## Module title

Machine Learning (for User Interfaces)  

### Abbreviation
10-HCI=MLUI-161-m01

### Module coordinator
holder of the Chair of Computer Science IX

### Module offered by
Institute of Computer Science

### ECTS
5

### Method of grading
- numerical grade
  - Only after succ. compl. of module(s)

### Duration
1 semester

### Module level
graduate

### Other prerequisites
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### Contents

Machine learning is the science of getting computers to act without being explicitly programmed. In the past decade, machine learning has given us practical speech recognition, effective web search, self-driving cars, and a vastly improved understanding of the human genome. Machine learning is so pervasive today that you probably use it dozens of times a day without knowing it. It is one of today's prominent paradigms in HCI applicable in all areas where the understanding of user input of high variability, specifically for natural interactions using, e.g., gesture, speech, or eye-gaze, is paramount. Many researchers also think it is the best way to make progress towards human-level AI.

In this course, students will learn about the most effective machine learning techniques, and gain practice implementing them and getting them to work. Students not only learn the theoretical underpinnings of learning, but also gain the practical know-how needed to quickly and powerfully apply these techniques to new problems. Finally, they learn about some of Silicon Valley's best practices in innovation as it pertains to machine learning and AI.

This course provides a broad introduction to machine learning, data-mining, and statistical pattern recognition. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI). The course will also draw from numerous case studies and applications, so that you'll also learn how to apply learning algorithms to building gesture-based and multimodal interfaces, text and speech understanding (web search, anti-spam), smart robots (perception, control), computer vision, medical informatics, audio, database mining, and other areas.

### Intended learning outcomes

After the course, the students will be able to solve machine learning tasks on their own using assistive technologies, e.g., like Octave. In addition, they will be able to derive main principles and apply these in own programs. Students will be able to choose the appropriate approach and tools to solve a given machine learning task in various application area, specifically in HCI.

### Courses

V (2) + Ü (2)

### Method of assessment

- presentation of project results (approx. 40 minutes)
- Language of assessment: German and/or English

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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### Module appears in

Master's degree (1 major) Computer Science (2016)
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