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Shortest Route Optimization using ML

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Abstract: *Route optimization is a critical problem in transportation and logistics. One of the most important challenges in this field is the optimization of short routes. In recent years, machine learning techniques have shown great promise in solving this problem. The aim of this research paper is to provide a comprehensive overview of the use of machine learning in short route optimization, their advantages and disadvantages, and potential applications. The paper will cover different machine learning techniques such as reinforcement learning, supervised learning, and unsupervised learning. The effectiveness of these techniques will be evaluated based on various criteria such as accuracy, scalability, and practicality. Finally, some real-world applications of machine learning-based short route optimization will be discussed.*

Keywords: Machine Learning, Dijkstra's Algorithm.

I. INTRODUCTION

Nowadays delivery businesses and vehicle transportation for various purposes or the small industries are growing very rapidly, according to on one of the report by the union of concerned scientists [1], "fright hauling trucks consumes 2-3 million barrels of the oil per day and emits about 348 million metric tons of carbon dioxide" The small-scale businesses for transportation using digital environment for ease in their work. In calculating the distance between preferred locations is difficult to calculate for various services to complete. 25% of the available fossil fuels in future, an amount that will increase due to increase in the transportation demand [2]. For that the implementation of route optimization is in transportation or related services is much needed.

The main focus in this Project is how to calculate the optimal route between two locations with in service area, taking into account all routes. To resolve this problem, need an algorithm that takes into account all the possibilities offered by locations for completing services in the service area. This involves route sequencing to evolve itself to be better than earlier path. It must also take into account the specified location is under service area. In this project main focusing on building machine model and software to find shortest route for specified location across region or area to empower the businesses by reducing cost of transportation and cost effective.

The desired result is very useful for the businesses, small industries who wants to grow their businesses by reducing the cost of transportation as well as time saving; it will definitely boost the businesses to work with maximum capacity. In this project building machine learning model and software, to find shortest route for specified location across region or area to empower the businesses by reducing cost of transportation.

II. PROPOSED WORK

MOTIVATION

Motivation for change often depends on the existence of a discrepancy between the patients' current behavior and important values or goals Using machine learning to optimize shortest routes can save time, money, and energy, adapt to changing conditions, handle complex networks, and provide personalized routing solutions.

III. METHODOLOGY

Machine learning includes data collection, preprocessing, feature engineering, algorithm selection, model training, evaluation, and deployment.

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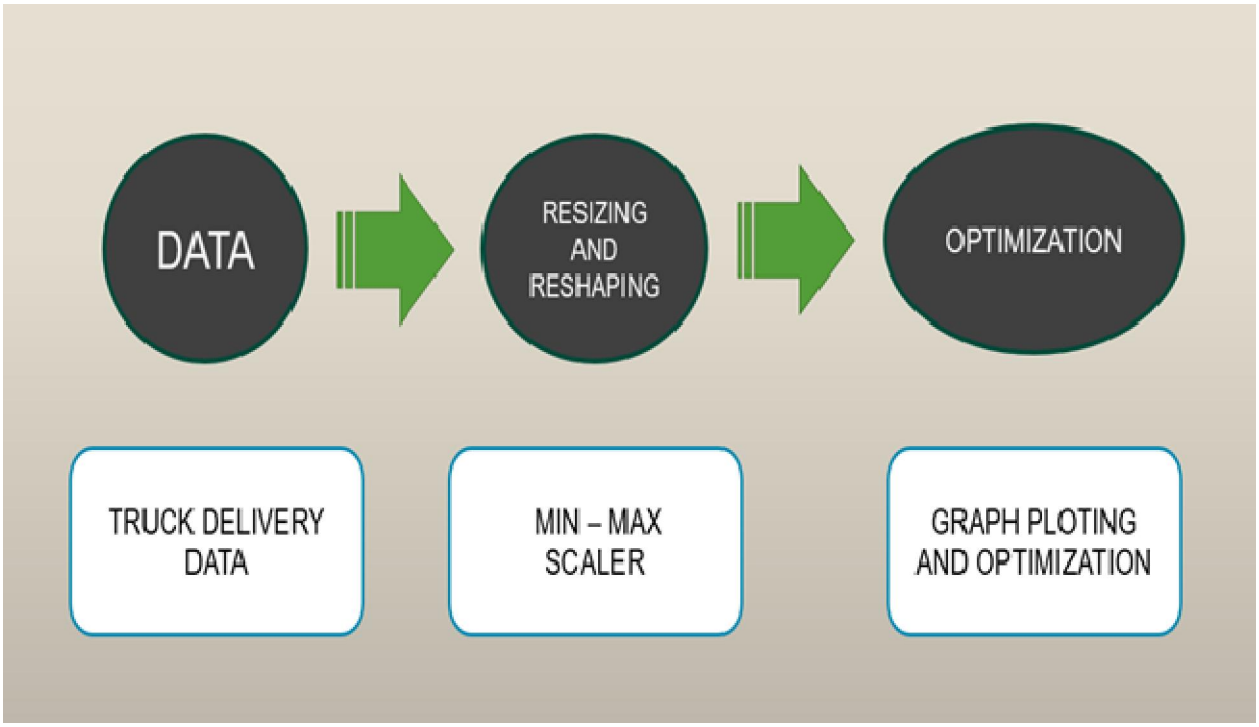
IV. SYSTEM ARCHITECTURE



