OpenAI ChatGPT(Dec 6, 2024 version, ChatGPT-4o)

Query 1: We are working on path planning for campus cleaning vehicles. Can you suggest some keywords for literature search related to this topic?

Output :

"Here are some relevant keywords for literature search in the field of campus cleaning vehicle path planning:

1. **Autonomous Path Planning**
2. *A Algorithm in Path Planning*\*
3. *Dynamic A Algorithm*\*
4. **Mobile Robot Path Optimization**
5. **Urban Cleaning Vehicle Scheduling**
6. **Greedy Pathfinding Algorithms**
7. **Disruption Handling in Path Planning**
8. **Vehicle Routing Problems (VRP)**
9. **Traffic-Responsive Path Planning**
10. **Multi-Robot Path Planning**

These keywords should help guide your literature search and provide a foundation for understanding the various approaches in this domain."

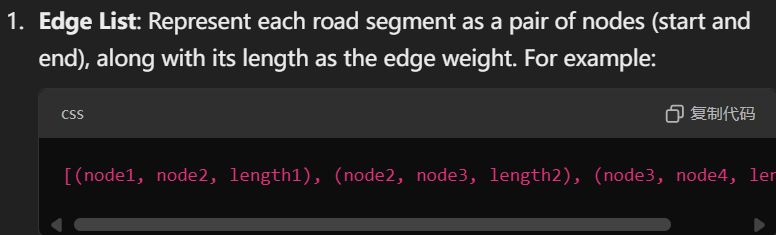
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Query 2: We have obtained the lengths of the campus roads through an electronic map and measuring function. Now we want to use these edge data to construct an undirected connected graph. What format should we process this data into for ease of future modeling?

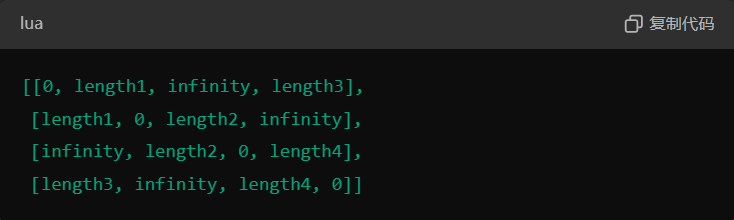
Output :

"To construct an undirected connected graph from the campus road data, you can format the data as an **edge list** or an **adjacency matrix**. Here are the steps:

1. **Edge List**: Represent each road segment as a pair of nodes (start and end), along with its length as the edge weight. For example:



1. **Adjacency Matrix**: If the number of nodes is small, use a matrix where each entry (i, j) represents the length of the road between node i and node j. For disconnected nodes, set the value to infinity (or a large number). Example format:



These formats will allow you to easily apply graph algorithms and model the cleaning vehicle's path planning."

OpenAI ChatGPT(Dec 7, 2024 version, ChatGPT-4o)

Query 3: We categorize unexpected events into two types: activity-construction events and special weather events. What are the differences in handling these two types of events in the model?

Output :

"In the model, unexpected events are treated differently based on their nature:

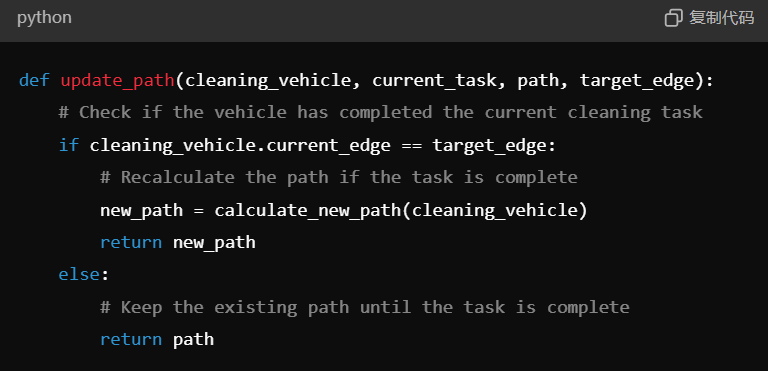
1. **Activity-Construction Events**: These events temporarily block certain paths or areas, so the model will mark these paths as impassable (i.e., remove them from the graph). The cleaning vehicle will then re-plan its path to avoid these blocked areas.
2. **Special Weather Events**: For events like rain, which don't physically block paths, the model may adjust the road's cleanliness level, increasing the dirtiness of the roads and possibly triggering additional cleaning tasks. Instead of blocking paths, weather events typically lead to changes in the environment's status, which influence cleaning priorities."

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Query 4: The dynamic A\* algorithm in our current version causes the cleaning vehicle to get stuck in place. Debugging revealed that after each timestamp update, the vehicle recalculates the path, causing the path to become chaotic. After around ten steps, the vehicle freezes. I would like to add a path protection mechanism, where the vehicle will only recalculate the path once it has completed the previous cleaning task. Please help me improve the Python code.

Output :

"In order to fix the issue of the vehicle getting stuck, we can implement a path protection mechanism that ensures the vehicle only re-plans its path after completing the previous task. Below is a sample Python code to modify the path planning logic:



This code checks if the vehicle has reached the target edge before recalculating the path. If not, the current path is maintained until the task is completed."