

Modul: 5171040

Reasoning and Decision Making under Uncertainty

Modulprofil

Prüfungsnummer

5171040

Dauer

1 Semester

Häufigkeit des Angebots

Jedes Sommersemester

SWS

4

ECTS-Credits (CP)

5.0

Workload

Angeleitete Studienzeit:

Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)

Seminaristischer Unterricht

Lehrsprache

Englisch

Organisation

Modulverantwortung

Prof. Dr. Frank Deinzer

Dozierende

Prof. Dr. Frank Deinzer

Verwendbarkeit

MAI

Studiensemester

1. Semester

Art des Moduls

Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO

none

Empfohlene Voraussetzungen

none

Inhalte

The course is composed of 2 thematic blocks.

Block A: Reinforcement Learning

1. Basic Reinforcement Learning Concepts

- Actions and States
- Goals, Rewards, Returns and Episodes
- Policies and Value Functions

2. Basic Reinforcement Learning Methods

- Finite Markov Decision Processes
- Dynamic Programming
- Monte Carlo Methods

3. Advanced tabular learning Methods

- Temporal-Difference Learning
- Bootstrapping Methods
- 4. Learning in Continuous State and Action Spaces
- On-Policy Approximation
- Value-function Approximation
- Off-Policy Approximation
- Approximate Eligibility Traces

5. Value Function Approximation Case Studies

- Computer Vision: Action planning
- Mastering Games: Backgammon, Go

6. Applications and Exercises

Block B: Sensor Fusion

1. Using Bayes for Sensor Data Fusion

- Modeling and Estimation of Densities
- Sensor Fusion over Time

2. Hidden Markov Models and Viterbi Algorithm

3. Recursive State Estimation

- Gaussian Filters
- Nonparametric Filters

4. Applications

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung

Keine

Art der Prüfung

Sonstige Prüfung (soP) gemäß
§§ 26, 27 APO

Dauer/Form der Prüfung

Portfolio

Die konkrete Festlegung der
abzuleistenden Prüfung erfolgt
im Studienplan

Prüfungssprache

Englisch

Voraussetzung für die Vergabe von Leistungspunkten

Keine

Lernergebnisse

- Students develop further knowledge and skills on the necessary mathematical foundations for understanding and developing algorithms for AI.
- Students can apply the principles of Reinforcement Learning algorithms
- Students can use the principles of modelling agents, environments and rewards.
- Students understand the necessity of function approximations in learning.
- Students understand the concepts of statistical sensor fusion
- Students can realize sensor fusion applications
- Students build on their acquired knowledge to master learning problems.

Literatur

1. Sutton, Barto. Reinforcement Learning - An Introduction. Bradford Books, 2018
2. Thorp. Beat the Dealer. Random House. 1966
3. Mitchell. Data Fusion: Concepts and Ideas. Springer. 2014
4. Thrun, Burgard, Fox: Probabilistic Robotics. MIT Press. 2005
5. Johnson, Freund, Miller. Miller & Freund's Probability and Statistics for Engineers. Pearson

Further specialized literature will be announced in the course.