Learning Outcomes

Main topic: Algorithms for number and string problems

On successful completion, students know:
- advantages and disadvantages of different data structures in the context of strings, in particular adjacency tries.
- implementations of fundamental number and string algorithms, in particular based on dynamic programming.
- approaches to solve showcase problems like the knapsack problem, pattern matching, and string alignment.

Furthermore, students will be able to:
- model given tasks with strings in a mathematical and formal way.
- design efficient algorithms to solve the given computational number and string problems with adequate data structures and basic algorithms.
- work in teams.
- successfully participate in programming contests such as the ACM Programming Contest.

Content

The course
- gives an introduction to modeling problems especially focusing on strings,
- gives an overview on standard techniques in algorithm design for challenging computational problems on numbers and strings,
- teaches to design and implement algorithms, and
- teaches effective team work.

Module Components

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Type</th>
<th>Number</th>
<th>Cycle</th>
<th>SWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithm Coding Club</td>
<td>PJ</td>
<td></td>
<td>WS/SS</td>
<td>2</td>
</tr>
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</table>

Workload and Credit Points

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Multiplier</th>
<th>Hours</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithm Coding Club (Projekt)</td>
<td>5.0</td>
<td>2.0h</td>
<td>10.0h</td>
</tr>
<tr>
<td>Attendance in discussions of solutions</td>
<td>5.0</td>
<td>4.0h</td>
<td>20.0h</td>
</tr>
<tr>
<td>Attendance in Lectures</td>
<td>5.0</td>
<td>2.0h</td>
<td>10.0h</td>
</tr>
<tr>
<td>Preparation for programming contests</td>
<td>5.0</td>
<td>10.0h</td>
<td>50.0h</td>
</tr>
</tbody>
</table>

The Workload of the module sums up to 90.0 Hours. Therefor the module contains 3 Credits.

Description of Teaching and Learning Methods

The course has the following 3-week pattern: First, a lecture provides the necessary algorithmic basics. Second, a programming contest takes place where the students solve programming tasks in small teams (2-3 students). Third, solutions and problems occurred in the implementation will be discussed.

Requirements for participation and examination

Desirable prerequisites for participation in the courses:
Basic knowledge in algorithms, data structures, and programming is helpful.
We do not recommend participation without basic programming skills in Java or C++.

Mandatory requirements for the module test application:
No information

Module completion
Duration of the Module
This module can be completed in one semester.

Maximum Number of Participants
The maximum capacity of students is 40

Registration Procedures
Please register at QISPOS or directly at the examination office.

Recommended reading, Lecture notes

<table>
<thead>
<tr>
<th>Lecture notes:</th>
<th>Electronical lecture notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>unavailable</td>
<td>available</td>
</tr>
</tbody>
</table>

Assigned Degree Programs
This module is used in the following modulelists:

Informatik (Bachelor of Science)
StuPO 2015
Modullisten der Semester: SS 2018

Miscellaneous
Students of other degrees can participate in this module if there is enough capacity.