417/827 Project Report

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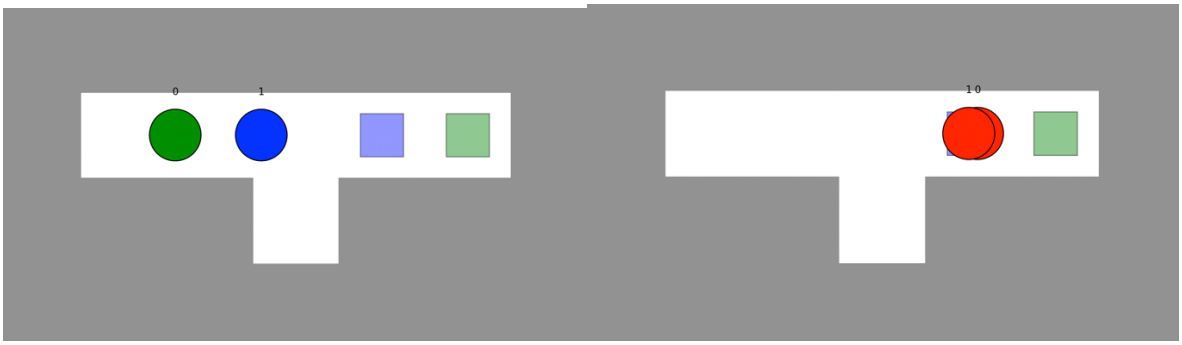
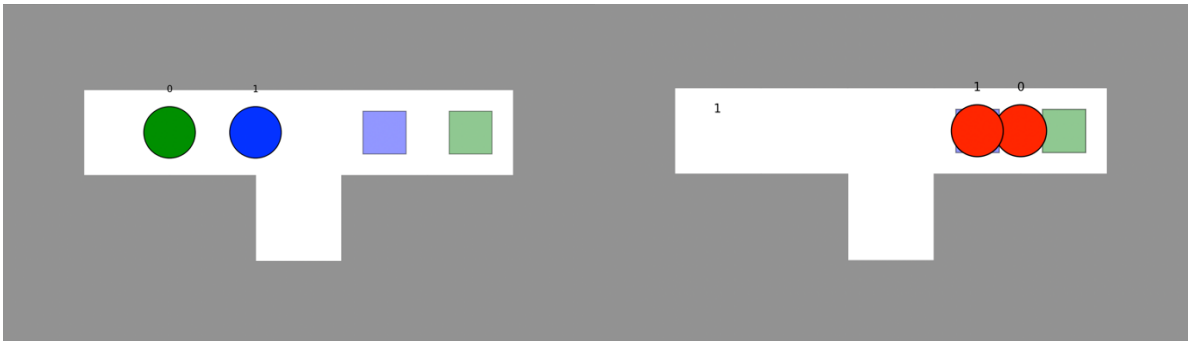
1 Task 1: Implementing Space Time A*

