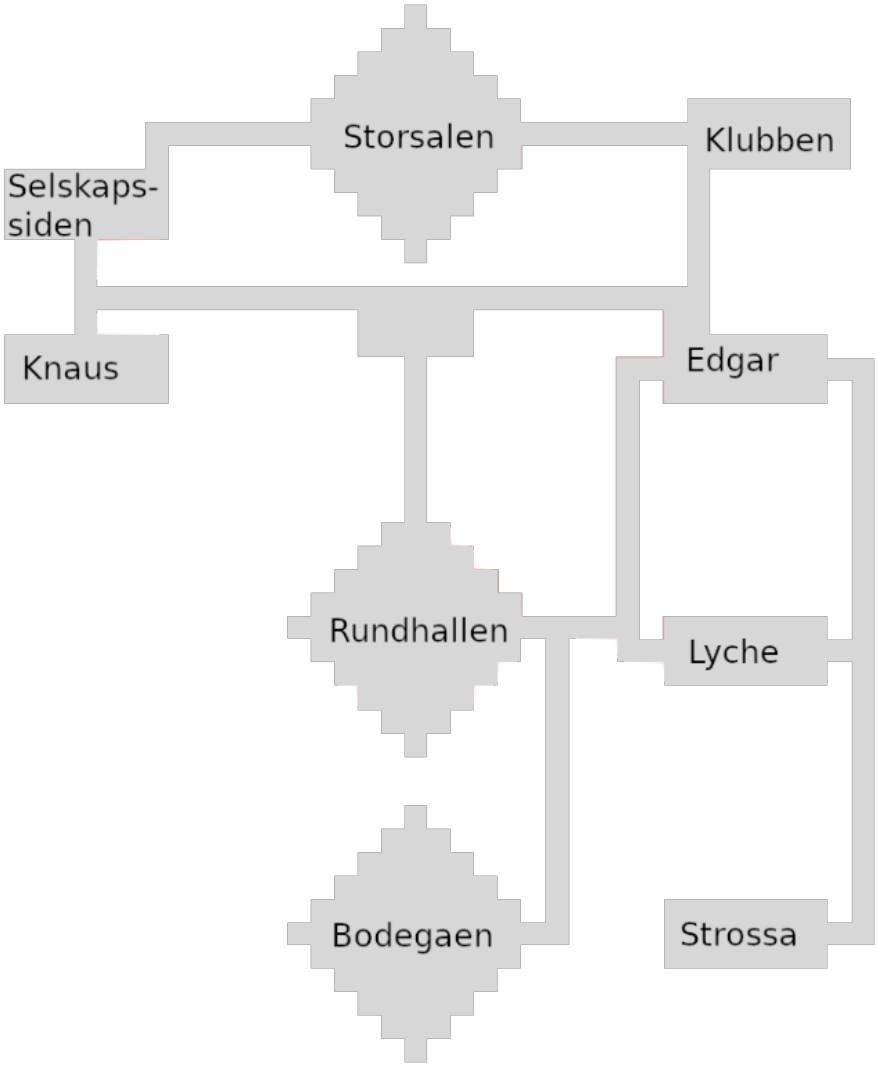
Applying the A* Algorithm

Samfundet map



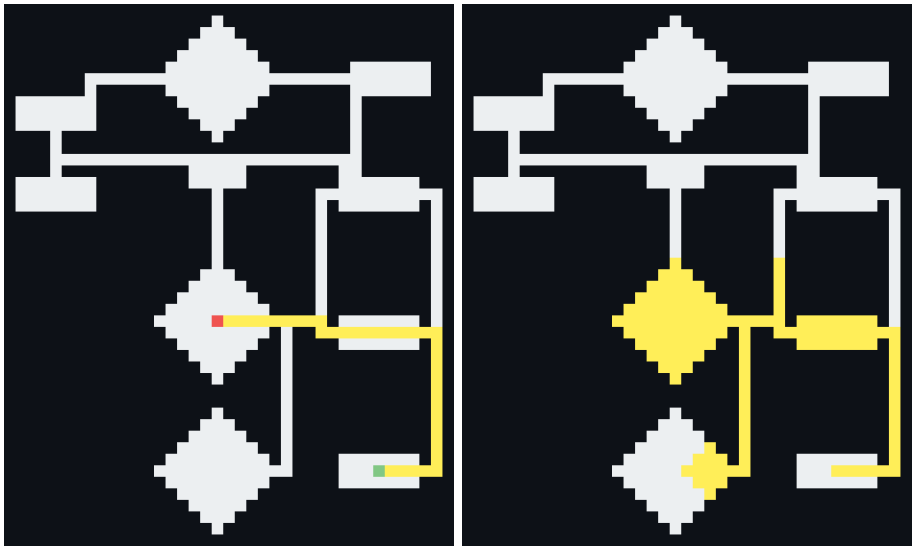
The solved tasks are visualized as follows.

- Red Tile is start position
- Green Tile is goal position
- Yellow is the shortest path found by my algorithm
- Black Tiles are walls (cannot move here)
- Gray tiles (for task 4) mark cost of each tile (darker = higher cost)

To the right is a visualization of all the nodes the algorithm checked before finding the path.

Task 1

You and your friend arrived at Samfundet only five minutes ago, but you've already managed to get separated. Being the resourceful person that you are, you call your