Computer Games Exercises: 2024s s11 (all)

https://www.umm.uni-heidelberg.de/miism/

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Answer header

Please put the author information in the header of all code files.

- `name (Name)`
- `coauthor list`

P01: A* algorithm

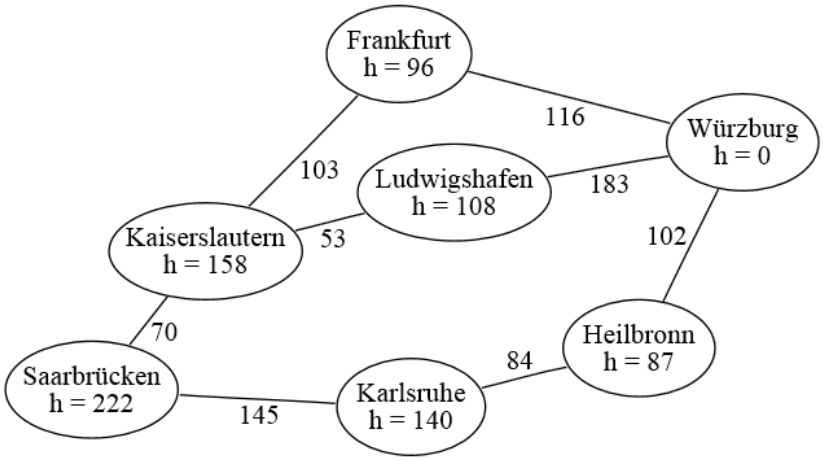
Basics

A* finds the path by selecting the node with the minimum cost. The cost of node n is computed by

$$f(n) = g(n) + h(n), \tag{1}$$

where $g(n)$ is the cost of the path from the start node to n, and $h(n)$ is a heuristic cost of the cheapest path from n to the goal.

Task



Source: https://de.wikipedia.org/wiki/A*-Algorithmus

Read the source code of the game `"A-star"` and extend the game.

- Implement the A* algorithm. If necessary, additional functions may be added to make the code elegant.
- Compute and show the shortest path from `Saarbrücken` to `Würzburg` in the scene. The related costs are shown in the figure above.
- Display the result path in the scene.
- Display the open list entries in the console after each update of the list. (If multiple neighbors of one node are added to the open list, the open list entries may be just displayed after all of the neighbors are added.)

Questions

Write the corresponding answers in the script file.

- Please suggest new heuristic costs in the graph, so that the A* algorithm visits less nodes to find the path than using the provided heuristic costs.