

1 Introduction: Part 1

1.1 PROBLEM STATEMENT

“Location-Based Services are often used to find proximal Points of Interest (PoI) - e.g., nearby restaurants and museums, etc. - in a plethora of applications” (Teng et al., 2021). Our client has developed an algorithm to efficiently determine the optimal semantically diverse PoIs as well as the optimal route between them given user constraints like maximum travel distance, preferred PoI categories, etc. Furthermore, our client has compiled a dataset of New York City that contains categorized PoIs and the road network that contains them.

The main objective of this project is to create a web application that creates a visualization for the algorithm mentioned above for travelers to display the optimal PoIs and the path between them as there are no current means to visualize the algorithms. Additionally, visualizations of other algorithms that determine paths between PoIs will be created to compare the PoI diversity along the routes to demonstrate the algorithm's effectiveness. Users will be able to input constraints from which the algorithm will compute the route to semantically diverse PoIs.

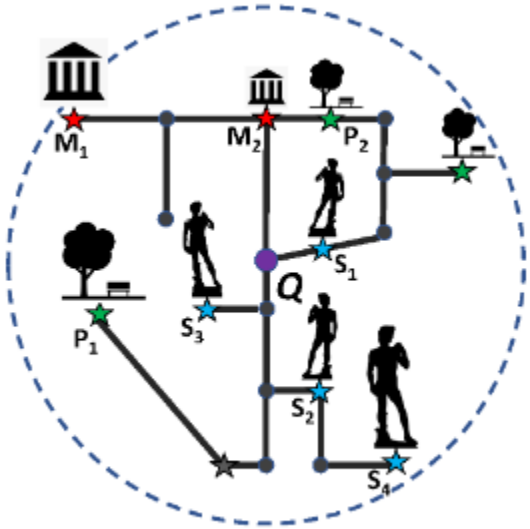


Figure 1: Running Example of Diverse Path Search

1.2 INTENDED USERS AND USES

Users:

- Tourists
 - Key characteristics:
 - They care about the locations they visit while on a trip.
 - They want to have new experiences.
 - Needs:
 - Easy to use interface.
 - Quick loading times.
 - Best route through their chosen interests.
 - A diverse route through different interests.
 - How they benefit:
 - Our application will give them the best opportunity to easily find the best route that fits their needs.
- Educator
 - Key characteristics:
 - They care about the efficiency of the application.
 - They care about the clear visibility of the algorithm's work.
 - Needs:
 - Need to be able to easily switch between routing algorithms.
 - Need an easy to use but professional interface.
 - Need the application to not slow down the algorithms for accurate comparisons between them.
 - How they benefit:
 - Our application will allow educators to directly compare multiple semantically diverse path-finding algorithms through points of interest. This will help them visually compare the algorithms for testing which is best.

Use Case	Affected Roles	Details
Set starting hotel	All	The starting hotel will be from a pre-set list of hotels in NYC.
Input POIs that interest user	All	Users can choose categories that interest them so they have a greater chance of visiting those locations on their route
Choose which algorithms are implemented for their route	Educators	Educators can choose which algorithms are used to compare with each other.
See most optimal route on map	All	Both Tourists and Educators will be interested in seeing the most optimal route.
Input constraints	All	The Tourist will want to constrain distance and time to

		benefit their needs. The Educator will want to constrain them for testing each algorithm.
--	--	---

1.3 REFERENCES

Teng, Trajcevski, & Züfle. (2021). Searching Semantically Diverse Paths.