WISSEN
TECHNIK
LEIDENSCHAFT

Lab program 1: Routing

Navigation Systems

WS 2023/24

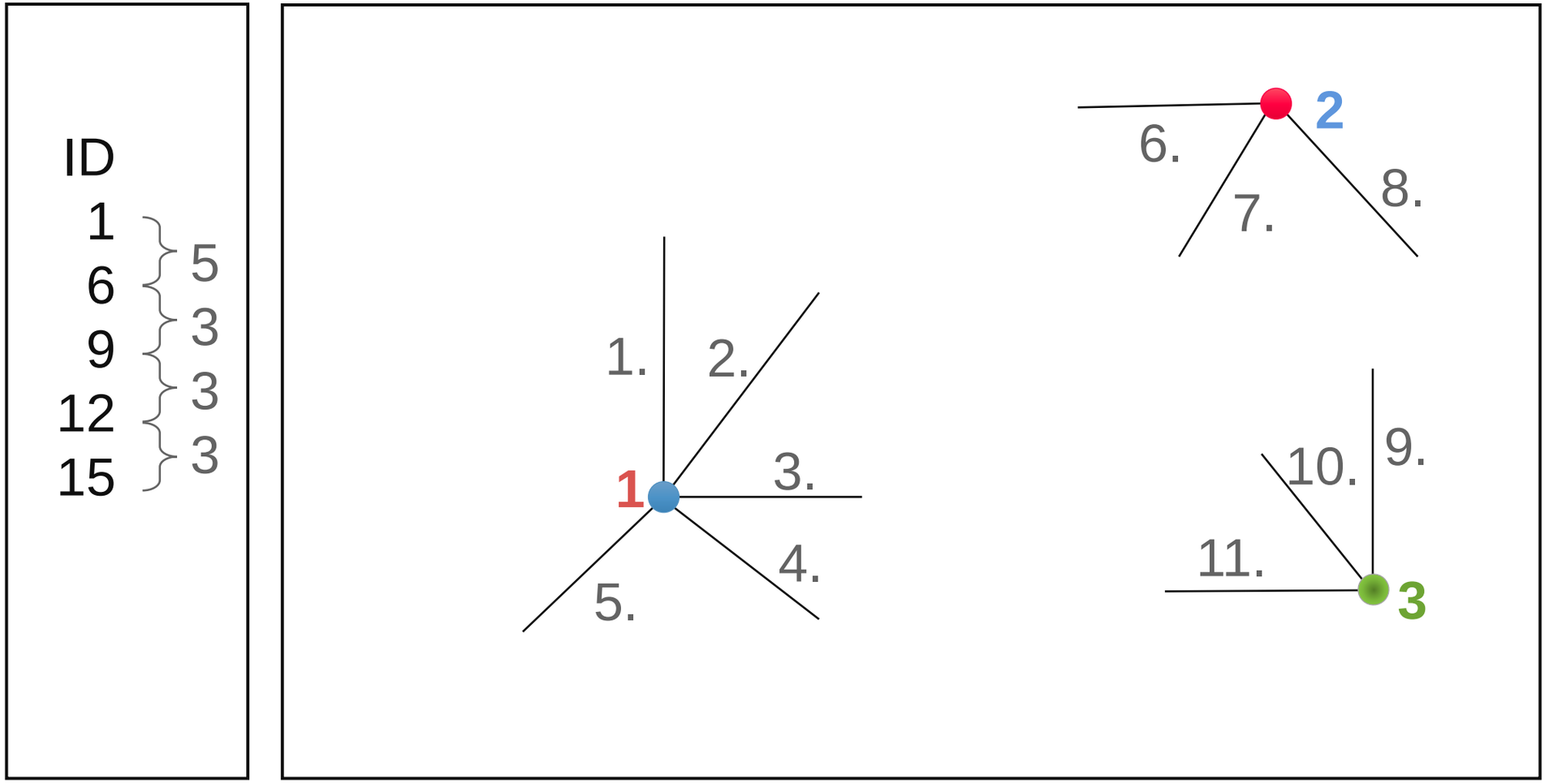
Lab 1: Routing
Aim

- Generate optimal routes
- Dijkstra algorithm
- Start node: place where you live
- End nodes:
  - Basilika Mariatrost
  - Schloss Eggenberg
  - Shopping-Center Murpark

