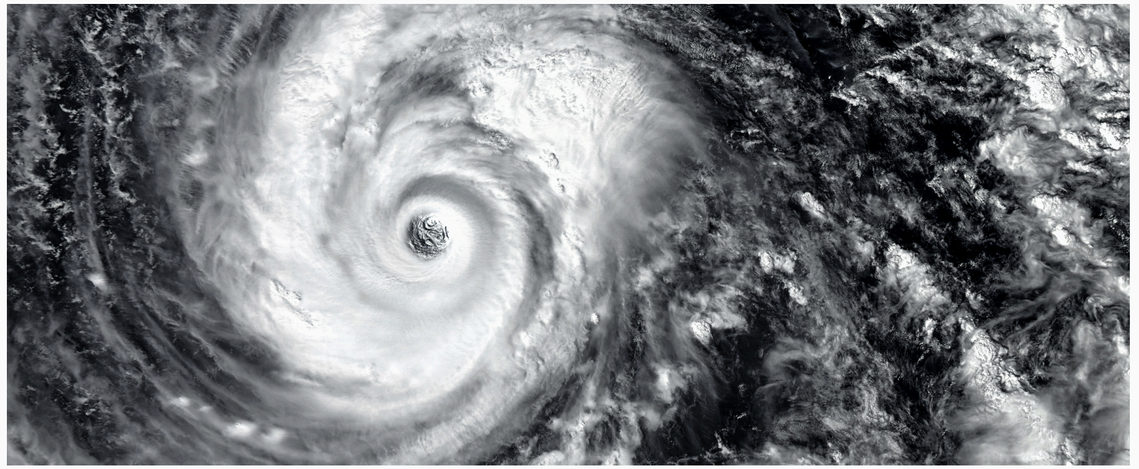
PJDSC - November 2025

BRIEF BACKGROUND



TYPHOON YOLANDA

“

It took **7-14 days** for disaster relief to arrive, leaving numerous Filipinos suffering from hunger.

Takeshita & Aratame’s (2015)

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It took **7-14 days** for disaster relief to arrive, leaving numerous Filipinos suffering from hunger.

Takeshita & Aratame’s (2015)

WHY?

Because of ***poor inventory management****,* ***uncoordinated emergency responses*** *among organizations, and* ***unequal distribution of aid****.*

PJDSC - November 2025

AGOS

Aid & Goods Optimization System

Presented by Knight to D4

PJDSC - October 2025

PROJECT AGOS

AGOS: Aids and Goods Optimization System, a website designed to improve logistical operations by optimizing relief deliveries and ensuring equitable distribution of aid.

METHODOLOGY

Data Acquisition

Data Sourced From:

- OpenStreetMaps
- Community Evacuation Centers in Calamba City, Laguna (Story Map)
- Google Maps
- National Inventory Day Data Collection (NID) by DepEd
- Google Maps Distance and Roads API
- News sites and NDRRMC posts

METHODOLOGY

Data Acquisition

Data Aggregation

- Using the schools listed in NID, a script accessing OSM was used to provide the coordinates of each school.
- Coordinates that were not provided were manually inputted via Google Maps. Coordinates of municipal halls were also manually inputted
- A script was run to link the 4 nearest nodes for each node in the map
- The distance and time it takes to get from each node was then taken from Google Maps' Roads and Distance API

METHODOLOGY

Data Acquisition

Relief Estimates

- Searching up articles, we chose a demand value that corresponds to a reasonable estimate for the demand and capacity of the truck and demand

