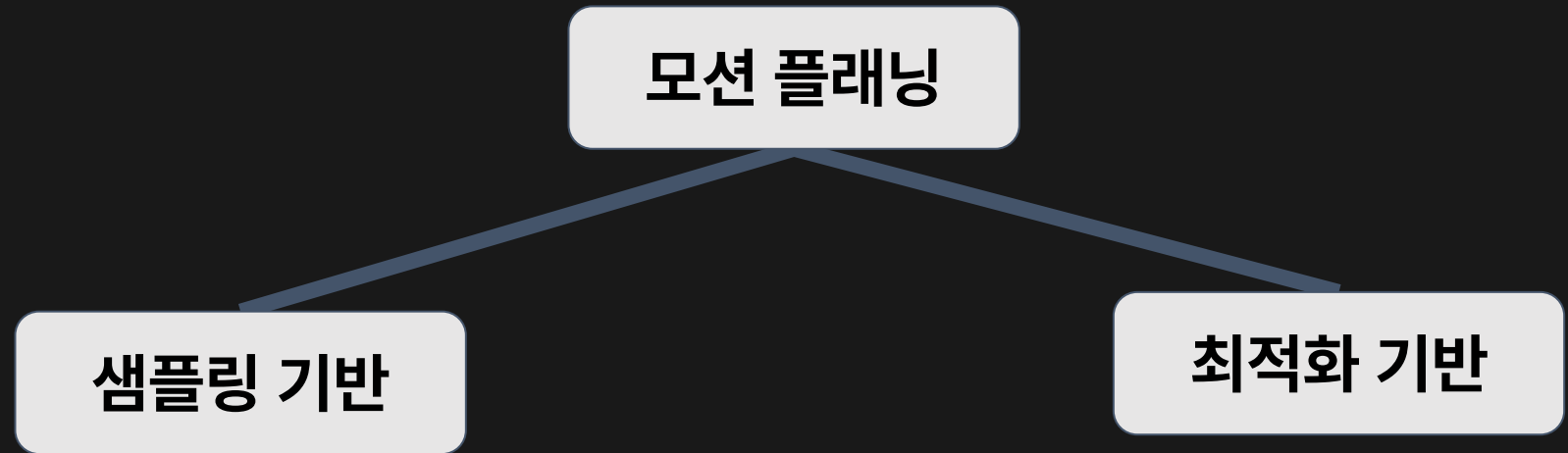


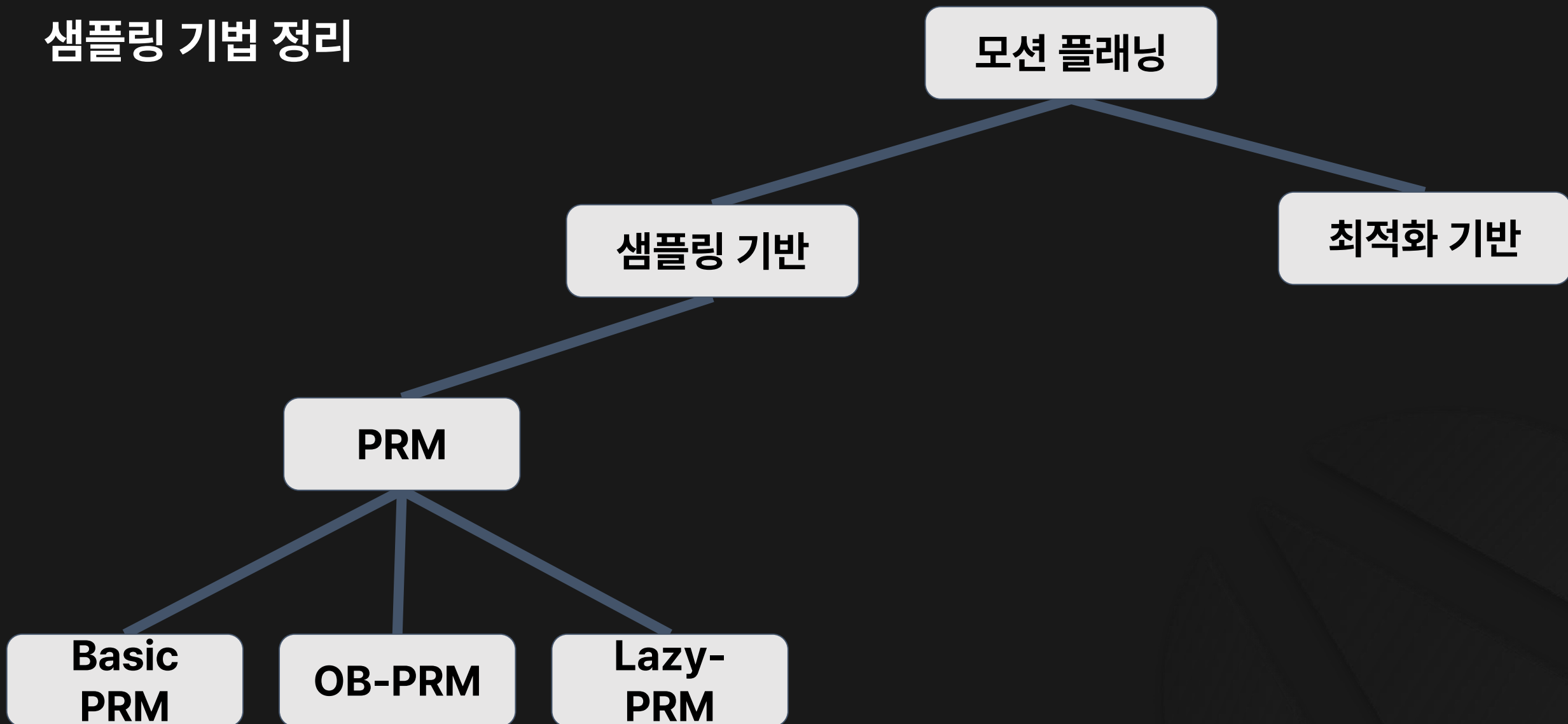
4-6 샘플링 기법 4:

Rapidly exploring Random Tree (RRT)

