An investigation of the effects of Anytime heuristics on the time complexity of the IDA^* search algorithm

Problem to be address:

It as been shown that Iterative Deepening A^* (IDA^*) has a space complexity of $O(mb)$ while A^* has a space complexity of $O(b^m)$. The time complexity for both algorithms are $O(b^m)$. The anytime heuristic search method, when applied to A^* provides a trade off between trade off between search time and solution quality. What if we applied anytime heuristic approach to IDA^*. will we it improve its time complexity? will it affect its space complexity.

The aim of this project will be to investigate the effects applying anytime heuristics on the time complexity of the IDA^* search algorithm.

Project questions:

An attempt will be made to answer the following questions in this project:

1. Is it possible to improve the time complexity of IDA^* with anytime heuristics?
2. Are there differences between IDA^* and IDA^* with anytime heuristics.

Resources that will be used for Testing the code

- Due to limited time available for this project I will be reusing the 3X4_puzzle provided in course SearchFrameWork code.
- Additionally due to my limited experience working with C++, I will be using the source code for "Artificial Intelligence: A Modern Approach" . The code is located here: https://github.com/aimacode/aima-python

Plan for experiments

The primary objectives of the experiments will be to compare the performance of IDA^* vs IDA^* with anytime heuristics. More specifically, I will be adopting the following experiments from assignment 3:

1. An examination of the difference between IDA^* vs IDA^* with anytime heuristics on all 100 unit sliding tile problems.
2. A comparison of the performance of IDA^* vs IDA^* with anytime heuristics on the inverse sliding tile puzzle.

Rough Project Schedule

Task	Estimated time required
Project Proposal	3 Days
Implement IDA^* Anytime search	2 weeks
Complete final project report	3 days
Complete project presentation	2 days