V. HARDWARE AND SOFTWARE REQUIREMENTS

Software Requirements

- Windows: 7 or newer
- Jupyter Notebook
- Python programming language

Hardware Requirements

To be able to run the app, the minimum requirements ofthe hardware for this system are:

- At least 4 GB RAM and 256 GB SSD.
- The hardware used must have a competent firewall to secure the data in the system

VI. LITERATURE SURVEY

1.Paper Name : Vehicale Route Optimization (Prediction of Chronic Kidney Disease using Adaptive Hybridized Deep Convolutional Neural Network on the Internet of Medical Things Platform.
Author – Raja Kumar Kedia
Abstract : Vehicle Route Optimization (VRO) is one of most important topic now-a-days as if it can be manipulated, then pollution, one of the biggest enemy of the environment may be curbed out. Basic objective of the classical problem of Vehicle Routing Problem (VRP) is to find a path in a group of city such that the length of path of all cities connected together is minimized and to solve the problem along with its numerous variations, many algorithms have been proposed in literature. In this paper, an effort has been made to study the techniques present for optimizing the route of vehicle, their working, efficiency and complexity.
Drawbacks:Limited capacity and use of vehicles for multiple trips in vehicle routing path has not been discussed. Solution found can be obtain upto 90% accuracy.

2.Paper Name: Route planning algorithms: Planific@ Project Route Planning Algorithms
Author : Carlos Martín and Gonzalo Martín Ortega i

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Abstract : — Planific@ is a route planning project for the city of Madrid (Spain). Its main aim is to develop an intelligence system capable of routing people from one place in the city to any other using the public transport. In order to do this, it is necessary to take into account such things as: time, traffic, user preferences, etc. Before beginning to design the project is necessary to make a comprehensive study of the variety of main known route planning algorithms suitable to be used in this project. Kidney disease or commonly known as kidney failure is a condition when the renal function is declining that could result in the inability of the kidneys to perform their duties. Kidney disease patients have the potential to get into the chronic phase.
Drawbacks: The hierarchical actions are broken down into sub actions and subgoals. That can contribute to final solution but at same time create complex model.For finding solution its make use of discrete duration based actions thus it may be possible to indicate the movement during and after the implementation of an action effect occurs which can reduce accuracy.

3.Paper Name:Automotive Route Optimization for a Logistics Service Provider
Author : ALDIN AVDIC ZHENGYANG XIANG
Abstract : Several case studies were done in order to clarify the potential benefits with the use of a route and load planning system within different industries. Moreover, with the chosen interviews of respondents from different organizations including Autolink, customers and hauliers, different demands or requirements from different points of perspective including managers, planners, customers etc. were collected and concentrated into the final evaluation criteria which includes five main groups with 22 sub-features in the software benchmarking model as the last part of this report. Therefore, based on the criteria identified, one software providers were stand out in most of the five categories among all the three softwares and was chosen as the final recommendation of the potential route planning system investigation.
Drawbacks: Currently the system is limited and the transportation planner does not receive full system support. Much of the work being done in the system is done manually. Furthermore, everything is not considered by the system in terms of data and parameters. The system is not able to handle real time data efficiently, which affects the decision-making process. It believes himself that the system should be able to handle certain type of parameters in order to work optimally.

4.Paper Name :Shortest Route Optimization for Emergency Service: Case Study in Kumasi, Ghana
Author : Edward Obeng Amoako
abstract : It is becoming difficult for emergence services to find the best route especially in Kumasi to any destination in order to save lives in real time. This study deals with the problem of finding shortest paths in traversing some locations within the Kumasi Metropolis in the Ashanti Region of Ghana. Dijkstra‘s Algorithm was selected to determine the shortest distances from any location to any destination within the Kumasi metropolis. The objective of thesis is to use Dijkstra‘s algorithm in constructing the minimum spanning tree considering the dual carriage ways in the road network of Kumasi metropolis within the shortest possible time for emergence services. The distance between 51 locations of the towns with the major roads was measured and a legend and a matrix were formulated. A visual basic program was prepared using Dijkstra‘s algorithm. The distances were used to prepare an input deck for the visual program. The methodology employed included review of relevant literature of the types of Dijkstra‘s algorithm and methods employed in the solution of the Dijkstra‘s algorithm and to develop computer solutions – ArcGIS and VB.net for faster computation of Dijkstra‘s algorithm.
Drawbacks: Sometimes the given algorithms may produce output that is of no use even though it has been correctly generated. For example, there can be a path that will require an ambulance and one bus only to reach the destination after 30 minutes. However, the algorithm may advise you to take a car and three times to take a bus which will take 25 minutes, 5 minutes less than the previous path. From the point of view of the defined conditions the second path is better, but a more reasonable path is the first one, though 5 minutes shorter.

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VI. CONCLUSION

The shortest route optimization problem with so many constraints was studied. So many methods like min-max scaler graph theory were developed for finding the optimum route for minimizing the time and cost. dijkstras algorithm with additional changes used to optimize the route.

VI. FUTURE SCOPE

Shortest route optimizer software can be essential part of your successes. The ultimate shortest route optimizer software not only offers shortest route for specified location but it also an integral part of user experience and satisfaction. The key success for shortest route optimizer help your any kind of businesses or startup that include delivery or transportation facilities and provide excellent and efficient business software.

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