395 families remain in Manila's 6 evacuation centers

By Ferdinand Patinio
July 24, 2025, 3:06 pm

Gov't agencies team up for aid caravan, call for public donations

By Ruth Abbey Gita-Carlos
October 4, 2025, 11:34 pm

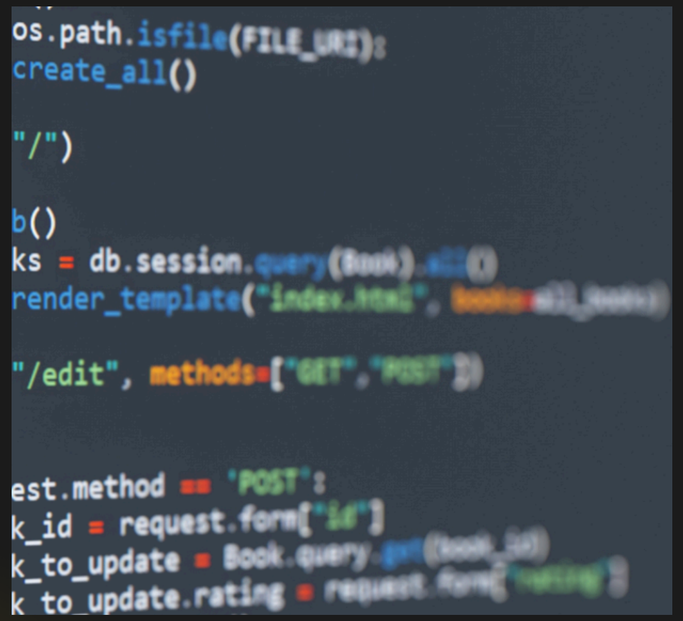
Share Share 26

NDRRMC
November 20 at 9:58 AM ·

LOOK: The distribution of 1,500 family food boxes by the Department of Social Welfare and Development to families badly affected by Typhoon Tino in Macarthur, Leyte on Nov. 20, 2025. The distribution has benefited households in nine villages.

Each food box contains six kilos of rice, five sachets of coffee, five cereal energy drinks, and 10 canned goods that will help meet their food needs. | Sarwell Meniano; Photos courtesy of DSWD Eastern Visayas

METHODOLOGY

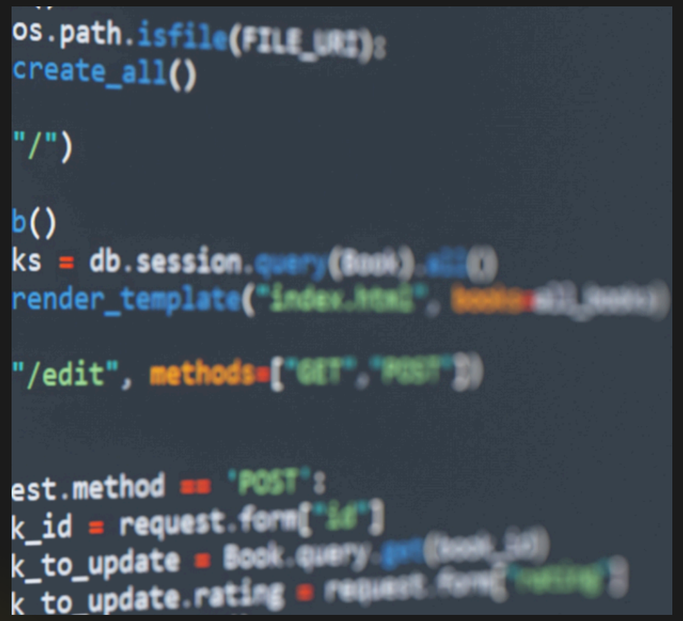


Coding the Algorithm

Based on:

Anuar, W. K., Lee, L. S., Seow, H.-V., & Pickl, S. (2022). A Multi-Depot Dynamic Vehicle Routing Problem with Stochastic Road Capacity: An MDP Model and Dynamic Policy for Post-Decision State Rollout Algorithm in Reinforcement Learning. Mathematics, 10(15), 2699. https://doi.org/10.3390/math10152699