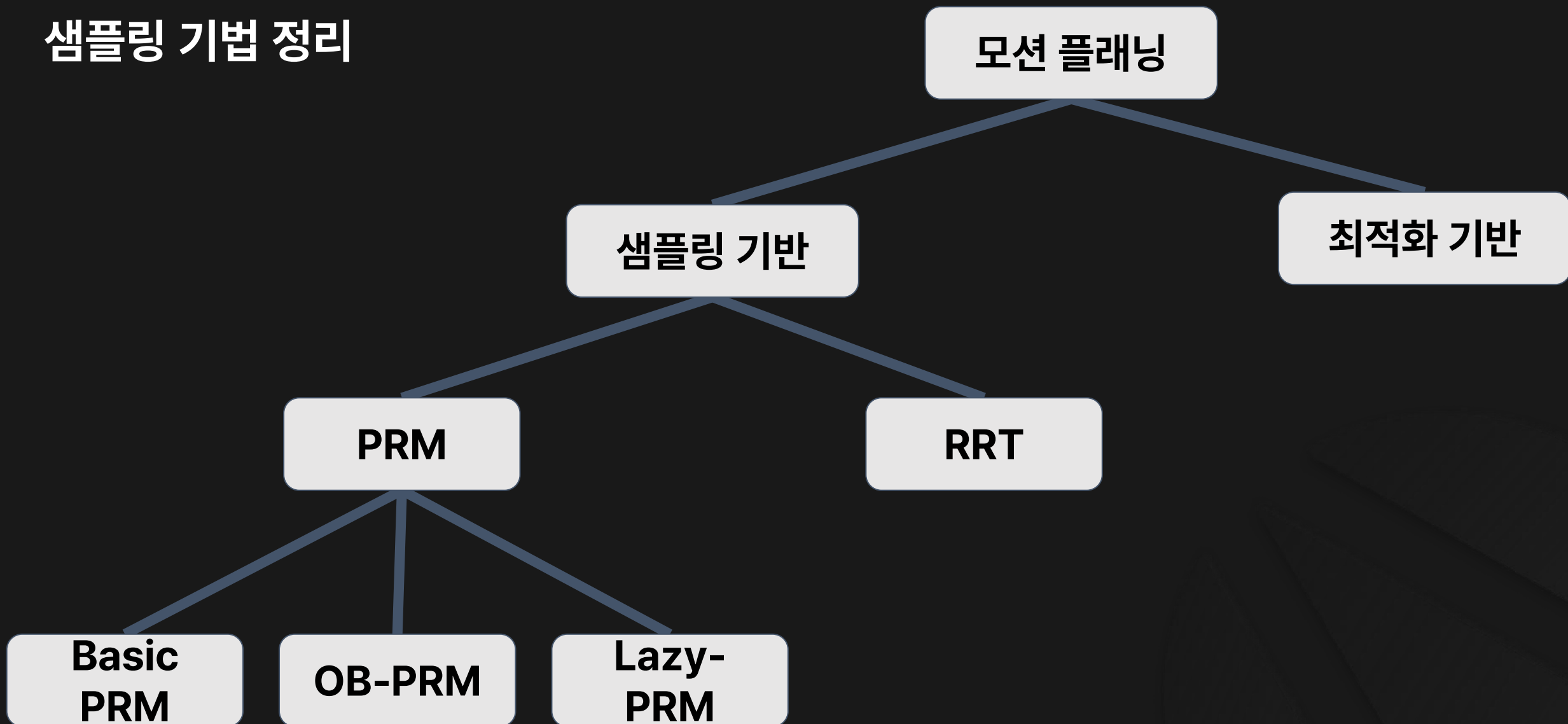
샘플링 기법 정리



샘플링 기법 정리

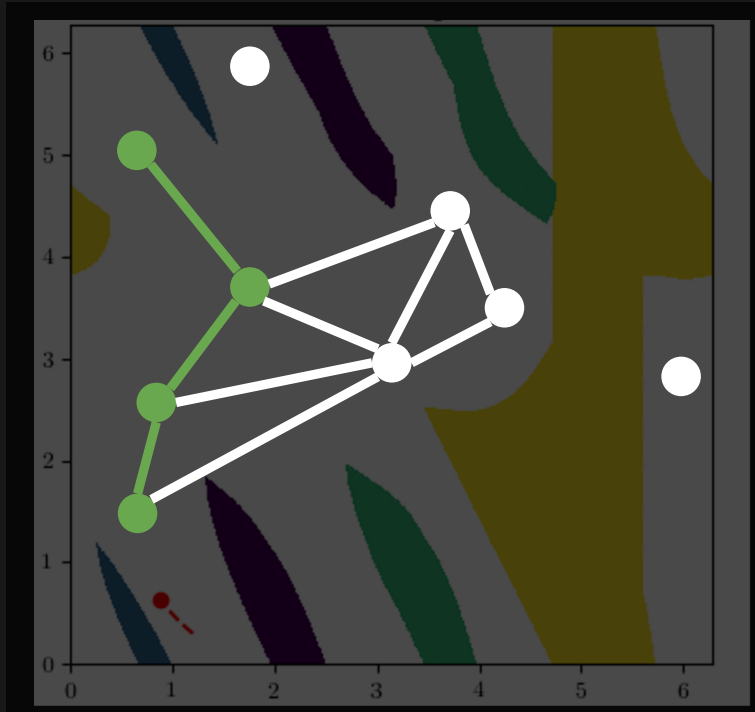


샘플링 기법 정리

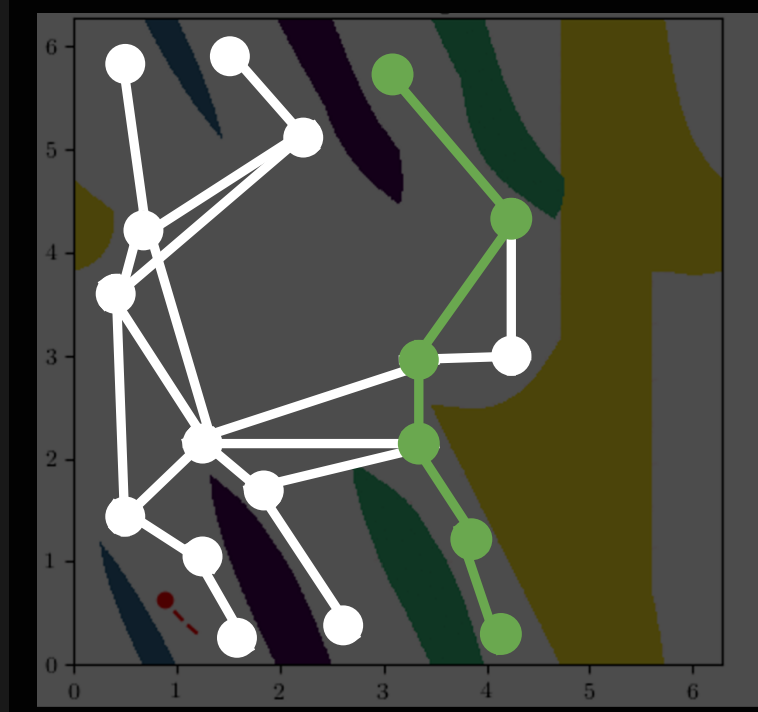


PRM, OB-PRM, Lazy-PRM

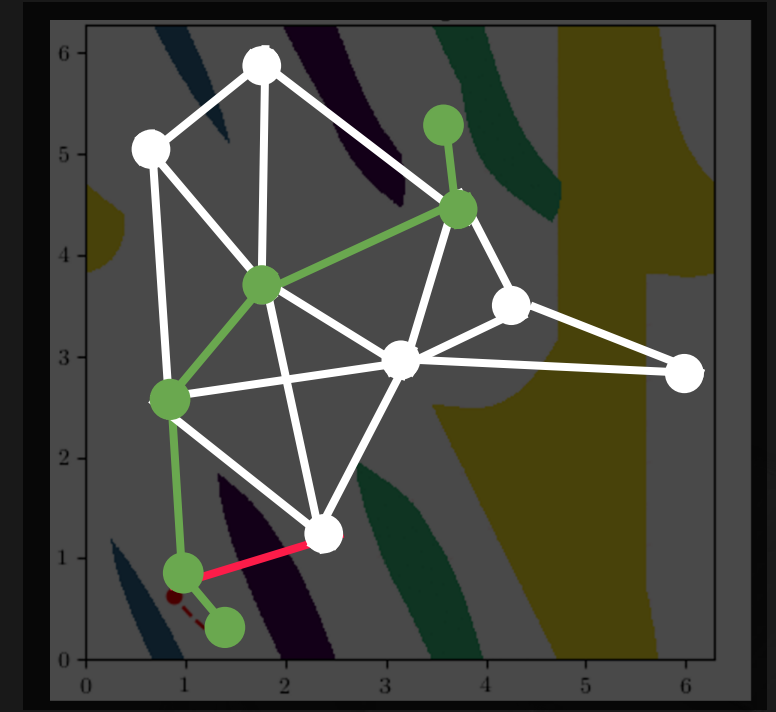