1.1 Searching in the Space-Time Domain



1.2 Handling Vertex Constraint

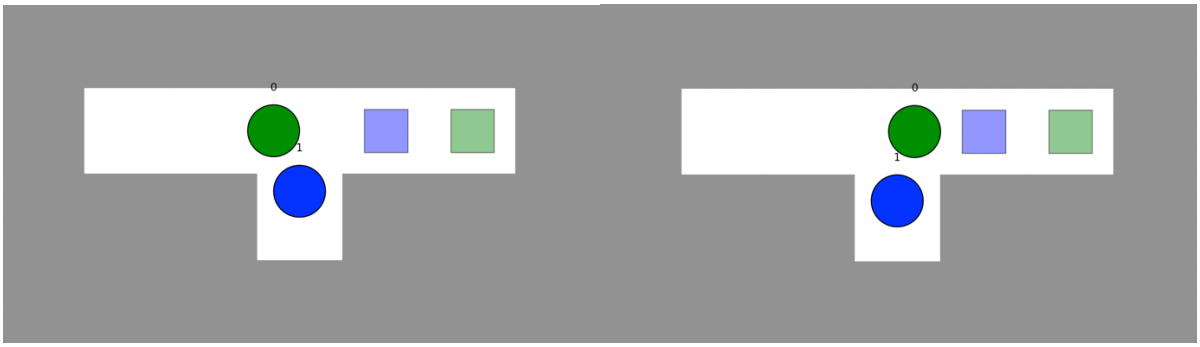


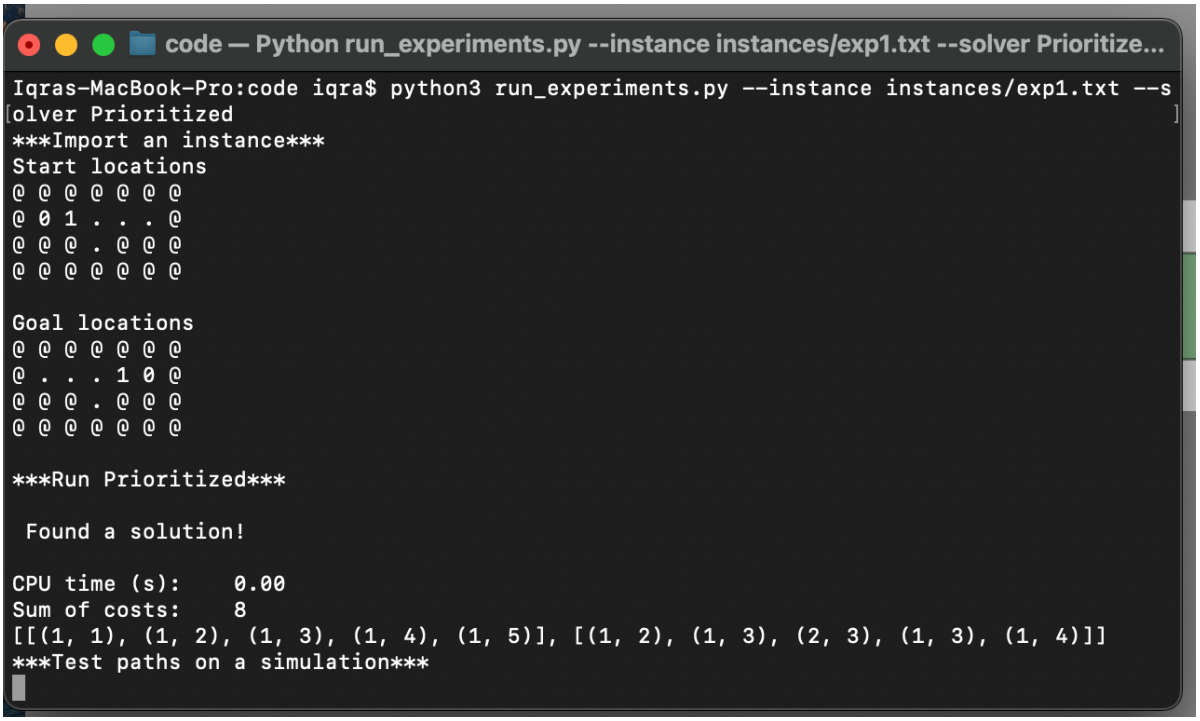
Waits for one time step before getting to the goal

1.4 Handling goal constraint

```
# Constraint for Task 1.2
#constraints = [{'agent': 0,'loc': [(1,5)],'timestep': 4}]

# Constraint for Task 1.3
#constraints = [{'agent': 0,'loc': [(1,2),(1,3)],'timestep': 1}]

# Constraints for Task 1.4
#constraints = [{'agent': 0,'loc': [(1,5)],'timestep': 10},
#               {'agent': 0,'loc': [(1,3),(1,4)],'timestep': 5},
#               {'agent': 0,'loc': [(1,3),(1,4)],'timestep': 7},
#

 # Constraints for Task 1.5
#constraints = [{'agent': 1,'loc': [(1,3)],'timestep': 2},
#               {'agent': 1,'loc': [(1,2)],'timestep': 2},
#               {'agent': 1,'loc': [(1,3),(1,4)],'timestep': 2}]
```

1.5 Designing constraints





Agent 1 (blue) move into the little nook and lets agent 0 pass by without any collision. Success!!

