Abstract

This paper presents a variant of the A-Star (A^*) pathfinder for robot path planning called A_r^* (pronounced A-r-Star) and demonstrates that the A_r^* algorithm outperforms A^* in a uniformly gridded sparse world and gives performance matching that of A^* in a uniformly gridded cluttered world. This algorithm is simple to implement and understand. It also highlights the performance advantages of the A_r^* algorithm and proves its properties experimentally and analytically (where appropriate). Some challenges affecting the performance of A_r^* have been presented and some solutions to these challenges have been developed and implemented. The performance of A_r^* has been compared to A^* running on both uniform and multi-resolution grids of different world scenarios. Results show that on a sparse high-resolution uniform grid world A_r^*'s search speed scales well and it outperforms A^* by an exponential factor.

References


Index Terms

Computer Science
Algorithms

Keywords
Pathfinder  Path Planning  A-r-Star  A-infinity-Star  Multi-resolution  Path Smoothing