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Optimized Map Generation for Physical trav-Elling Salesman Problem

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ABSTRACT

This project presents a method for generating complex problems that allowmultiple non ob- vious solutions for the physical traveling salesman problem (PTSP). PTSP is a single- player game adaptation of the classical travel- ingsalesman problem that makes use of a sim- ple physics model: the player has to visit a number of waypoints as quickly as possible by navigating a ship in real time across an obsta- cle-filled 2-D plane. This project proposes an evolutionary approach to obtaining maps where the optimalsolution is not immediately obvious. The evolutionary algorithm covari- ance matrix adaptation-evolutionary strategy (CMA-ES) is employed, where maps, indirect- ly represented as vectors of real numbers, are evolved to differentiate maximally between a game-playing agent that follows two or more different routes.

INTRODUCTION:

Optimized map generation for physical travel- ling salesman problem is a rapidly evolvingfield in the domain of computer science and optimization. The travelling salesman problem is a classic optimization problem that seeks to find the shortest possible route that a salesper- son must take to visit a given set of cities and return to their starting point. With the advent of Powerful Algorithm and technologies, auto- mated map generation become an importantarea of research for solving this problem.

In this context, optimized map generation re- fers to the use of computational methods to generate optimized maps that can be used to plan the shortest possible route for the travel- ling salesman problem.

These maps may include information on dis- tances between cities, road networks, and other relevant data that can be used to optimize the route and minimize the salesperson's travel time.

There are several techniques used in automat- ed map generation, such as heuristic algo- rithms, machine learning, and graph theory. These techniques have enabled the develop-ment of efficient and accurate methods for generating maps that can solve the travelling salesman problem with minimal error rates.

Overall, the field of map generation for the physically travelling salesman problem holds great promise for improving the efficiency and effectiveness of route planning for salesper- sons, logistics companies, and transportation providers, among others.

EXISTING SYSTEM:

There are several existing systems for op- timized map generation for physical travel-ling salesman problem. Here are a few ex- amples:

Google Maps API: Google Maps is one of the most popular map generation tools in the world, and its API provides a range of fea- tures that can be used to generate optimized routes for the travelling salesman problem. The API can be integrated with other appli- cations, such as route optimization software, to provide accurate and up-to-date maps.

1. Maps box:

Map box is a platform for creating custom maps, and it provides an API that can be used to generate optimized routes for the travelling salesman problem. The platform offers a range of features, including real- time traffic data, satellite imagery, andcus-tom styling options.

2. Optimo Route:

Optimo Route is a route optimization software that uses automated map generation to generateoptimized routes forthe travelling salesman problem .The software is designed for logis- tics companies and transportation providers andcan be used to optimize routes for multipleve- hicles and drivers.

3. Open Route Service:

Open Route Service is an open-source platform that provides a range of routing and mapping services,including automated map generation for the travelling salesman problem.The platform offers a range of features,including real-time trafficdata, elevation

PROPOSED SYSTEM:

A proposed system for optimised map generation for the physical travelling salesman problem could include the fol- lowing components: Data collection: The system would need to collect data on the cities and locations that the salesperson needs to visit, including their coordinates, distances between them, and any other relevant information that could affect the travel time.

1. Map generation: Using the collecteddata,the system would generate a map that in- cludes all of the locations to be visited, as well as any road networks or transporta- tions modes available. The map would be optimized to minimize the distance trav- elled by the salesperson, while taking into account any constraints or limitations, suchas time or vehicle capacity.

2. Route optimization:

Once the map is generated, the system would use a routing algorithm to optimize the route for the salesperson. This would involve calculating the shortest possible route between each of the locations, while considering any constraints or limitations that may apply, such as time windows or vehicle capacity.

3. Real-time updates:

The system would continuously monitor thesta-tus of the salesperson's journey, updating the route as needed to account for any changes or unforeseen events ,such as traffic or unex- pected delays.

4. User interface:

The system would provide an easy-to-use in- terface for the salesperson to interact with al- lowing them to input their starting location anddestination, as well as any other relevant in- formation,such as time constraints or vehicle type.

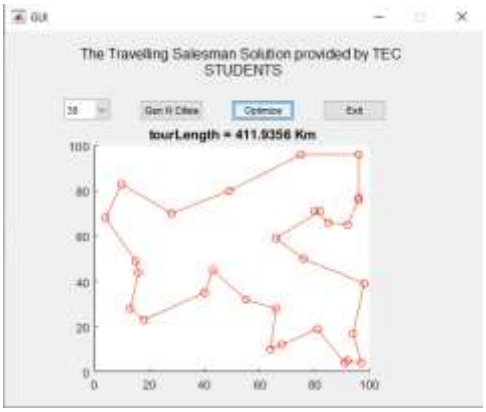
Overall,the proposed system would provide an optimised route for the salesperson, taking into account all relevant factors to ensure the shortest possible travel time. It would also provide real-time updates and an intuitive interface, making it easy for the salesperson to navigate the route and make any necessary adjustments along the way.

RESULTS:

We are here generating maps for 30 cit- ies,70 cities,100 cities.Our project will generate maps up to maximum of 100 cit- ies.

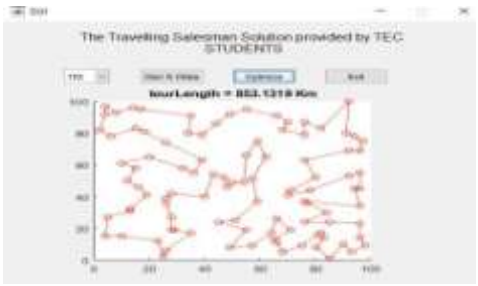
We are creating a GUI application to makeit easy for end user. This GUI will look likebelow

Map Generation for 30-Waypoints:



CONCLUSION:

This project introduced an evolu- tionary algorithm capable of auto-matically generating high- quality maps for the PTSP game. We are implementing an algorithm for the physical travelling sales problem (PTSP). With this algorithm, we have understood that to generate maps for the PTSP problem auto- matically. The maps generated here have to meet the conditions to be feasible map. The maps obtained with this algorithm will be tested further for optimization. This re- search can be extended in several



ways. For instance, the number of waypoints that a map contains could be increased, resulting in more challengingmaps. Another possibility is to allow the evolutionary algorithm to modify slightly the rules of the game.

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