Scheduling Interface for Electric Delivery Vehicles

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ABSTRACT: Logistic play an important role in our modern life and logistic organizations are slowly starting to use electric vehicles for their work as they are more capable and eco friendly. Electric vehicles have a limited range that they can cover on a single charge unlike fuel powered vehicles. So, this project provides an interface which can be used by logistic company workers to plan the daily route that an agent have to take to complete his deliveries of a single day, This interface make his task easier by planning a perfect route which he have to take to complete all this deliveries and return to the office without running out of the range of the vehicle.

KEYWORDS: Travelling sales person algorithm, Python, Tkinter, Logistics, Delivery

I.INTRODUCTION

With the growing awareness of climate change and the need to reduce greenhouse gas emissions, many companies are shifting towards sustainable practices, including the use of electric vehicles (EVs) for transportation. Electric delivery vehicles (EDVs) are becoming increasingly popular for last-mile deliveries, as they provide a cleaner and more efficient mode of transportation. However, the efficient scheduling of these vehicles can be challenging, as they have unique limitations and requirements that need to be taken into account.

The range of EDVs is limited compared to traditional delivery vehicles, and they require charging, which can take several hours. This means that efficient scheduling is essential to ensure that vehicles can complete their deliveries within the available range and charging time. Additionally, traffic conditions and delivery locations need to be considered to optimize delivery routes and minimize travel time. These factors make scheduling EDVs a complex task, which requires a specialized interface to help operators manage their fleet effectively.

The implementation of a scheduling interface for EDVs has several benefits. Firstly, it can help companies improve the efficiency of their delivery operations, reducing costs and improving customer satisfaction. Secondly, it can help to reduce the environmental impact of deliveries by ensuring that EDVs are used in the most efficient way possible, reducing the number of vehicles needed and minimizing emissions. Finally, the interface can help to promote the use of EDVs by demonstrating their practicality and efficiency in last-mile delivery operations.In conclusion, the development of a scheduling interface for EDVs is a crucial step towards promoting sustainable transportation practices and reducing the environmental impact of deliveries. By considering the unique requirements and limitations of EDVs, this interface can help to improve the efficiency of delivery operations, reduce costs, and save time.it also helps us to reduce pollution and make our planet eco friendly.

II. RELATED WORK

Electric delivery vehicles (EDVs) are a promising solution for last-mile deliveries, as they provide a cleaner and more efficient mode of transportation compared to traditional vehicles. However, scheduling the use of EDVs can be challenging, as they have unique limitations and requirements that need to be taken into account. Several studies have

investigated the optimization of EDV scheduling. For example, Zhang and Liu (2019) proposed a model that optimizes the delivery routes and schedules of EDVs by taking into account the time-varying charging infrastructure and traffic congestion. They found that their model could significantly improve the efficiency of EDV delivery operations.

1.Similarly, Lu et al. (2018) developed a scheduling algorithm that considers the range and charging time of EDVs, as well as the delivery time windows and road conditions. They tested their algorithm using real-world data from a logistics company and found that it could reduce the number of vehicles needed and improve the overall efficiency of the delivery operation.

2.studies have focused on the design of interfaces for EDV scheduling. For instance, Chen et al. (2020) proposed a scheduling system that allows users to input delivery locations and times, and then generates optimized delivery routes and schedules based on the battery capacity and charging station availability. They found that their system could reduce the average travel distance of EDVs by 11.2% compared to traditional scheduling methods.3. it is suggested that the optimization of EDV scheduling can significantly improve the efficiency and environmental sustainability of delivery operations. The development of specialized interfaces for EDV scheduling can also simplify the process and reduce the training time required to operate the system. However, further research is needed to test the effectiveness of such interfaces in real-world scenarios and to explore their potential for scalability and integration with other logistics software."

III. METHODOLOGY

The following algorithms are used for the proposed model.

