Fast Trajectory Replanning

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1 Understanding the methods

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2 The Effects of Ties

- Forward Repetitive A* can break ties (when the F value are same between different cells) by either choosing a smaller G value or a Higher G value - 20x difference.
- The observation that we had was, choosing higher G values was significantly better than lower G values.
- The reason we could attribute this behaviour for is that, on choosing Higher G values we moving away from the start state and moving away from start state means we are closer to the goal and hence we achieve the goal state faster.
- If we expand cells with a lower G value we will be moving in and around the start state which is farther from the goal state.

3 Forward vs. Backward

- Based on the experiments we conducted, Forward Repetitive A star is much faster than Backward Repetitive A Star - 10x difference. The logical reason we think of is the maze we generate is based on a standard algorithm and is not too random in nature, hence this type of maze generation favours the Forward A Star more. Since we have only one start cell and one target cell, nothing else other than the properties of maze can tell the betterness of the algorithm.

4 Heuristics in the Adaptive A*

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5 Heuristics in the Adaptive A*

- Adaptive A star is slightly better than Forward Repritive A star in terms of timing as it considers previously computed path cost and hence better expansion of nodes

6 Statistical Significance

- We can take two synthetic datasets where we have the path from start to goal across different kinds and varieties of mazes for the solving of Breaking of Ties problem. We can hold type I error as rejecting the hypothesis that larger g value means shorter path and type II error as not rejecting that shorter g value tending to short path. And carry out tests and verify the hypothesis and see how Type I and Type II error comes out.