Search Algorithms II

ME/CS 132b Advanced Robotics: Navigation and Perception 4/14/2011

Before we get started...

Homework Sets #1 and #2 due today

Homework Set #3 (of 3) assigned today

Due one week from today (4/21)

Lab #1 assigned one week from today (4/21)

Due three weeks from today (5/5)

Term project kickoff approximately two and a half weeks from today (5/3)



Recap of Search Algorithms I

Breadth-First Search - FIFO

Depth-First Search - LIFO

Dijkstra's Algorithm - Evaluate all nodes that enter the open list

A* Search - Heuristic search







Optimal Paths for Wheeled Vehicles

In some instances optimal paths for wheeled vehicles can be computed to provide better estimates of cost-to-go

Dubins Curves (Ackermann)

Reeds-Shepp Curves (Ackermann)

Balkcom-Mason Curves (Differential Drive)





























































S	ummary
Variety of search algor degrees of optimality a	ithms exist with different nd efficiency
A* search provides an admissible heuristic	optimal solution with an
WA* is fast but genera	tes a sub-optimal solution
AWA*/ARA* generate an initial sub-optimal solutio and iteratively refines the path	
D*/D*Lite/Field D* re searches to path effect	use information from previous ively in dynamic graphs
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Next Lecture (4/19)

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Navigation and Control

Path Following

Hierarchical Navigation

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[Likhachev 04a] Maxim Likhachev, Geoff Gordon an Sebastian Thrun, "ARA*: Anytime A* with Provable Bounds on Sub-Optimality, "Advances in Neural Information Processing Systems 16 (NIPS), MIT Press, Cambridge, MA, 2004.	d [Carsten 07a] J. Carsten, A. Rankin, D. Ferguson, and A. Stentz, "Global Path Planning On-Board the Mars Exploration Rovers." Proceedings of the 2007 IEEE Aerospace Conference. 2007.	
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