Tutorial 3: Shortest path

Artificial Intelligence

G.Guérard

Exercise 1

The air company Europa serves various European cities. The table below gives against the flight times between these cities.

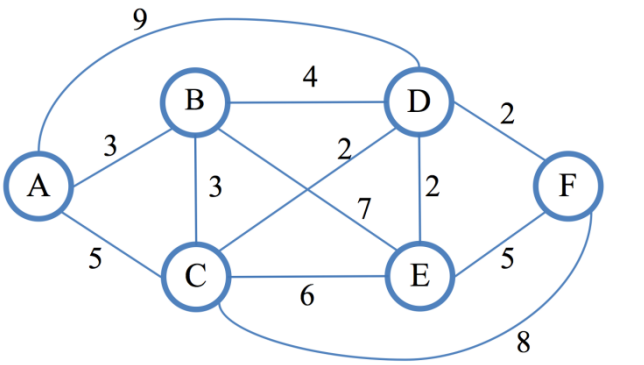
• How to determine the fastest route between two cities?

• How to modify the previous method to take into account the duration of stops in different cities?

	A	**B**	**C**	**D**	**E**
A		1h30	2h00		2h15
B	1h40				3h00
C	2h20			2h55	
D			3h20		1h05
E	2h25	3h10	1h10		

Exercise 2

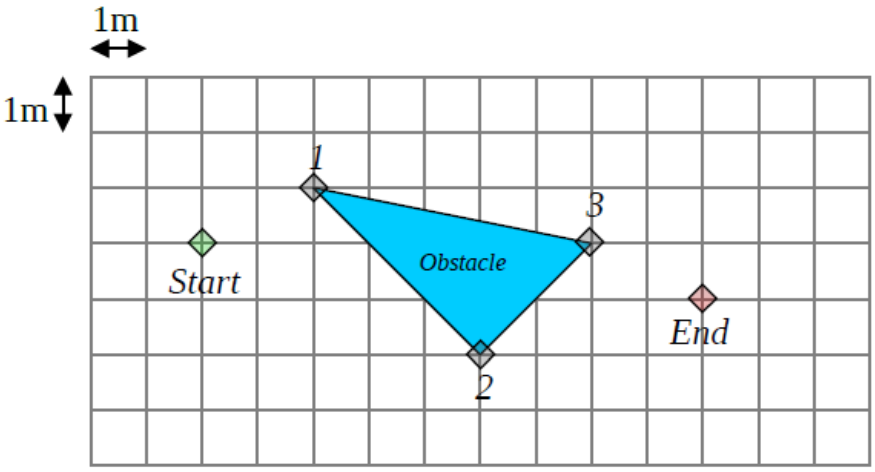
We want to build a new plant in the following network, nodes are places and links represents costs to send energy from one place to another:



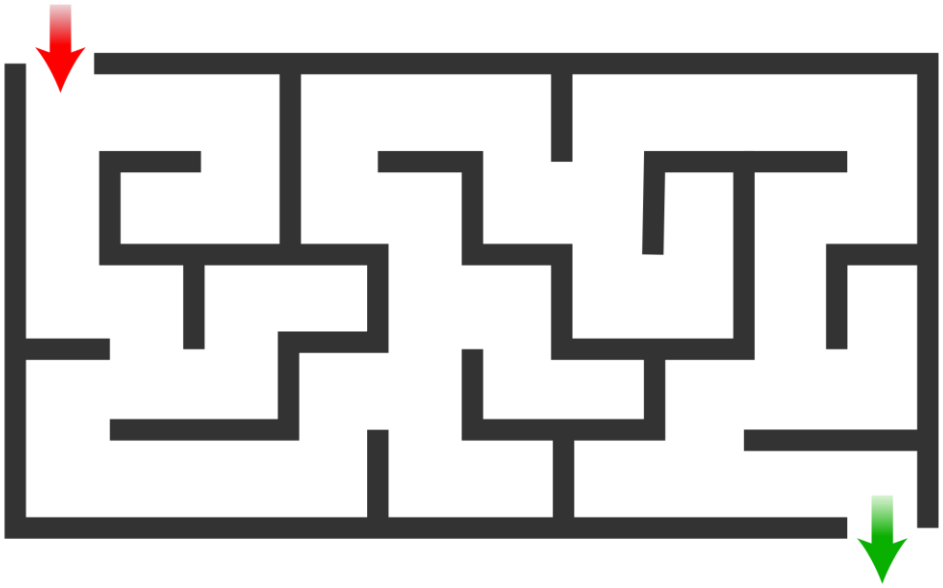
Based on Dijkstra algorithm, propose a method to find the best place to build the plant, and then solve the problem with your method. Solve the problem with Floyd-Warshall algorithm.

Exercise 3

A robot moves in the following environment. It starts from the node labeled *start* and needs to reach the node labeled *end.* The environment is continuous and the scale is supplied on the figure. Considering the robot is a point, what is the shortest path from Start to End.



Exercise 4



Propose an algorithm to solve any maze based on search tree. Propose an algorithm to find a minimum path in any maze based on our previous one. Solve this problem with Dijkstra. Considering the maze is not known, do the algorithms still work? How to proceed?

Exercise 5

Considering the graph in exercise 1, edges are directed from left to right (or up to down) and weights are decreased by 4. How to find a minimal path from A to F? Solve it.