friend, which tells you that they went looking for you and is currently located at Strossa. Your task is therefore to find the shortest path from Rundhallen (your location) to Strossa using your implementation of the A algorithm.*

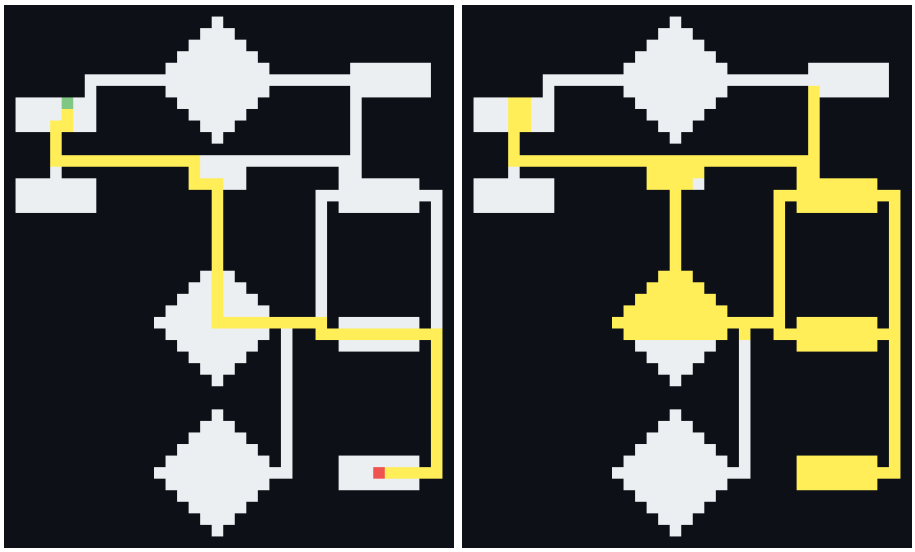


138 Tiles were checked before finding the path.

Task 2

When you arrive at Strossa, your friend is nowhere to be found. Applying your intellect, you deduce that they have probably moved on and you missed them in the stairs. You call your friend again and find out that they are now at Selskapssiden. Your task is now to use your A implementation to find the shortest path from Strossa to Selskapssiden.*

