Improving Path Quality

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Motion Planning via Manifold Samples

Salzmann-Hemmer-Raveh-Halperin
ESA 2011
Improving quality by path hybridization

**Example:** move the rod from the bottom to the top of a 2D grid \((rotation + translation)\)
3 randomly generated motion paths
H-Graphs: Hybridizing multiple motion paths
(= looking for shortcuts)
Hybridizing the paths
Double-Wrench: 12 dof
Switching the two wrenches (rotation + translation x 2)

long runs of PRM same time as total time of HGraphs

H-Graphs become particularly useful for high-dimensional problems (at least in this example)

Scene adapted from Nieuwenhuisen et al., ICRA 04
Comparison of running times

- hybridizing five motion paths in a 2-D maze:
  - from 3.52 seconds to 0.83 seconds on average (75% decrease), with comparable path quality
applied to car-like motion with various quality criteria: length, smoothness, clearance, number of reverse vehicle motions
related work, more details, more experiments:

- [http://acg.cs.tau.ac.il/projects](http://acg.cs.tau.ac.il/projects)
  IEEE Transactions on Robotics, 2011
THE END