MATH 8650
Advanced Data Structures
Fall 2018

Term Project Proposal
Optimization of Bellman Ford Algorithm

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1 Introduction

Pathfinding is the plotting of a computer application of the shortest route between two points. It is an essential part of many applications such as video games, robot navigation, road maps etc. Dijkstra's and Bellman Ford are two of many algorithms that are used to find the shortest path. Even though Dijkstra's is faster, Bellman Ford is considered when negative cycles are present in the graph. Standard Bellman Ford has a complexity of O(VxE) where V is the vertices and E is the edges of the graph. In this project we will try to improve the runtime of Bellman Ford algorithm.

2 Goals

1. Implement Bellman Ford Algorithm
2. Implement optimized Bellman Ford Algorithm
3. Design test cases to validate the implementation
4. Compare the two for performance, accuracy and efficiency

3 Deliverables

1. Python implementation source code (Jupyter Notebook)
2. Report
3. Project Presentation

4 References

[1] `https://en.wikipedia.org/wiki/Pathfinding`

[2] `https://en.wikipedia.org/wiki/Bellman%E2%80%93Ford_algorithm`

[3] Wei Zhang , Hao Chen , Chong Jiang , Lin Zhu ,"Improvement And Experimental Evaluation Bellman-Ford Algorithm", *International Conference on Advanced Information and Communication Technology for Education (ICAICTE 2013)*