Lab 1: Routing
Given data

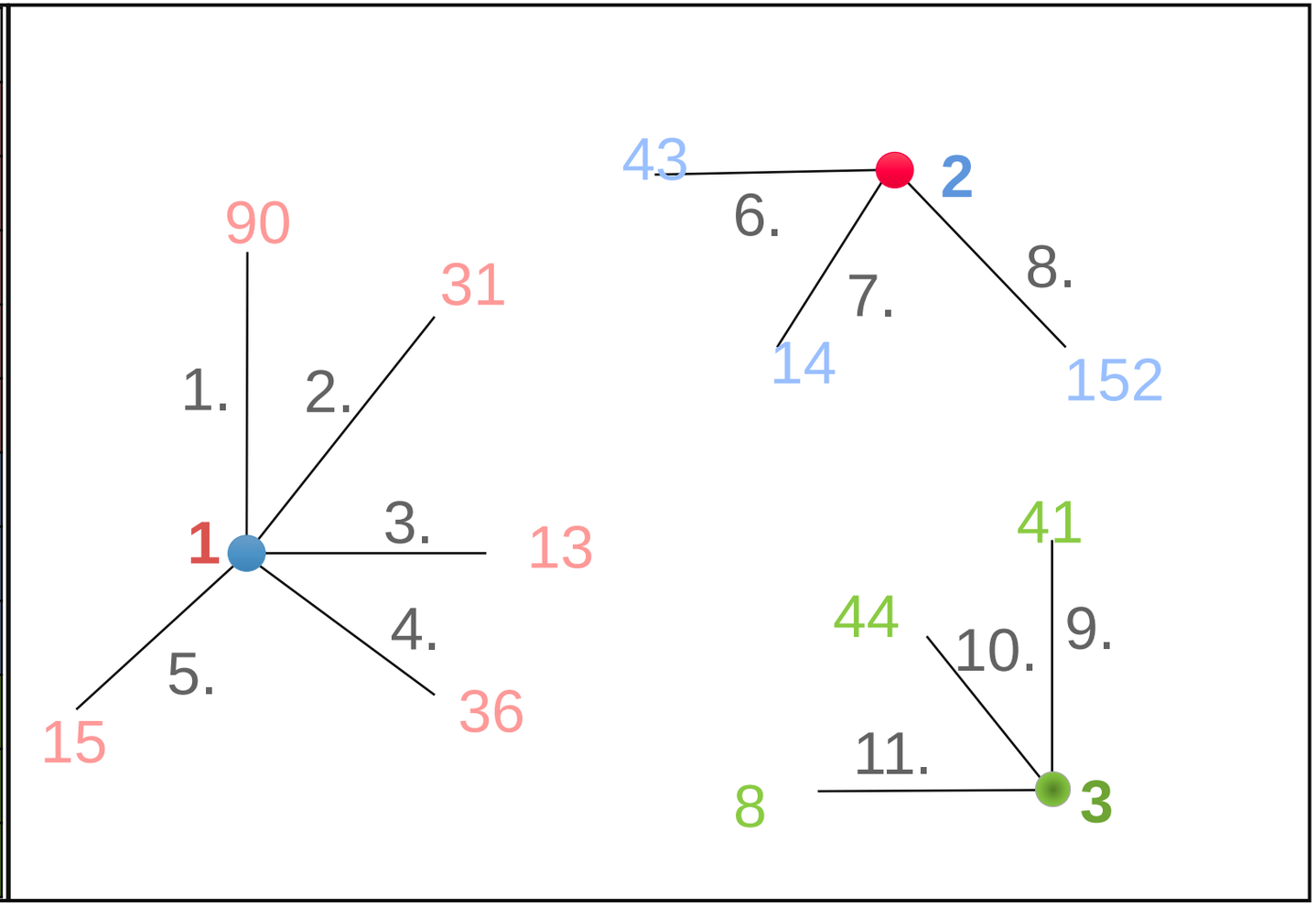
- nodepl.txt
  - Coordinates of nodes (φ and λ in degrees)
- nodelist.txt
  - Adjacency list of nodes
- arclist.txt
  - Adjacency list of arcs
  - Columns: time, distance, speed limit, clazz, flags

Adjacency list of nodes



Adjacency list of arcs

v_j	c_{ij} [m]
90	63.20
31	78.77
13	40.25
36	78.26
15	81.44
43	34.78
14	81.44
152	81.44
41	77.18
44	11.90
8	45.89



