



REVIEWER'S REPORT

Manuscript No.: IJAR-56234

Title: Comparison of Heuristic Search Algorithms in Solving 11-puzzle Problems

Recommendation:

- Accept as it is
- Accept after minor revision.....
- Accept after major revision
- Do not accept (*Reasons below*).....

Rating	Excel.	Good	Fair	Poor
Originality		-		
Techn. Quality		-		
Clarity		-		
Significance		-		

Reviewer Name: Dr Gulnawaz

Detailed Reviewer's Report

This paper presents a comparative study of the A* and IDA* heuristic search algorithms applied to the 11-puzzle problem using the Manhattan distance heuristic. The topic is well-chosen and relevant to the field of Artificial Intelligence, particularly in heuristic search and combinatorial problem solving. By focusing on the 11-puzzle, the study addresses a relatively underexplored mid-complexity problem that lies between the classical 8-puzzle and 15-puzzle benchmarks, which strengthens the novelty of the work.

One of the key strengths of the paper is its clear experimental design. Both algorithms were implemented under identical conditions, using the same heuristic and state representation, which ensures fairness in comparison. The use of multiple evaluation metrics — including nodes generated, nodes expanded, effective branching factor, CPU time, and solution depth — provides a comprehensive performance assessment. The results are clearly presented and consistently show that A* outperforms IDA* in terms of time efficiency and node processing, while acknowledging IDA*'s advantage in memory usage. The percentage-based comparisons make the findings easy to interpret and convincing.

The methodology section is generally well-structured, and the explanation of the Manhattan distance heuristic is accurate and appropriate for sliding tile puzzles. The inclusion of large-scale testing (over two million instances) adds credibility to the empirical results. The discussion appropriately connects the findings to previous research and supports the claim that performance trends observed in smaller puzzles extend to the 11-puzzle.

However, there are areas that could be improved. The paper occasionally contains minor grammatical issues and formatting inconsistencies that affect readability. Some sentences are lengthy and could be

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simplified for clarity. In addition, while the hardware configuration is mentioned, more detail about implementation specifics (e.g., programming libraries, memory usage measurements, termination conditions) would improve reproducibility. The claim about the 11-puzzle state space could also be supported with clearer explanation or citation. Finally, including a brief analysis of memory consumption would strengthen the comparison, since memory efficiency is one of IDA*'s primary advantages.

Overall, this is a solid experimental study with clear results and meaningful conclusions. With minor revisions in language clarity and additional implementation details, the paper would make a strong contribution to research on heuristic search algorithm performance and benchmarking.