

# **TDT4136: Introduction to AI 2023**

## **Assignment 2: Applying the A\* search**

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### **• Introduction – Description of the code**

For this Project we had to make a program able to apply the A\* algorithm to find the closest path from a starting point to a goal point.

For that, first we define a class node that includes a position, the cost to get to it, which is divided into the cost of getting to the point, the Euclidean distance and the total cost; and the previous point. Then we made the functions to calculate the Euclidean distance and another to calculate which is the best node to examine next.

After that we get to the A\* search in which we follow the following steps:

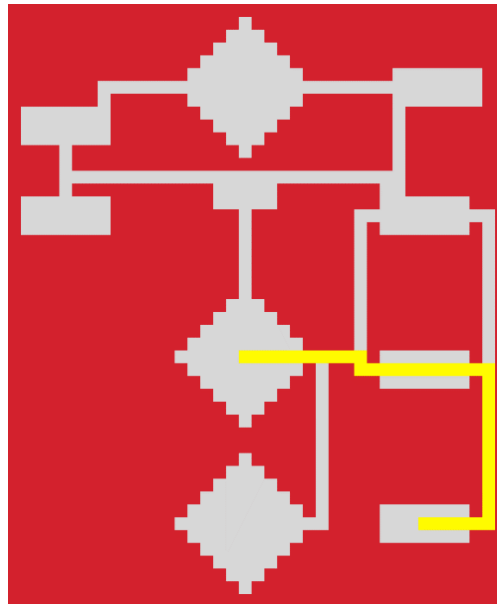
- First, we make three arrays storing nodes, one for the resulting path, one for the nodes to be examined, and another for visited nodes.
- Second, we set up the start position with its total cost and including the not\_visited and the visited array, as well as setting it as the current node to examine.
- Then the loop starts by examining the neighbours of the current node, calculating their costs and adding them to a neighbours list if they are not a wall.
- After visiting the 4 nodes we check if they were already in the visited or not\_visited list and they weren't, we add them in the not\_visited.
- Finally, we set a new current node by using the findBestNode function and we check if it is the goal. If it is, we reconstruct the path checking the previous node of each node leading up to the goal until we reach the start; If it isn't, we examine the new node.

To conclude, finding the best path, we use a modified version of the function provided by the assignment to include a yellow color to show the path.

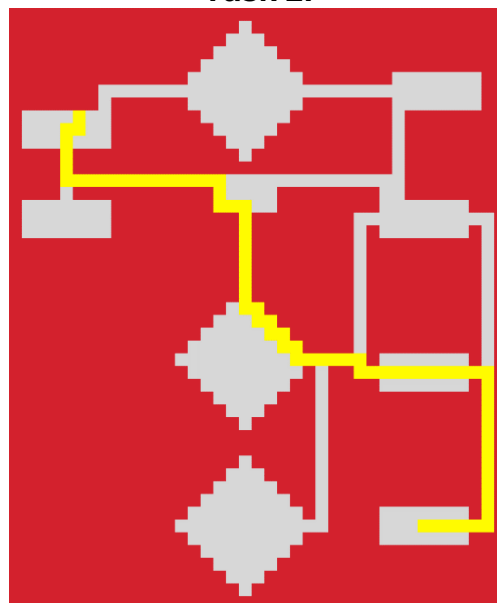
- **Part 1 – Grid with obstacles**

For the first part of the assignment the program has find the best path from the Rundhallen to Strossa (Task 1) and from Strossa to Selskapssiden in a grid with equal value for each position, so the question really was shortest path.

**Task 1:**



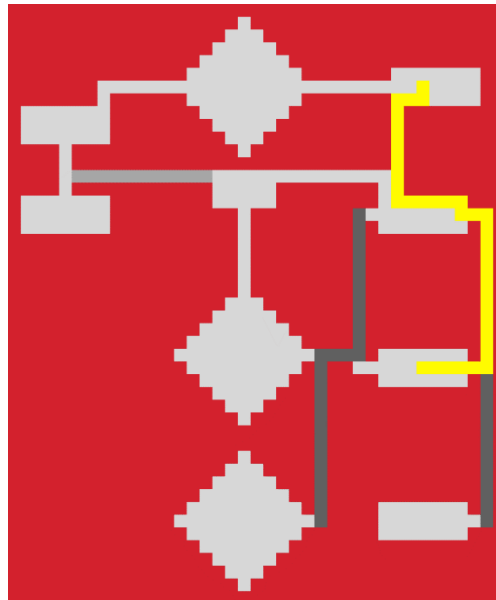
**Task 2:**



- **Part 2 – Grids with different costs**

For the second part, the goal was from Lyche to Klubben for both tasks similar to Part 1, but now there are some places harder to get around, therefore we have to find the least costly path.

**Task 3:**



**Task 4:**

