MATH 8650
Advanced Data Structures
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Term Project Proposal
Optimization of Bellman Ford Algorithm

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1   Introduction

Is it possible to find the shortest path in a negative weighed graph faster than the Bellman Ford Algorithm? Path-finding 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 Algorithm 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 implement an algorithm[3] that finds the shortest path for graphs that include negative weights and compare it with Bellman Ford Algorithm to see which one performs better.

2   Goals

1. Implement Bellman Ford Algorithm

2. Implement the proposed Algorithm[3]

3. Design test cases to validate the implementation

4. Compare the two for performance 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)*