# Senior Design II – PIRM 1

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Client: Dr. Goce Trajcevski

#### Problem Statement

Can you identify which one has a lower time complexity?

<u>O(m loglog n logloglog n)</u> Stratified Binary Tree Variant of Dijkstra's

vs.

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

Your answer is likely No.

- Algorithm research is always developing
- Efficiency is important, but hard to compare

This project aims to develop a system that enables comparing algorithms for this purpose,

#### Interactive Evaluation of Shortest-Path Methods

This project aims to develop a system that enables:

- The use of various algorithms on a variety of different existing or given traffic network datasets to output detailed comparisons
- For use by educators, students, and assisting programmers.
- Facilitate the decision-making process when evaluating algorithms for a given project using detailed comparisons and performance metrics

### Stakeholders & Use-Cases

#### • Educators

- Present and educate people about the efficiency of different shortest-path algorithms
- Generate reports on the efficiency of the different algorithms

#### • Students

• Tool to better understand and learn about the performance of algorithms on different data sets

#### Requirements & Constraints

Functional Requirements	<b>UI Requirements</b>
• Algorithm execution on data sets + metrics report	• User upload/algorithm selection
<ul> <li>Visualizations of algorithm outcomes/comparisons</li> </ul>	• Clean, organized presentation of SP visualizations
Resource Requirements	Constraints
Resource Requirements • Optimal resource usage per algorithm run	Constraints • Model View Controller Framework
Resource Requirements         • Optimal resource usage per algorithm run         • Report generation and storage	Constraints <ul> <li>Model View Controller</li> <li>Framework</li> <li>Budget: No more than \$200</li> </ul>

### Design/Wireframe

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## Goals

- Research and integrate various code bases containing the shortest path algorithms
- Allowing algorithm and dataset selection through the frontend
- Develop the Algorithm Execution Driver



## Technical Challenges

#### • Integrate different code bases

• Provided shortest path algorithms are written a combination of different languages such as C++, C#, and java and will need to be translated and integrated over into our Algorithm Execution Driver.

#### • Conduct a comprehensive test suite

- To ensure the algorithms are working as intended after being implemented, we will need to perform a comprehensive test suite on the Algorithm Execution Driver
- Scope of algorithms included
  - How many algorithms do we want to include? Are we going to include different types?