METHODOLOGY

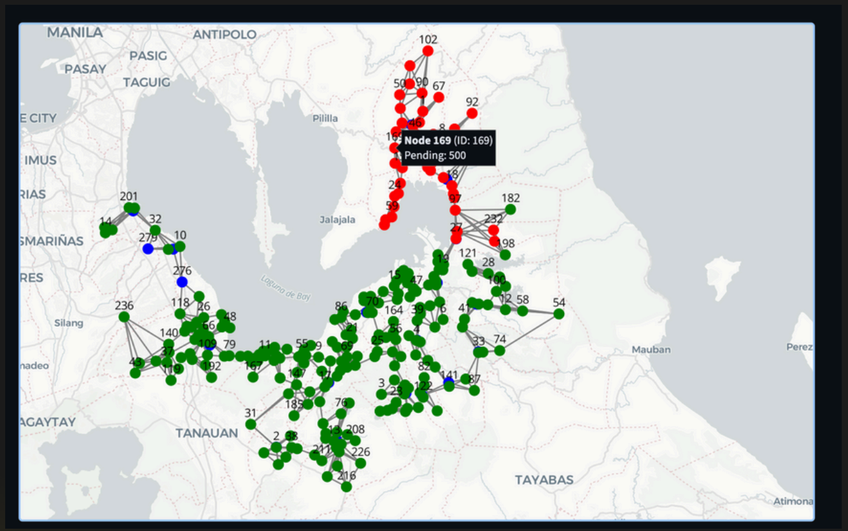


Coding the Algorithm

Algorithm:

- Implemented the 5 roll-out algorithms listed in the paper but tweaked to suit the application’s needs; specifically with the graph size.

METHODOLOGY



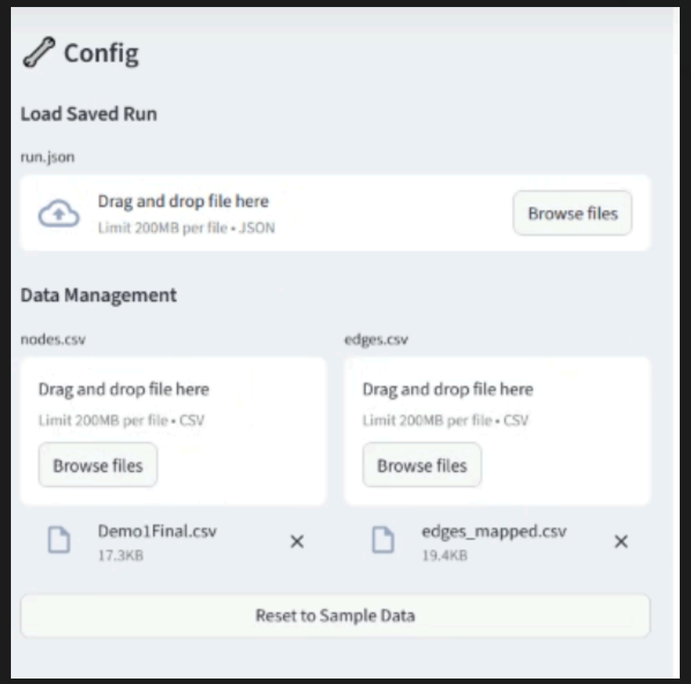
Dashboard creation

Dashboard:

- Uses Stremlit, pyplot, OSM to plot the map, plot the nodes, and connect the nodes.
- Streamlit is used to host the dashboard

Dashboard walkthrough

Data Input Panel: nodes



- Load a JSON save file
- Input the csv file containing the shelters and depots
- Input the csv file containing the edges connecting each node and the corresponding weights

