Computational Geometry
(Geometriske Algoritmer)

“the pizza meeting”

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Overview

1. Why an Independent Subject?
2. Example Topics
3. Applications
4. Formal Details
5. Disclaimer
One-Dimensional Data
Two-Dimensional Data
Two-Dimensional Data
Two-Dimensional Data
Two-Dimensional Data
Convex Hull
Dynamic Convex Hull
Dynamic Convex Hull
Triangulations
Example Applications

Geometric algorithms are important parts of:

- Computer Graphics
- Geographic Information Systems (GIS)
- Robot Motion Planning
- Design: CAD, VLSI, ...
- Image Analysis
- Computer Games
Course Content

**Algorithms and Data Structures for Geometric Objects**

- Triangulations and Voronoi Diagrams
- Interval and Point Searches
- Convex Hulls
- Range Searching
- Motion Planning
- etc.
Introduction to (continuation of) important general techniques:

- Line Sweeping
- Fractional Cascading
- Randomization
- Amortization
Prerequisites

Analysis of Algorithms and Data Structures

(DM507/DM508, or equivalent)

- Search Trees
- Divide and Conquer
- Asymptotic Notation
- Time and Space Analysis
- Correctness Analysis
Format

- 10 ECTS over one semester
- Obligatory assignment in parts (some individual)
- Oral exam
- 2h lectures, 2h discussion section per week
Disclaimer

- Chalk & blackboard lectures...
- Core algorithmic problems (not graphics and games)
- This is *not* math!
- But there will be proofs in every lecture (of correctness and complexity)
- Course language is English, if necessary