A. TRAVELLING SALES PERSON ALGORITHM

In the context of electric delivery vehicles, the TSP can be used to optimize the delivery routes and schedules based on factors such as vehicle range, charging station availability, and delivery time windows. By finding the most efficient route, EDVs can reduce the distance travelled and the time spent on the road, which can lead to significant cost savings and environmental benefits. The interface for this project will provide a user-friendly way for users to input the delivery locations and time windows, and display the optimized route and schedule for the EDVs. The interface will also take into account the unique limitations and requirements of EDVs, such as vehicle range and charging station availability, and adjust the route and schedule accordingly.

B. APPLICATIONS

- Logistics
- Food delivery
- Medical deliveries
- Travel route planning

C.ADVANTAGES

- Optimizes the delivery routes and schedules, leading to cost savings and environmental benefits.
- Reduces the risk of human error in the delivery process.
- Improves customer satisfaction through faster and more efficient delivery.
- Can be customized to meet the unique requirements of different delivery operations.

D.DISADVANTAGES

- Requires accurate data on delivery locations, time windows, and vehicle range.
- May not be effective in all delivery scenarios, such as those with highly variable demand or complex delivery requirements.

IV.FLOW CHART

The following steps are to be followed for the data to be passed from one top level to the bottom level that is shown in Fig 1.

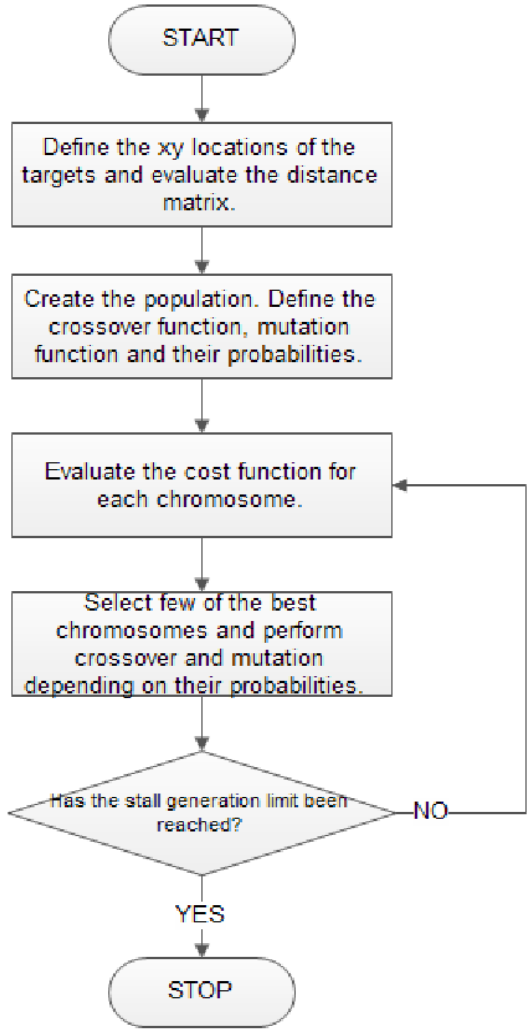

Fig.1 Flow chart of Travelling sales person algorithm

V. CONCLUSION

In conclusion, the project on scheduling interface for electric delivery vehicles is an important application of the Travelling Salesperson Problem (TSP) and Python programming language. By using the TSP algorithm, the project aims to optimize the delivery route of electric vehicles, thereby reducing travel time, fuel consumption, and carbon emissions. The interface developed using Python and Tkinter allows users to input data such as delivery locations and vehicle capacity, and generates an optimized delivery route.

The project has several advantages, such as reducing fuel consumption and carbon emissions, improving delivery times, and reducing transportation costs. However, it also has some limitations, such as the lack of real-time notifications and the need for manual data input.In terms of future work, the project could be extended to include real-time notifications and automatic data input from sensors and GPS devices. Additionally, it could be integrated with other logistics systems to improve supply chain management and optimize overall delivery routes. Overall, the project highlights the potential of TSP algorithms and Python programming for optimizing delivery routes and improving sustainability in logistics operations..

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