Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Visualisation of graphs

Organisational matters

Jonathan Klawitter · Summer semester 2020

Organisational

Lectures

- pre-recorded

Exercise sheets

- one per week
- Thursday to Thursday
- $\sim$ 20 points
- submit solutions online
- we recommend LaTeX and ipe
- we provide a template

Tutorials

- by Myroslav Kryven
- pre-recorded solutions

WueCampus website

- Please enrole

Chat

- Chat ls1-vg @ info rocket.chat
- `https://go.uniwue.de/chat-vg`
- Ask questions, discuss, ...

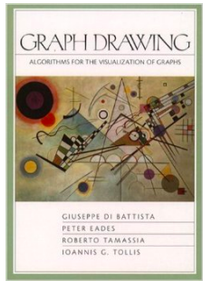
Evaluation

- Oral exam, $\sim$ 20 min
- $\geq$ 50% of points on exercise sheets
  $\Rightarrow$ 0.3 bonus

Feedback is welcomed

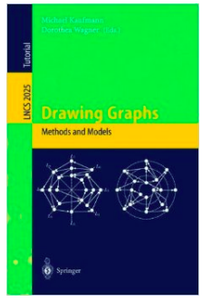
Books

[GD, Ch. 3]



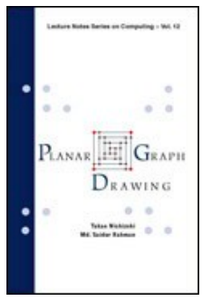
G. Di Battista, P. Eades, R. Tamassia, I. Tollis:
Graph Drawing: Algorithms for the Visualization of Graphs
Prentice Hall, 1998

[DG, Ch. 5]

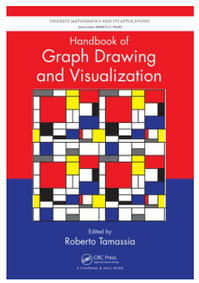


M. Kaufmann, D. Wagner:
Drawing Graphs: Methods and Models
Springer, 2001

[PGD, Ch. 4]



T. Nishizeki, Md. S. Rahman:
Planar Graph Drawing
World Scientific, 2004



R. Tamassia:
Handbook of Graph Drawing and Visualization
CRC Press, 2013
`http://cs.brown.edu/people/rtamassi/gdhandbook/`

What is this course about?

Learning objectives

- Overview of graph visualisation.
- Improved knowledge of modeling and solving problems via graph algorithms.

Visualisation problem:

- Given a graph G, visualise it with a drawing Γ.

Here:

- Reducing the visualisation problem to its **algorithmic core**.

graph class $\Rightarrow$ layout style $\Rightarrow$ algorithm $\Rightarrow$ analysis

- modeling
- data structures
- divide & conquer, incremental
- combinatorial optimization (flows, ILPs)
- force-based algorithm
- proofs

What is this course about?

Requirements

Builds on topics from ADS and AGT:

- Basic graph theory
  - Graphs, vertices, edges
  - Degree, neighbourhood, adjacent, incident
  - Connectivity, trees, cycles, paths
  - ...
- Basic algorithm analysis
  - asymptotic runtime, Big-$\mathcal{O}$
  - computational complexity, NP-completeness
  - flows, LPs
  - ...

What is this course about?

Topics

- Drawing trees and series-parallel graphs
- Straight-line drawings of planar graphs
- Orthogonal grid drawings
- Upward planarity
- Hierarchical layouts of directed graphs
- Force-based algorithm
- Contact representation
- Crossing lemma
- ...