Lab 1: Routing
Tasks

- Cost functions
  - Time
  - Distance

- Additionally, choose between:
- 2.1 Self-developed cost-function for Dijkstra’s algorithm
- 2.2 Heuristic A* algorithm

Lab 1: Routing
Deliverables

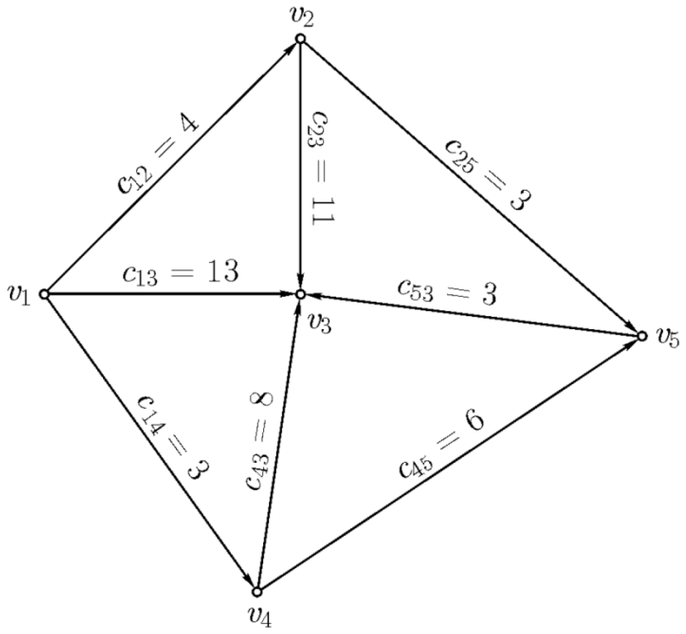
- Source code
- Presentation
  - Visualization of optimal routes (time & distance)
  - Evaluation of routes
  - Self-made cost function *or* A*-algorithm
  - 5 minutes video with audio commentary
- Peer-review of presentations

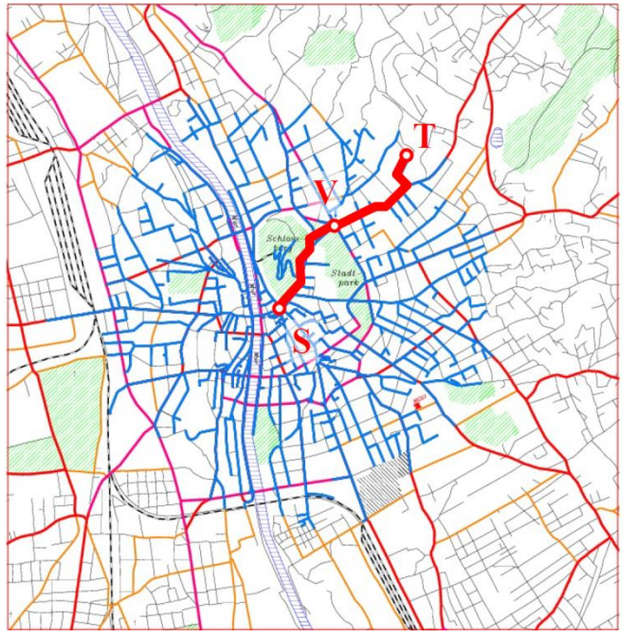
Dijkstra algorithm

- Shortest path from one node to all other nodes
- Assign temporary or permanent labels during search process
- Predecessor list

Dijkstra algorithm

- Check with small amount of data
  - Example from lecture





Results and visualization

- prelist.txt
  - Store your predecessors
  - Necessary to visualize route
- Visualization
  - Be aware of aspect ratio
  - Label your graph
  - Use appropriate line width

Evaluation

- Lab due: 15th December, 08:00 a.m.
- Source code of developed software
- Short presentation
  - Presentation: Video with audio commentary (.mp4)
  - 5 minutes
  - Peer-evaluation by 20th December

Peer-evaluation of presentations

- Watch and evaluate 3 presentations of your peers
- Assessment criteria
  - Presentation style
  - Completeness
  - Visualization of results and interpretation
  - Own cost function *or* comparison to A*

Best presentation award

- 3 best presentations will be rewarded with a small prize and will be put on TUBE