PRM



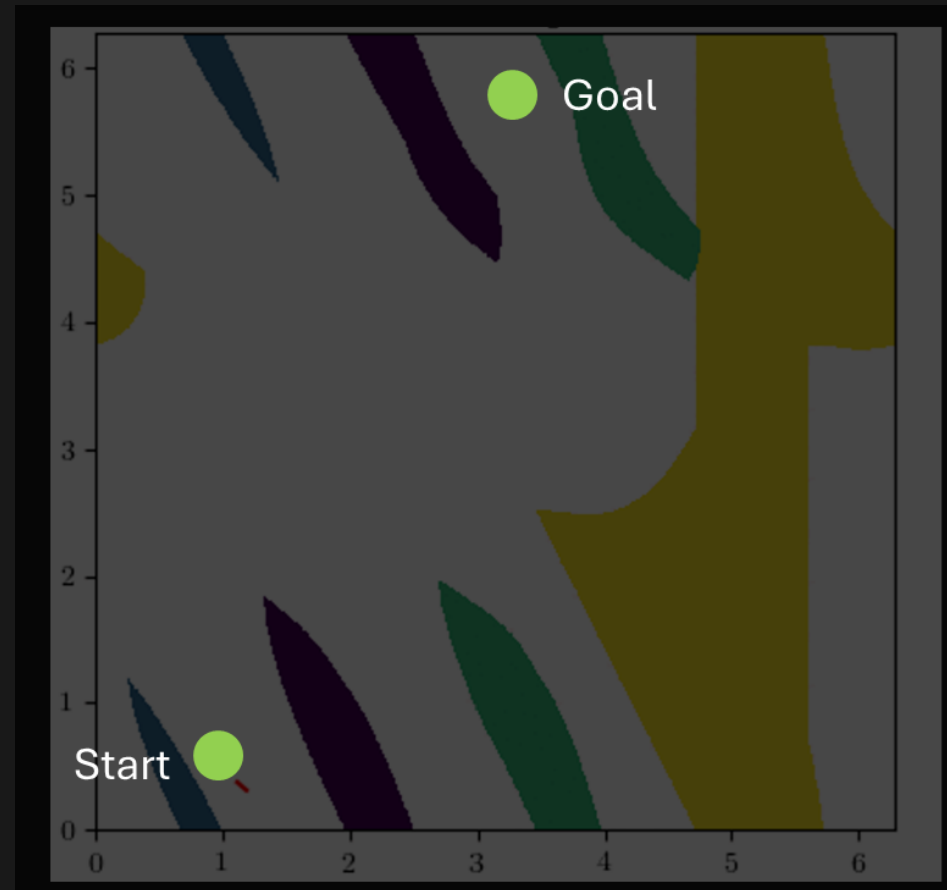
OB-PRM



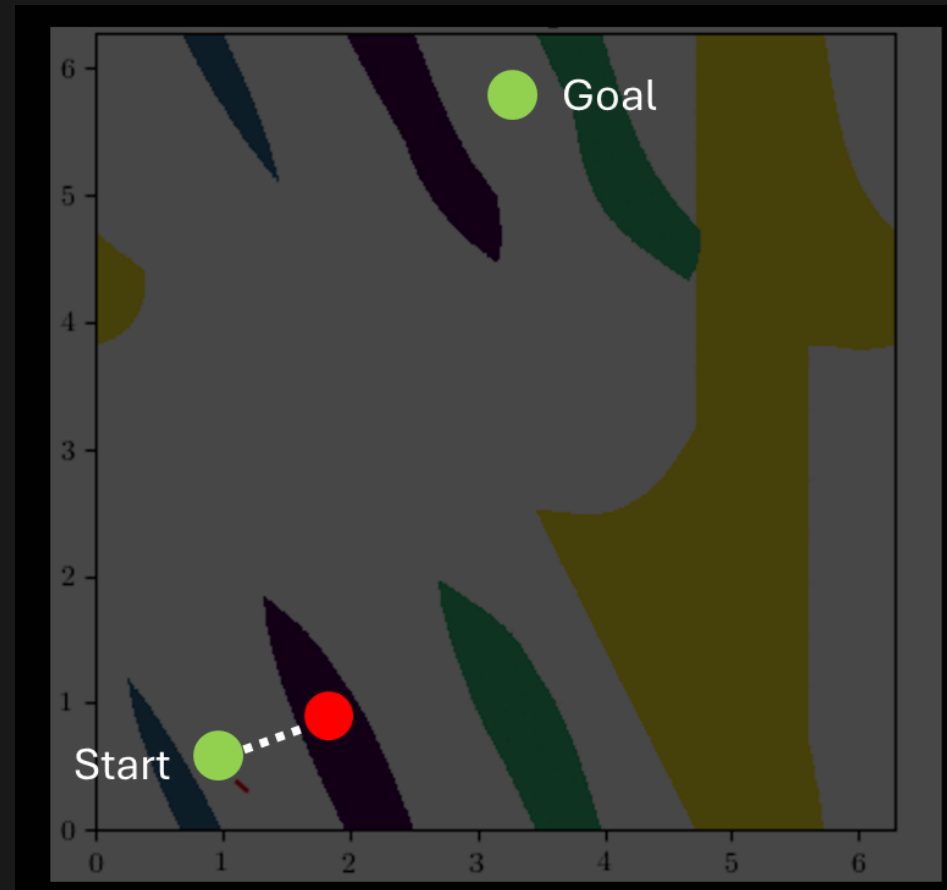
Lazy-PRM



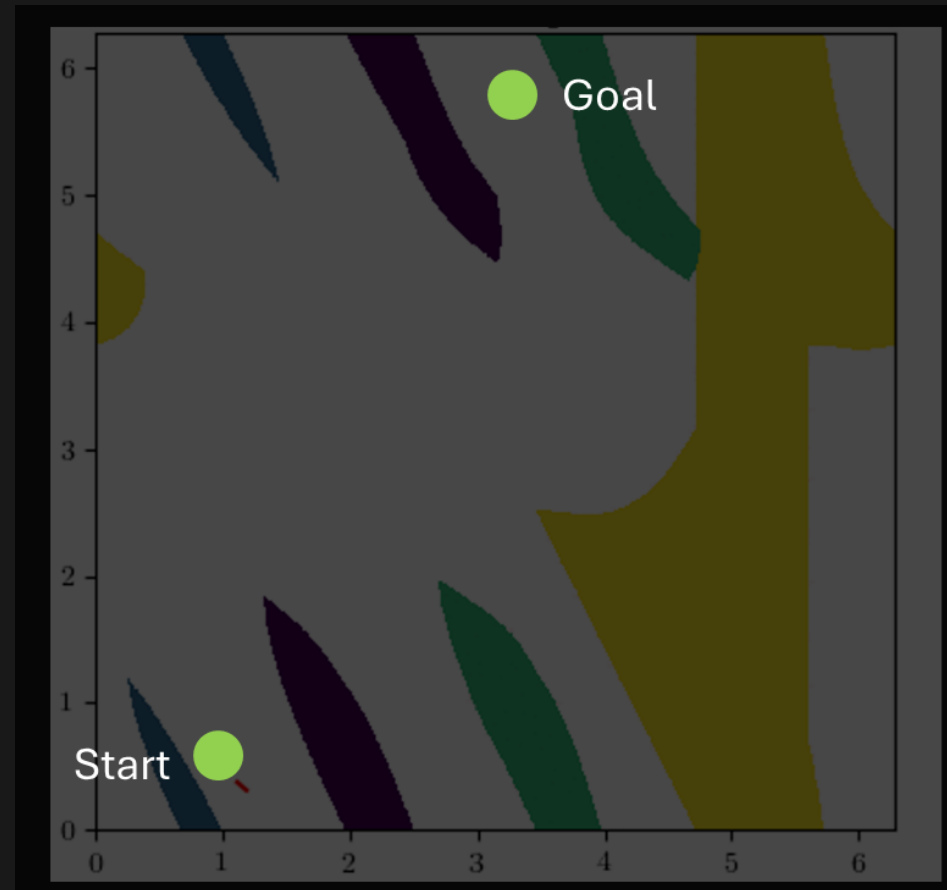
Rapidly exploring Random Tree (RRT)