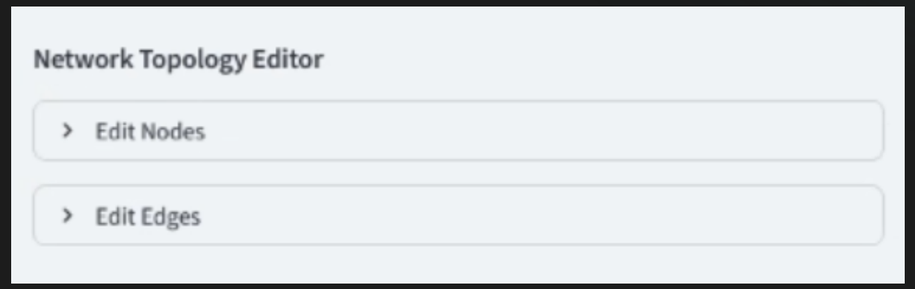
csv format:
id,type,lat,lon,demand

csv format:
u,v,weight,max_capacity, time,damage

note: u and v are the two nodes being connected

Dashboard walkthrough

Network Topology Editor

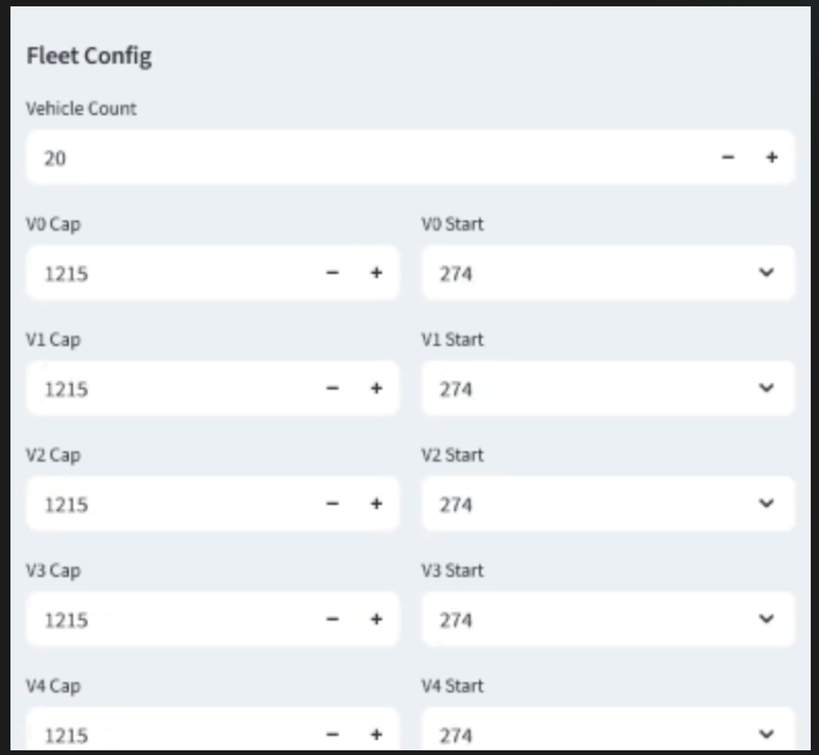


Allows to edit the values in the uploaded csv files

Solver Paremeters

Allows to edit the values in the uploaded csv files

Dashboard walkthrough

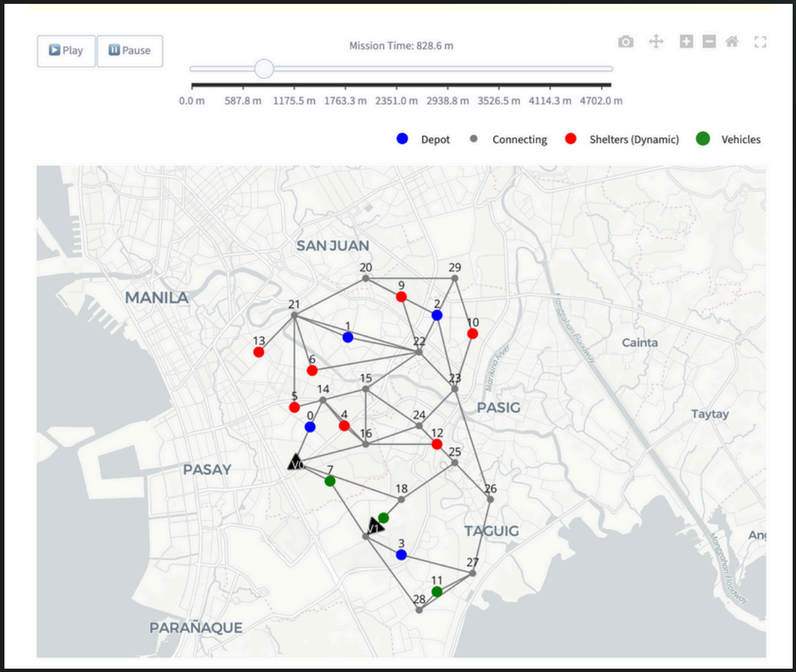


Data Input Panel: vehicles

- Set the number of vehicles that simulation would like to be run
- Capacity and Start Locations are manually set by the user.

