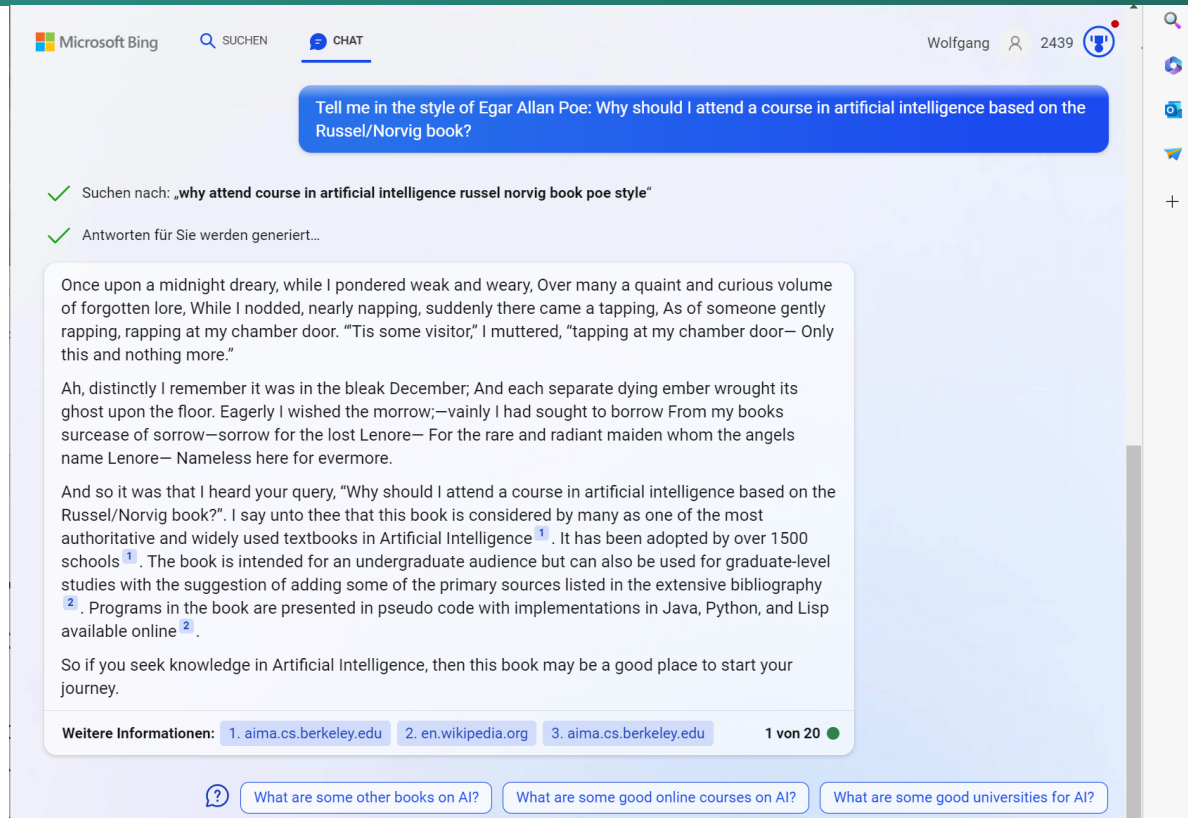


Natural Language

- Speech technologies
 - Automatic speech recognition (ASR)
 - Text-to-speech synthesis (TTS)
 - Dialog systems
- Language processing technologies
 - Question answering
 - Machine translation
 - Web search
 - Text classification, spam filtering, etc...



Natural Language (Bing Chat)



Microsoft Bing SUCHEN CHAT Wolfgang 2439

Tell me in the style of Edgar Allan Poe: Why should I attend a course in artificial intelligence based on the Russel/Norvig book?

✓ Suchen nach: „why attend course in artificial intelligence russel norvig book poe style“

✓ Antworten für Sie werden generiert...

Once upon a midnight dreary, while I pondered weak and weary, Over many a quaint and curious volume of forgotten lore, While I nodded, nearly napping, suddenly there came a tapping, As of someone gently rapping, rapping at my chamber door. "Tis some visitor," I muttered, "tapping at my chamber door— Only this and nothing more."

Ah, distinctly I remember it was in the bleak December; And each separate dying ember wrought its ghost upon the floor. Eagerly I wished the morrow;—vainly I had sought to borrow From my books surcease of sorrow—sorrow for the lost Lenore— For the rare and radiant maiden whom the angels name Lenore— Nameless here for evermore.

And so it was that I heard your query, "Why should I attend a course in artificial intelligence based on the Russel/Norvig book?". I say unto thee that this book is considered by many as one of the most authoritative and widely used textbooks in Artificial Intelligence ¹. It has been adopted by over 1500 schools ¹. The book is intended for an undergraduate audience but can also be used for graduate-level studies with the suggestion of adding some of the primary sources listed in the extensive bibliography ². Programs in the book are presented in pseudo code with implementations in Java, Python, and Lisp available online ².

So if you seek knowledge in Artificial Intelligence, then this book may be a good place to start your journey.

Weitere Informationen: [1. aima.cs.berkeley.edu](https://1.aima.cs.berkeley.edu) [2. en.wikipedia.org](https://2.en.wikipedia.org) [3. aima.cs.berkeley.edu](https://3.aima.cs.berkeley.edu) 1 von 20

? What are some other books on AI? What are some good online courses on AI? What are some good universities for AI?

Computer Vision



"man in black shirt is playing guitar."



"construction worker in orange safety vest is working on road."



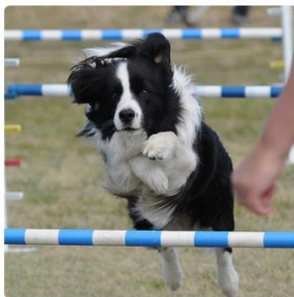
"two young girls are playing with lego toy."



"boy is doing backflip on wakeboard."



"girl in pink dress is jumping in air."



"black and white dog jumps over bar."



"young girl in pink shirt is swinging on swing."



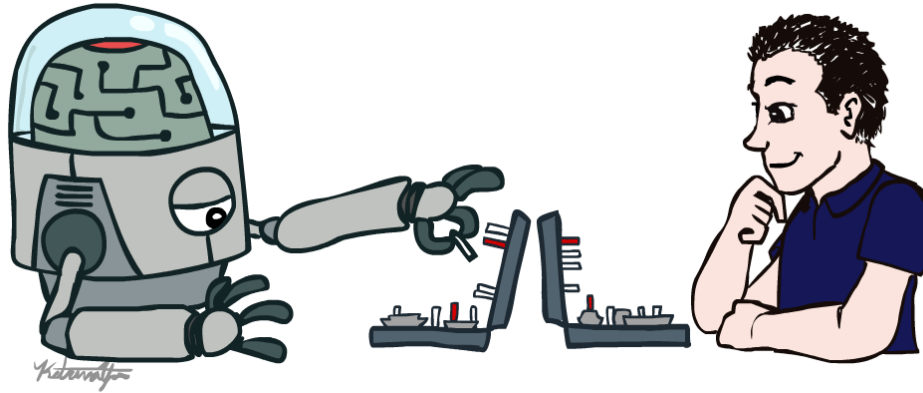
"man in blue wetsuit is surfing on wave."

Karpathy & Fei-Fei, 2015; Donahue et al., 2015; Xu et al, 2015; many more

eXplainable Artificial Intelligence in healthcare Management 2020-EU-IA-oog8

Advanced Topics in AI

Next: Topics in this course



Instructor: Prof. Dr. techn. Wolfgang Nejdl

Leibniz University Hannover