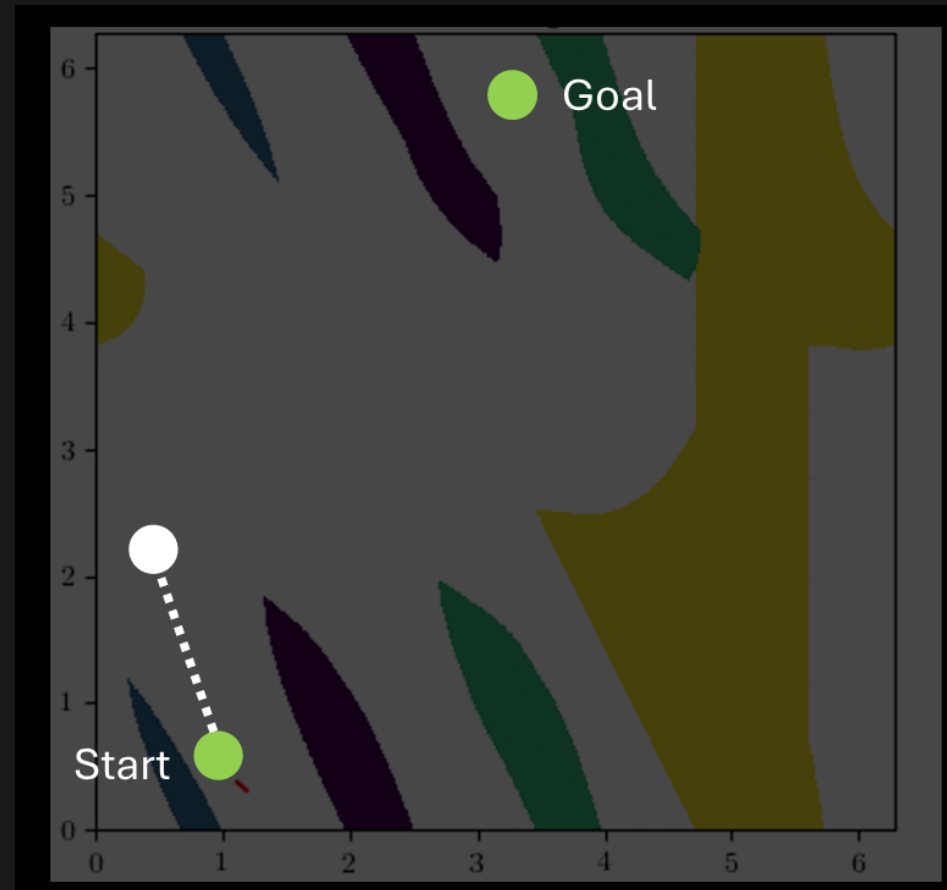
Rapidly exploring Random Tree (RRT)



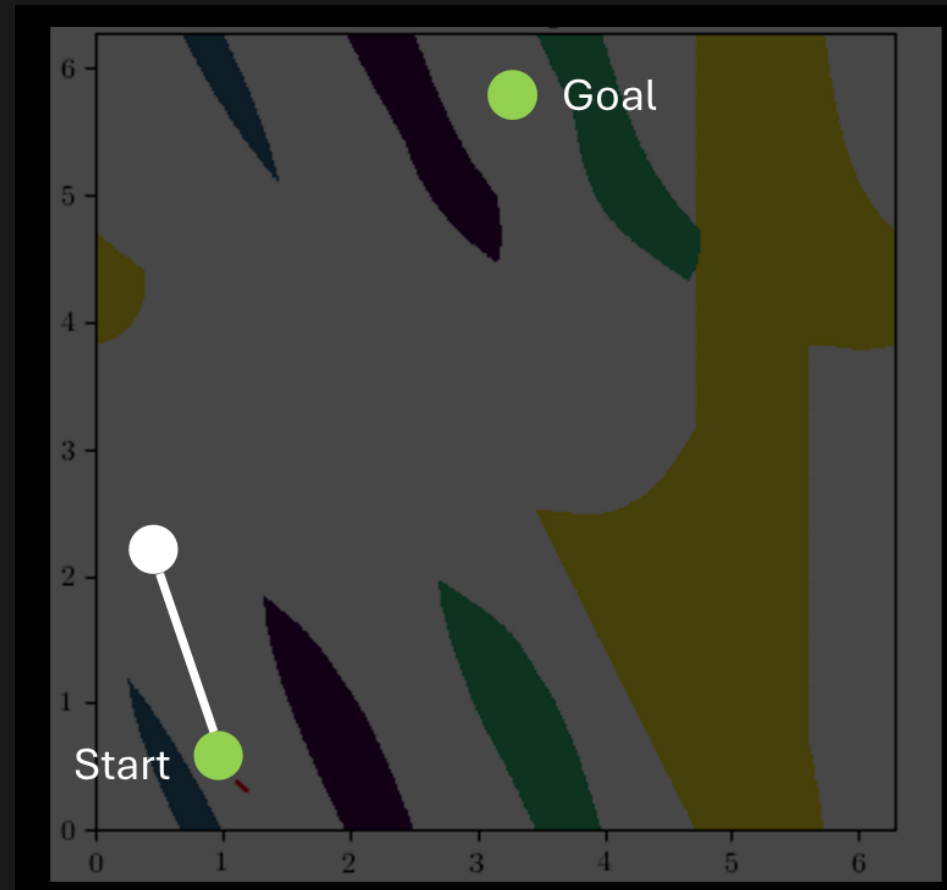
Rapidly exploring Random Tree (RRT)



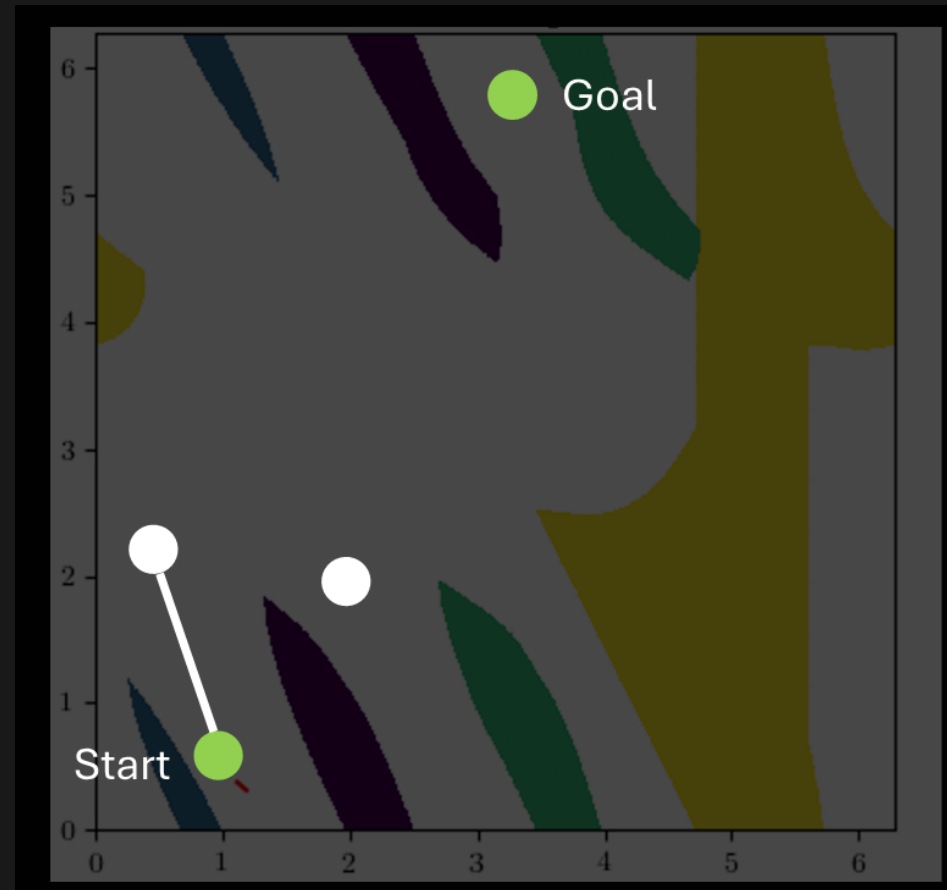
Rapidly exploring Random Tree (RRT)



