Interactive Evaluation of Shortest Path Methods

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Problem Statement

Can you identify which one has a lower time complexity?

$O(m \, loglog \, n \, logloglog \, n)$
Stratified Binary Tree Variant of Dijkstra's

$O(m + (n \, log \, n)/(loglogn))$
Fredman and Tarjan's Fibonacci Heap Variant of Dijkstra's

Problem Statement

Your answer is likely **No.**

- Algorithm research has developed different variations for shortest-path calculations

- Efficiency is a major consideration for algorithms, but it's often difficult to compare or visualize their performance

This project aims to address that, using various algorithms and test suites to output detailed comparisons between them

Can you identify which one has a lower time complexity?

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Stratified Binary Tree Variant of Dijkstra's

vs.

$$O(m + (n\ log\ n)/(loglogn))$$
Fredman and Tarjan's Fibonacci Heap Variant of Dijkstra's

Requirements & Constraints

- **Functional Requirements**
  - Seamless integration of multiple algorithms and their execution on data sets
  - Correct runtime measurements
  - Good visualizations of algorithm outcomes and comparisons among them

- **Resource Requirements**
  - Need server capable of running the code
  - Optimal resource usage per algorithm run
  - Algorithm run report generation and storage

- **UI Requirements**
  - User upload/algorithm selection
  - Clean, organized presentation of SP visualizations

Engineering Standards

- **IEEE/ISO/IEC 26514-2021**
  - Design and development of Information for users
- **IEEE/ISO/IEC 29119-1-2021**
  - Software and systems engineering – Software testing
- **IEEE/ISO/IEC 42010-2022**
  - Software, systems, and enterprise – Architecture description

Intended Users and Uses

- **Educators**
  - Present and educate people about the efficiency of different shortest-path algorithms
- **Researchers**
  - Generate reports on the efficiency of the different algorithms
  - Compare and choose different algorithms for their own projects based on the type of data sets they work with
- **Students**
  - Tool to better understand and learn about the performance of algorithms on different data sets