Avoiding Unnecessary Calculations in Robot Navigation

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Abstract— **For solving problems of robot navigation over unknown and changing terrain, many algorithms have been invented. For example, D* Lite, which is a dynamic, incremental search algorithm, is the most successful one. The improved performance of the D* Lite algorithm over other replanning algorithms is largely due to updating terrain cost estimates rather than recalculating them between robot movements. However, the D* Lite algorithm performs some recalculation every time a change in terrain is discovered. In this paper, it is shown that recalculation is often not necessary, particularly when several optimal solutions (shortest paths) exist, and an efficient test for determining this is presented. These ideas are packaged in a modified version of D* Lite which we call ID* Lite for Improved D* Lite. We present experimental results that show the speedups possible for a variety of benchmarks. Also, a novel realistic benchmark is described.**

Keywords: robot navigation, uncertainty, planning

Conclusion

A modification to the D* Lite algorithm for planning has been introduced and packaged as an algorithm called ID* Lite. The modification is to update vertices as less as possible and to seek alternative shortest paths when inconsistencies are discovered, rather than recompute to remove all inconsistencies before finding a new shortest path. It is shown that the modification results in far better performance on random grid problems. The modifications proposed for D* Lite can coexist with other D* Lite variants such as delayed D* Lite easily.

References

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