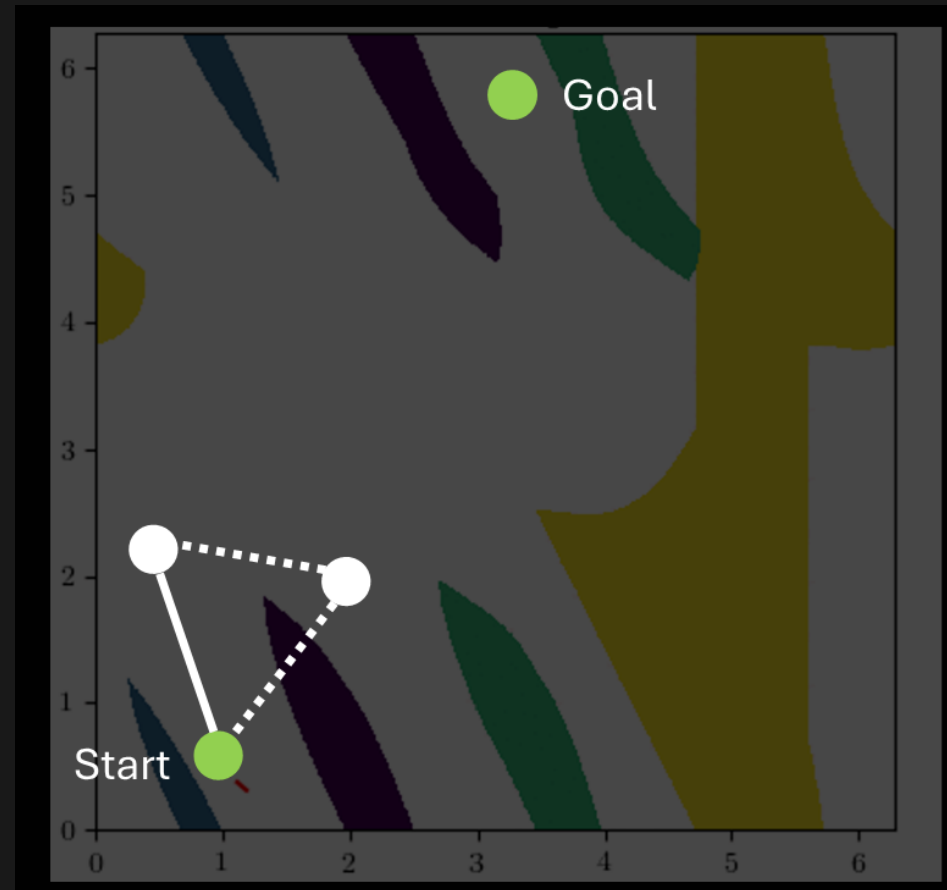
Rapidly exploring Random Tree (RRT)



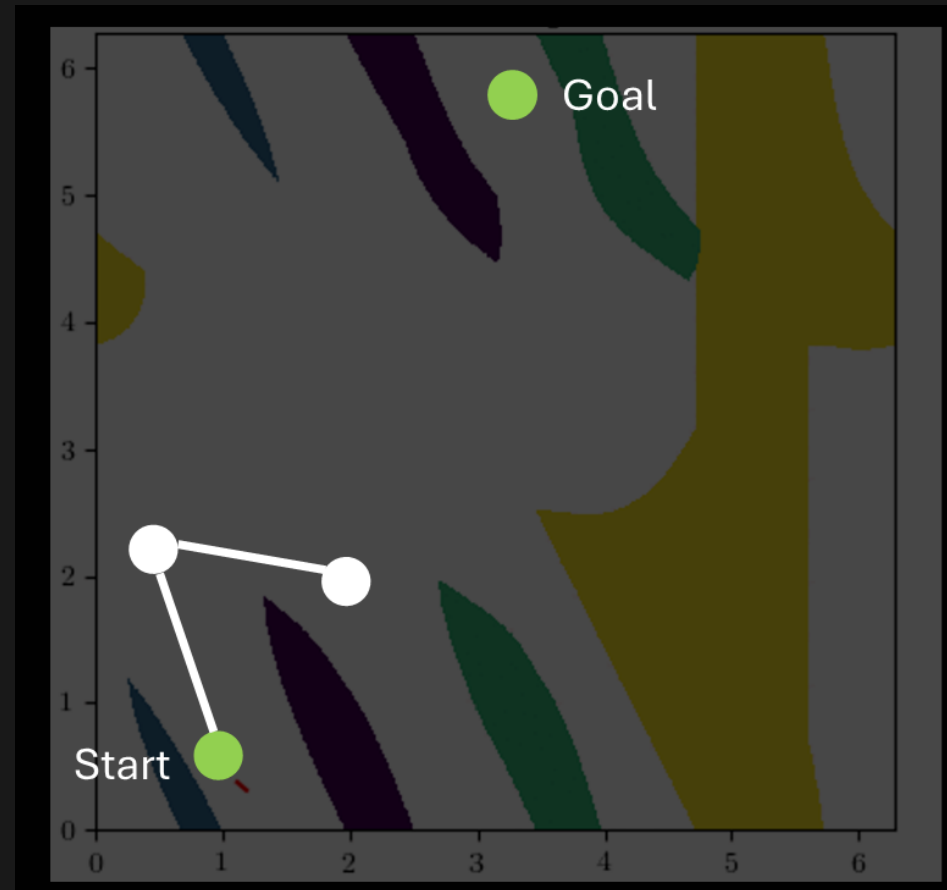
Rapidly exploring Random Tree (RRT)



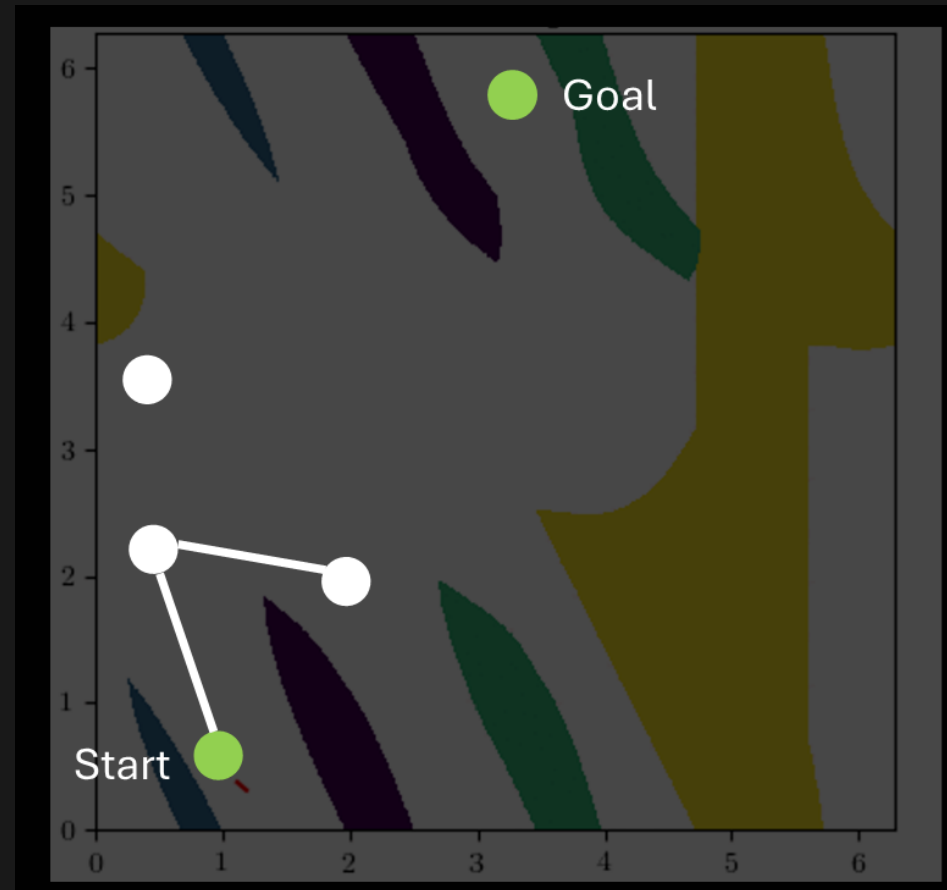
Rapidly exploring Random Tree (RRT)



