handout: slides
asst3 posted

EOLQs

Motion Planning

Planning Problems

Observability: complete, partial, hidden
State: discrete, continuous
Actions: deterministic, stochastic, discrete, continuous
Nature: static, deterministic, stochastic
Interaction: one decision, sequential
Time: static/off-line, on-line, discrete, continuous
Percepts: discrete, continuous, uncertain
Others: solo, cooperative, competitive

Motion Planning Problems

- geometry
- kinematics
- dynamics
- hybrid state
- steering: closed form, controller, random (raw simulator)

Geometric 'Path Planning'

- grid pathfinding: basic discretization
- visibility graphs: clever discretization

single- vs multiple-query

- PRM: discretization by sampling

non-point robots: eg, 7-DOF arms
workspace, freespace

what if you don't have infinite acceleration?

- configuration space vs state space
- Heuristic search: lattice, grid
- RRT (next)

Break

- asst2
- asst3
- projects

RRTs

RRT

initialize the tree with the initial state
until the tree reaches the goal:
    sample a random state
    find the nearest state in the tree
    extend from that state toward the sample

(Lavalle video)
goal bias
smoothing
bidirectional
probabilistically complete

RRT*

for all states near new state
    if path to new through near is better
        rewire using that path
for all states near new state
    if path to near through new is better
        rewire using that path

(Karaman video)
asymptotically optimal

BIT*

until tired
  sample (additional) random states
  consider nearby states to be successors
  run A* over the implied graph

uses both a vertex open list and edge open list to minimize edge evaluation
prune any states with $f \geq incumbent$
PC and AO and heuristically guided!

Others

- Potential fields
- Skeletonization
- Trajectory optimization

EOLQs

Please write down the most pressing question you have about the course material covered so far and put it in the box on your way out.

Thanks!