Machine Learning: Supervised Methods

<table>
<thead>
<tr>
<th>Module-No./Abbreviation</th>
<th>Credits</th>
<th>Workload</th>
<th>Term</th>
<th>Frequency</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE-WP28/ ML:SM</td>
<td>6 CP</td>
<td>180 h</td>
<td>2nd Sem.</td>
<td>Summer</td>
<td>1 Semester</td>
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<tr>
<th>Courses</th>
<th>Contact hours</th>
<th>Self-Study</th>
<th>Group Size:</th>
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<tbody>
<tr>
<td>Machine Learning: Supervised Methods</td>
<td>4 SWS (60 h)</td>
<td>120 h</td>
<td>No Restrictions</td>
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Prerequisites
The course requires basic mathematical tools from linear algebra, calculus, and probability theory. More advanced mathematical material will be introduced as needed. The practical sessions involve programming exercises in Python. Participants need basic programming experience. They are expected to bring their own devices (laptops).

Learning goals / Competences
The participants understand statistical learning theory. They have basic experience with machine learning software, and they know how to work with data for supervised learning. They are able to apply this knowledge to new problems and data sets.

After successfully completing the module, the students
- understand the basics of statistical learning theory,
- know the most relevant algorithms of supervised machine learning, and are able to apply them to learning problems,
- know and understand the strengths and limitations of various learning models and algorithms,
- can apply standard machine learning software for solving learning problems.

Content
The field of machine learning constitutes a modern approach to artificial intelligence. It is situated in between computer science, neuroscience, statistics, and robotics, with applications ranging all over science and engineering, medicine, economics, etc. Machine learning algorithms automate the process of learning, thus allowing prediction and decision-making machines to improve with experience. This lecture will cover a contemporary spectrum of supervised learning methods. The course will use the flipped classroom concept. Students work through the relevant lecture material at home. The material is then consolidated in a 4 hours/week practical session.

Teaching methods / Language
Lecture (2h / week), Exercises (2h / week) / English

The course applies a flipped classroom format. The sessions plan is largely based on the following caltech lectures: http://work.caltech.edu/telecourse.html

Mode of assessment
Written examination (90 min, 100%)

Requirement for the award of credit points
Passed final module examination

Module applicability
MSc. Computational Engineering

Weight of the mark for the final score
6 %

Module coordinator and lecturer(s)
Prof. Dr. T. Glasmachers, Assistants

Further information