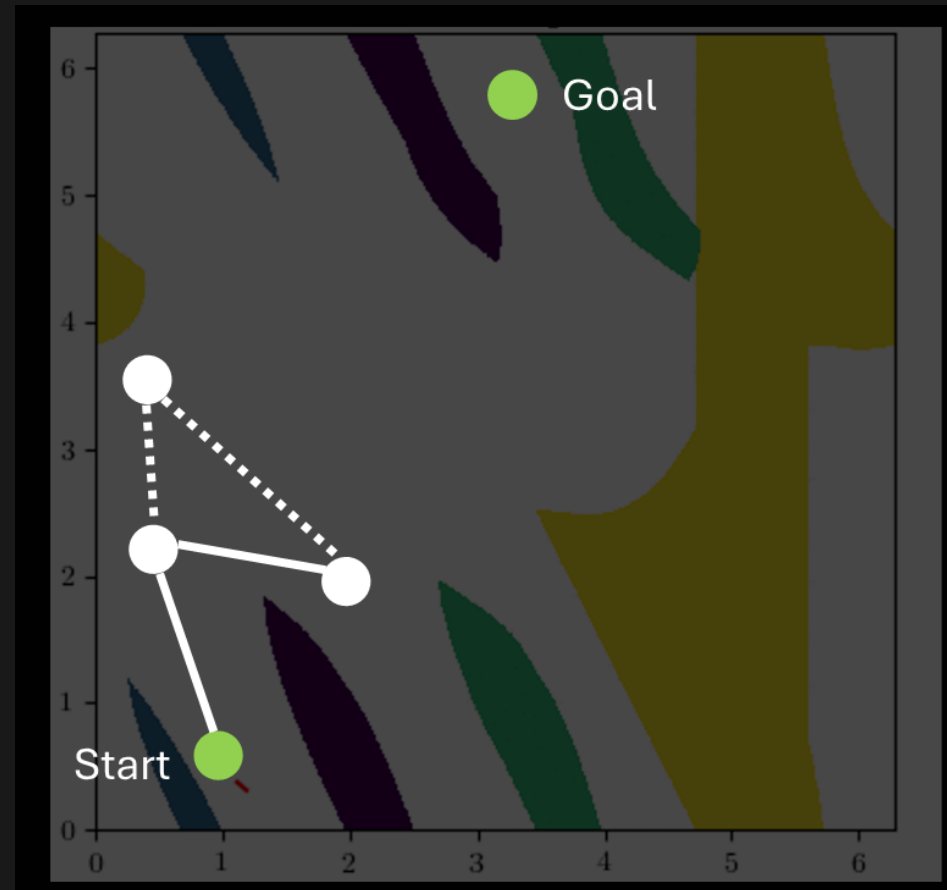
Rapidly exploring Random Tree (RRT)



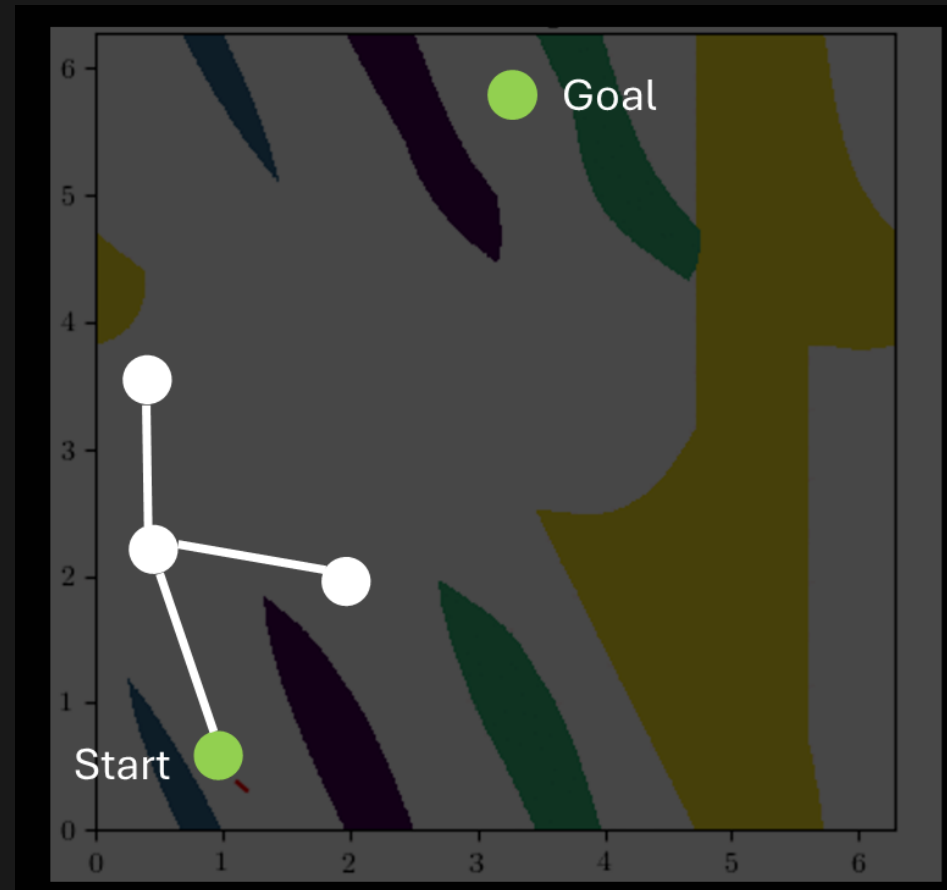
Rapidly exploring Random Tree (RRT)



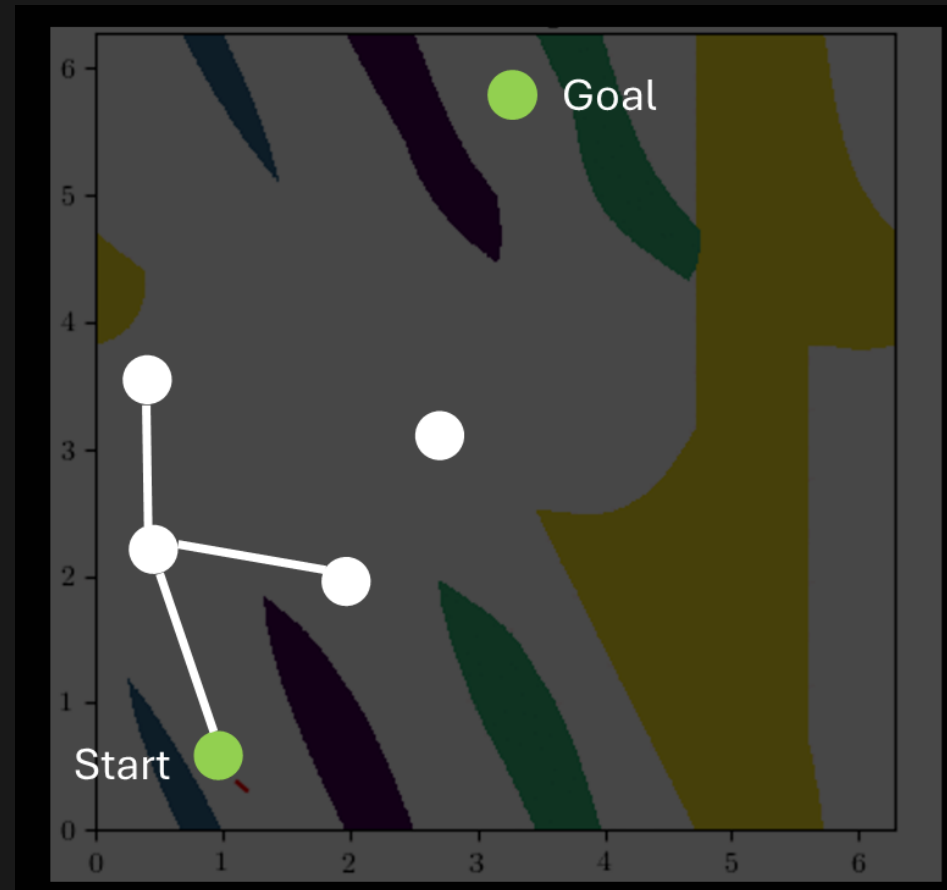
Rapidly exploring Random Tree (RRT)