2 Task 2: Implementing Prioritized Planning

2.4 Addressing Failures

```
if curr['time_step']>10:
    print("couldnt be solved in time :( ")
    return None
```

Added a timestep of 10 as a condition. Therefore, if there are more than 10 steps, it says the problem could not be solved in time

2.5 Showing that Prioritized Planning is Incomplete and Suboptimal

For exp2_3 the program provides so solution given the correct order but in the event of a reversed order, we are provided with a solution

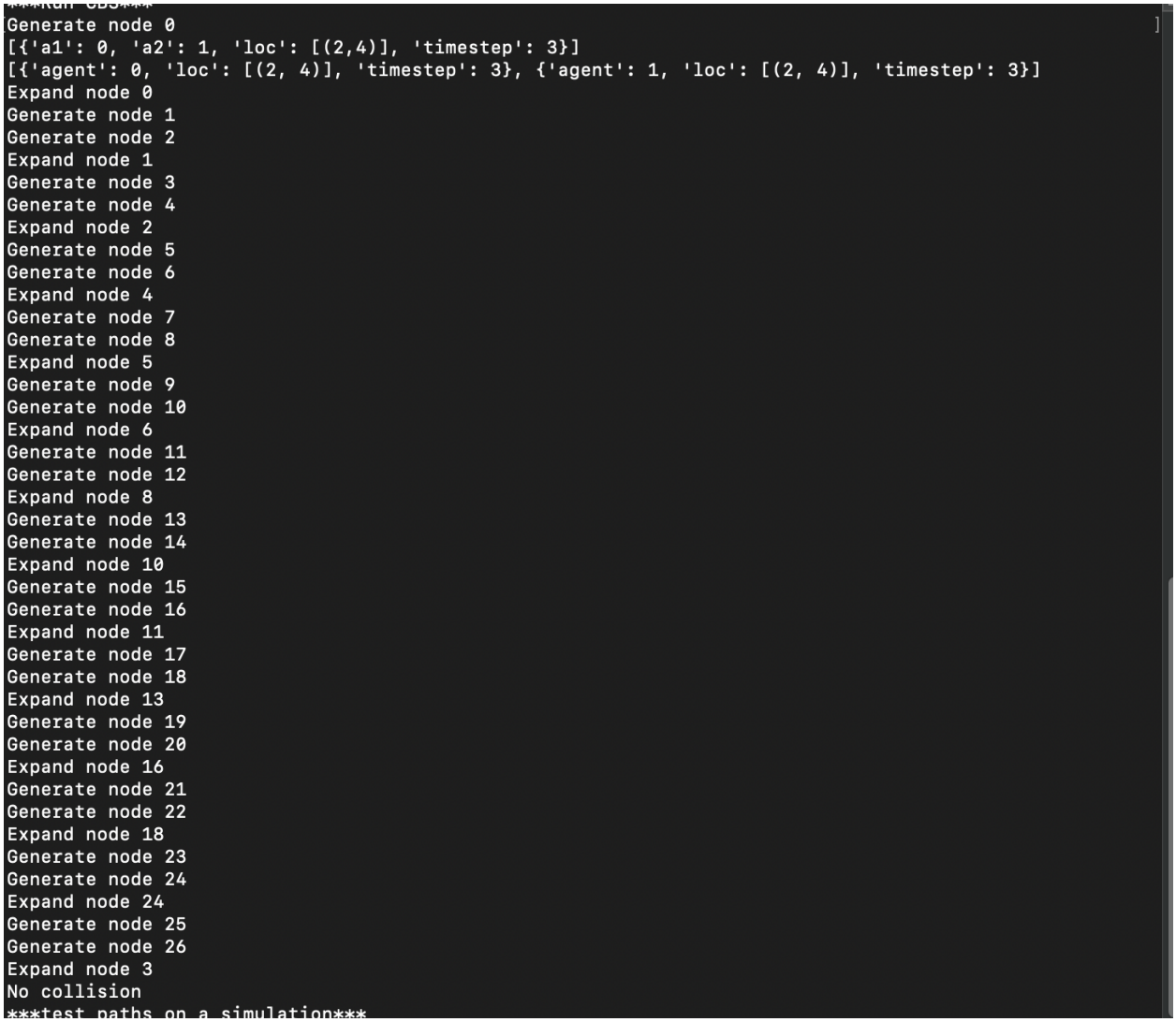
For the plan provided, the program provides us with no result regardless of the order even though a solution exists

```
4 7
@ @ @ @ @ @ @
@ @ . . . . @ @ @
@ @ @ . @ @ @
@ @ @ @ @ @ @
2
1 2 1 4
2 3 2 3
```

For test_4 we are provided with a solution but there is a collision in it, so we are not able to get a collision free answer

3 Task 3: Implementing Conflict-Based Search (CBS)

3.3 implementing the high-level search



4 Task 4: Implementing CBS with disjoint splitting

4.3 adjusting the high-level search