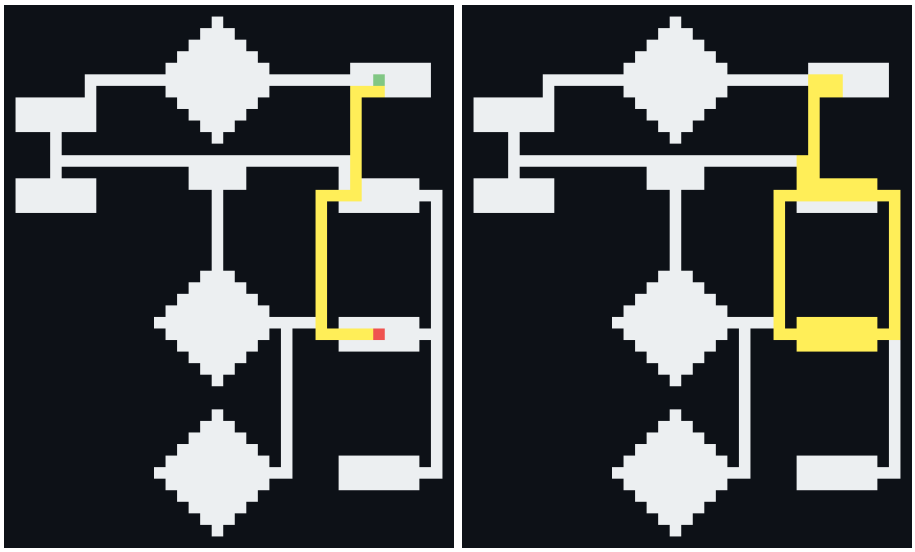
For a given state in the A search, i.e. a given cell on the board, the successor states will be the adjacent cells to the north, south, west and east that are within he boundaries of the board and that do not contain obstacles. Suggestions for the heuristic function h() for this problem are to calculate either the Manhattan distance or the Euclidean distance between the current cell and the goal cell.*



213 Tiles were checked before finding the path.

Task 3

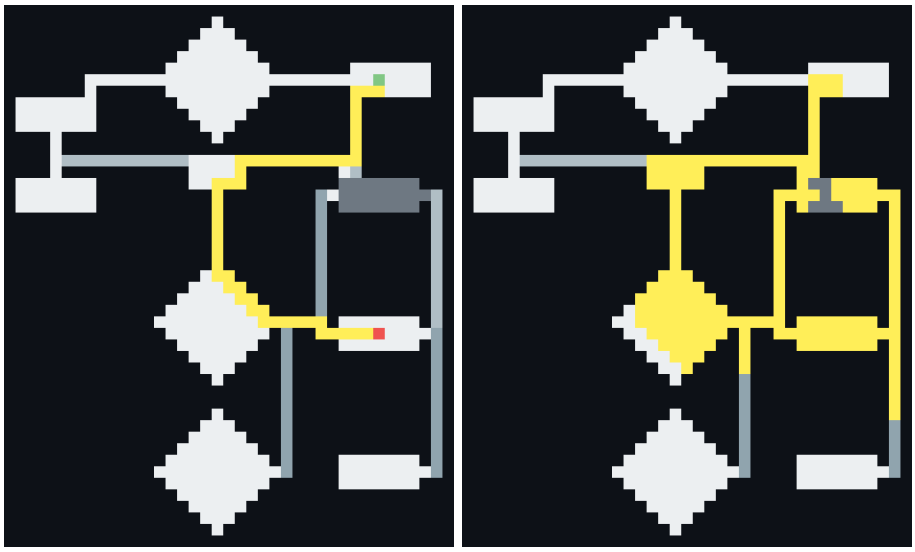
Tonight you are going to a concert at Samfundet. The concert is held at Klubben and will start at 21. You arrived early to enjoy a Lyche-Burger with some friends before going to the concert. The time is 20:45 and you should get going. The stairs from Rundhallen to Edgar have become packed with all the concert goers arriving. Use your A implementation to find the path from Lyche to Klubben with the least cost.*



