

Motion Planning

Completeness in Motion Planning

Completeness

A motion planning algorithm is **complete** if:

- when solutions exist, the algorithm is guaranteed to return one in finite time, and
- when no solutions exist, the algorithm is guaranteed to report failure.

Is PRM complete?

Is RRT complete?

Probabilistic Completeness

A sampling-based motion planning algorithm is **probabilistically complete** if:

- when solutions exist, the probability of returning one goes to one as the number of samples increases:

$$\lim_{n \rightarrow \infty} P(\text{success}) = 1$$

Both the PRM and the RRT methods are probabilistically complete.