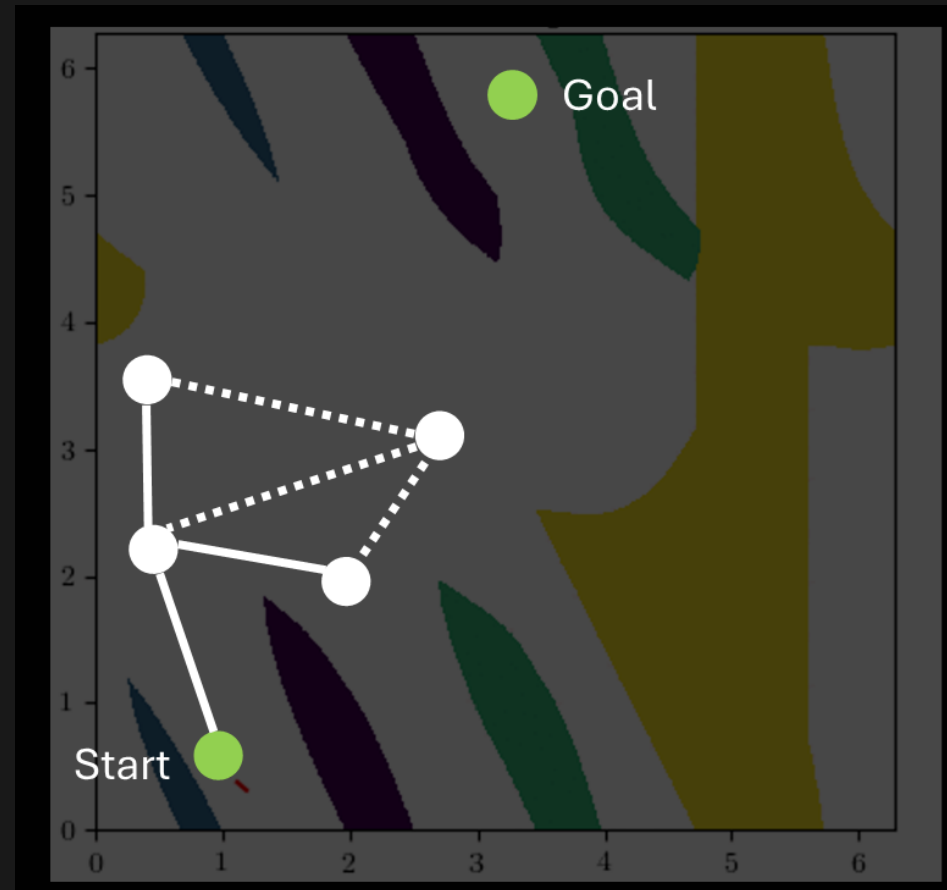
Rapidly exploring Random Tree (RRT)



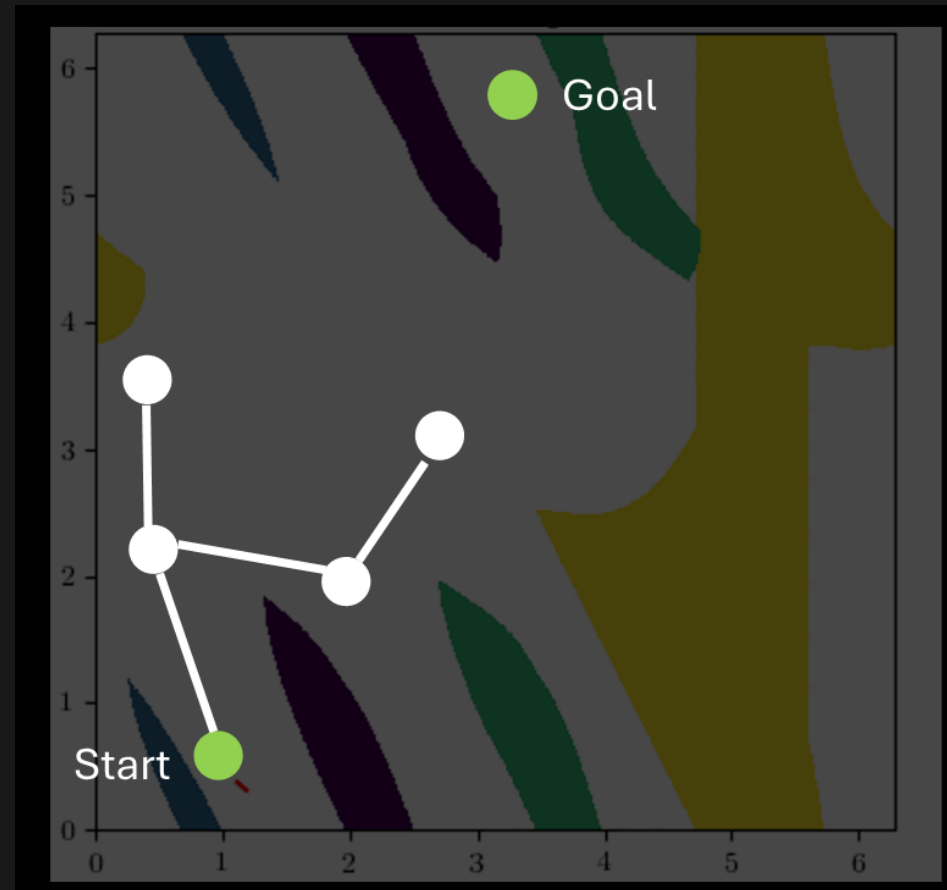
Rapidly exploring Random Tree (RRT)



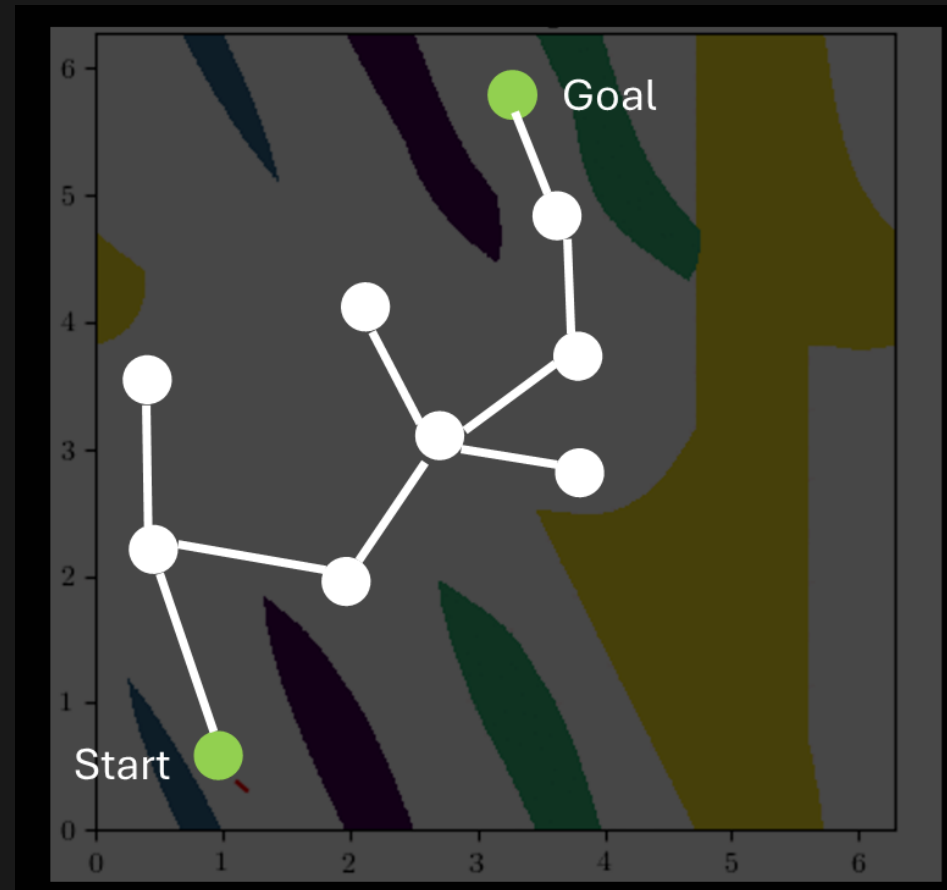
Rapidly exploring Random Tree (RRT)