80 Tiles were checked before finding the path.v

Task 4

As you start walking you remember seeing a poster announcing a free chocolate cake party at Edgar this very evening. Edgar is therefore filled with hungry students scrambling to eat as much cake as possible. Use your A implementation to find the new least-cost path from Lyche to Klubben, now considering the cake party at Edgar.*



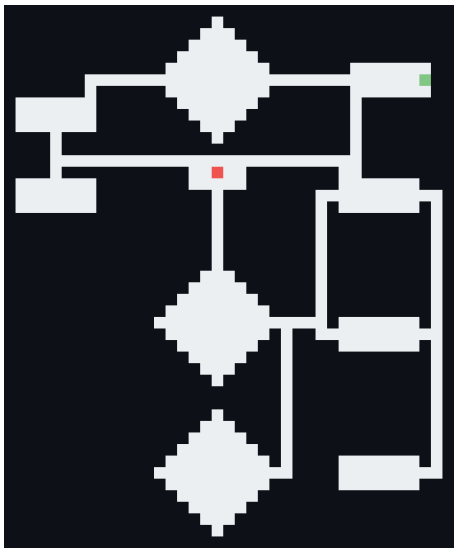
173 Tiles were checked before finding the path.

Task 5

After having finished the concert you feel the need for sugar! You rush down to Edgar to get some of that free chocolate cake. After having satisfied your sugar cravings you notice that you have separated from your friend again. You head to the top of "Rytterhallen" and call to find that they are still at Klubben. Having had one beer too many they tell you that they will be heading towards "Selskapssiden" and can meet you outside. Having just consumed four chocolate cakes, you experience a sugar high and you quickly estimate that with your sugar high and your friend's reduced balance, you can move at four times their speed. Use this information along with the knowledge that your friend will be starting out at Klubben and moving towards Selskapssiden to improve your A implementation to handle a moving target.*

> *A tick() function is provided with the code in Map_Obj. This function moves the goal one step towards Selskapssiden every fourth call. You should call this function every iteration of your A* algorithm for the goal to move properly.*

Before goal starts moving:



To account for the moving target the only change i made was that the goal_state changes, this is not optimal if the goal moves at the same speed as "we" can move, but technically does it's job just fine.

```
if self.map.task == 5:
    new_x, new_y = self.map.tick()
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self.goal_state = State(new_x, new_y)
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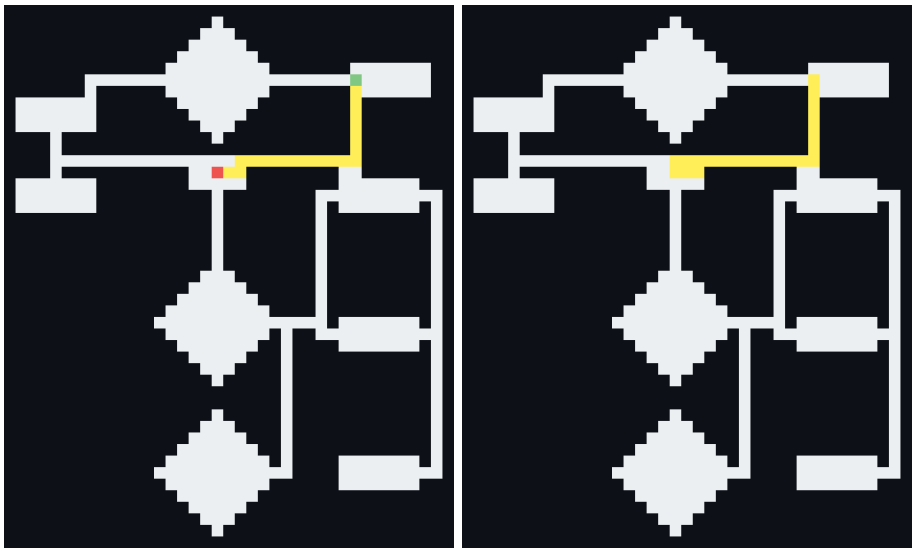

23 Tiles were checked before finding the path.