Investigating Exploration Techniques in Anytime Heuristic Search

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Abstract. hello

1 Introduction

Evaluation Metrics:

1. Total Stored nodes [1]
2. Total Expanded nodes [1]
3. Solution quality at fixed CPU intervals [2]
4. Average time between solutions [2]
5. Average number of solutions found before optimal solution was found
6. Average time taken to find optimal solution
7. Lower bound on optimal solution at fixed CPU intervals

Parameters:

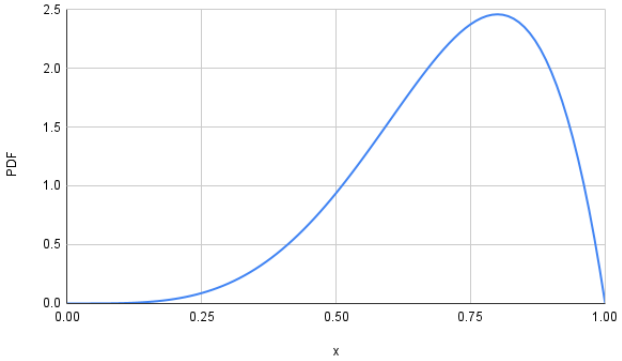
1. Weights: 1.3, 1.5, 2 [1] (1.3 performed best, so maybe just do that?)
2. Epsilon: 0.1, 0.2, 0.3 [3]
3. Unit cost and inverse cost

2 Background

3 Exploration in AWA*

3.1 ϵ-AWA*

3.2 $\alpha\beta$-AWA*



4 Evaluation

In order to evaluate the usefulness of exploration in AWA* a number of experiments were conducted on 2 problem domains–the unit-cost and the inverse-cost sliding tile puzzles. In each domain, multiple weights and epsilon values will be used to parameterize the three algorithms. For the weights, 1.3, 2, and 5, will be used in order to see how weighing the heuristic more or less impacts the search. For $\epsilon-$AWA* and $\alpha\beta-$AWA*, 0.1 and 0.3 will be used as the ϵ value in order to see how more or less random exploration impacts the search.

Degraded heuristic.

Summarize architecture.

4.1 Unit-Cost Tile Puzzle

Degraded Heuristic

4.2 Inverse-Cost Tile Puzzle

Degraded Heuristic

5 Conclusion

Algorithm 1 $\epsilon - AWA^*$ node selection

$y \leftarrow$ randrange(0,1)
if $y \leq epsilon$ **then**
  return randomSample($OPEN$)
else
  return $\arg\min_{x \in OPEN} f'(x)$
end if

Algorithm 2 $\alpha\beta - AWA^*$ node selection

Require: $\gamma \leftarrow beta(\alpha, \beta)$
$y \leftarrow$ randrange(0,1)
if $y \leq epsilon$ **then**
  $row \leftarrow$ sampleRow($OPEN$, γ)
  $start \leftarrow 2^{row} - 1$
  $end \leftarrow 2 \cdot start$
  return randomSample($OPEN[start : end]$)
else
  return $\arg\min_{x \in OPEN} f'(x)$
end if

References

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3. Valenzano, R.A., Sturtevant, N.R., Schaeffer, J., Xie, F.: A comparison of knowledge-based gbfs enhancements and knowledge-free exploration. In: Twenty-Fourth International Conference on Automated Planning and Scheduling (2014)