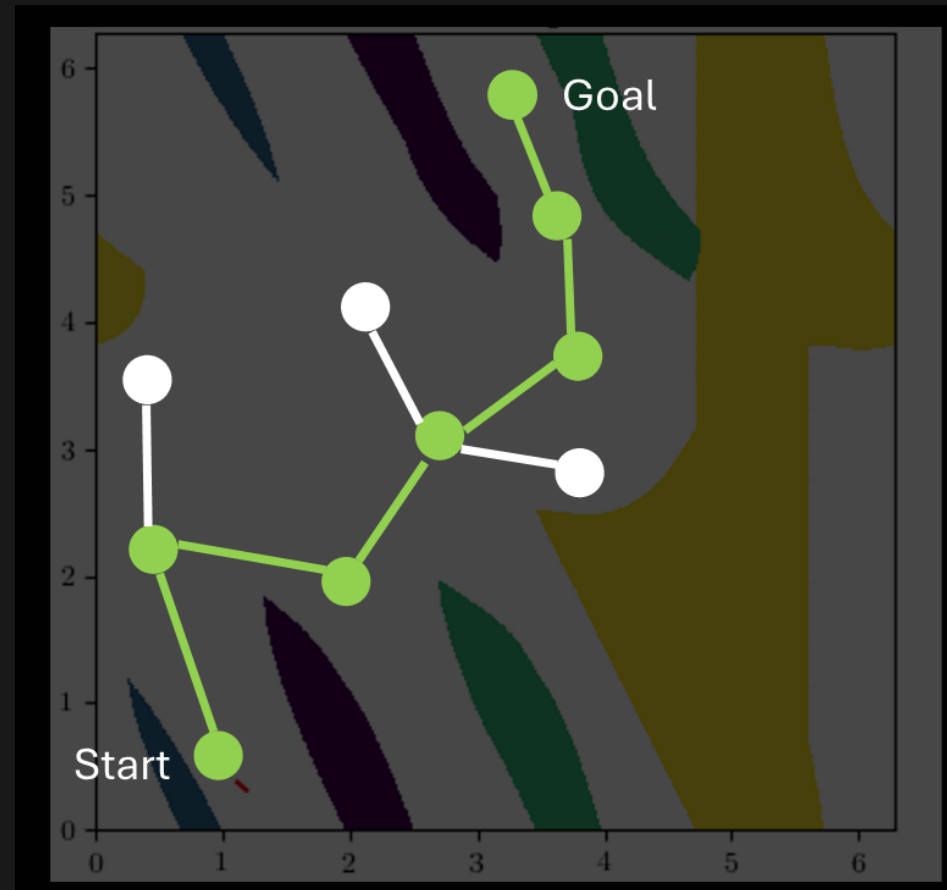
Rapidly exploring Random Tree (RRT)



Rapidly exploring Random Tree (RRT)

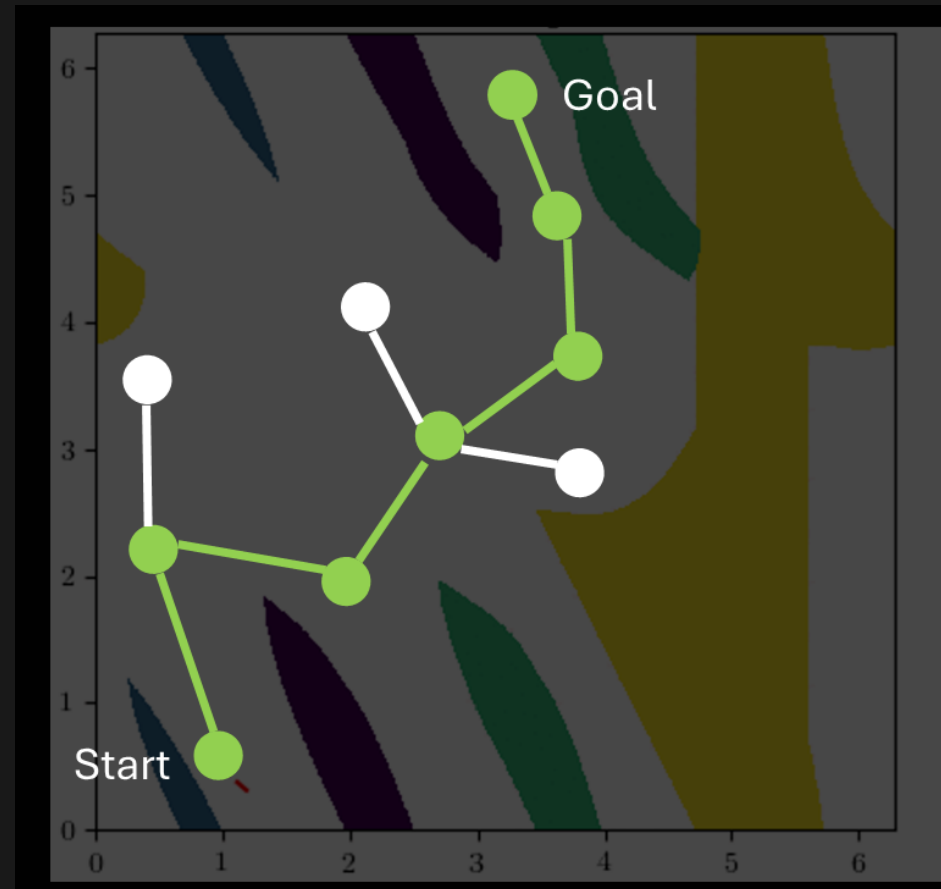


Rapidly exploring Random Tree (RRT)



Rapidly exploring Random Tree (RRT)

- 주요 특징
 - Single-query
 - Narrow Passage
 - 샘플링 방법에 따라 성능이 결정 됨
 - 최적의 경로 보장 X
 - Probabilistically Complete



Rapidly exploring Random Tree (RRT)

Algorithm 4 Rapidly-exploring Random Tree (RRT)**Require:** Maximum iterations N , step size δ , start q_{start} , goal q_{goal} **Ensure:** A path from q_{start} to q_{goal} , if one exists

```
1: Initialize tree  $T \leftarrow \{q_{\text{start}}\}$ 
2: for  $i = 1$  to  $N$  do
3:   Sample random configuration  $q_{\text{rand}}$ 
4:    $q_{\text{near}} \leftarrow \text{Nearest}(T, q_{\text{rand}})$ 
5:    $q_{\text{new}} \leftarrow \text{Steer}(q_{\text{near}}, q_{\text{rand}}, \delta)$ 
6:   if collision-free( $q_{\text{near}}, q_{\text{new}}$ ) then
7:     Add  $q_{\text{new}}$  to  $T$  with edge from  $q_{\text{near}}$ 
8:     if  $q_{\text{new}} \approx q_{\text{goal}}$  then
9:       return Extract path from  $q_{\text{start}}$  to  $q_{\text{goal}}$ 
10:    end if
11:  end if
12: end for
13: return Failure (no path found)
```

PRM vs. RRT

PRM

- Graph
- Multi-query
- Probabilistic Completeness
- Narrow Passage Problem
- 샘플링 기법에 따라 성능이 달라짐

PRM vs. RRT

RRT

- Tree
- Single-query
- Probabilistic Completeness
- Narrow Passage Problem
- 샘플링 기법에 따라 성능이 달라짐

강의 요약

01

RRT

- Tree
- Single-query
- Probabilistic
- Completeness
- Narrow Passage

02

알고리즘

03

코드 분석