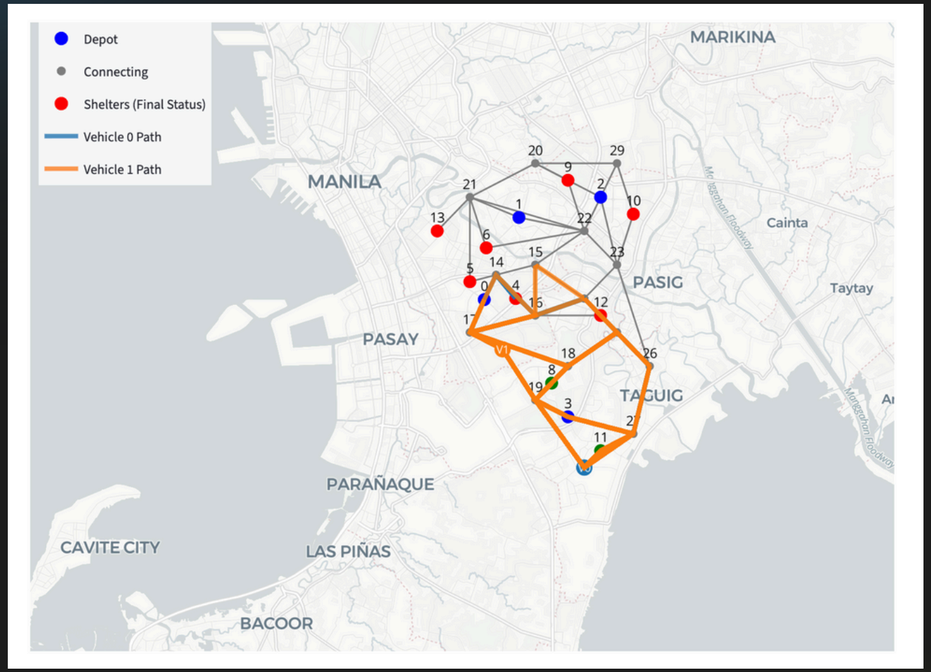
Dashboard walkthrough

Map 1



- Visualization of the vehicles moving from one node to another as well as the total time it takes

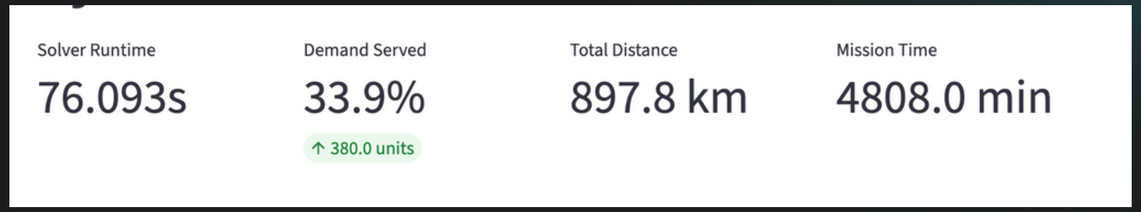
Map 2



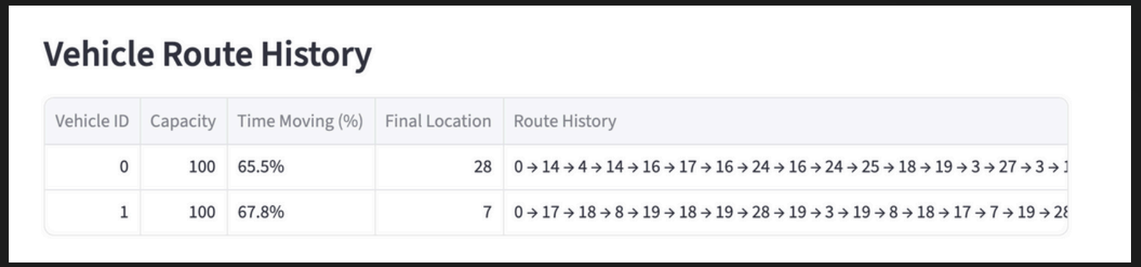
- **Visualization of the full route of each vehicle. Each route can be isolated to be viewed**

Dashboard walkthrough

Summary Statistics



- Summary statistics



Vehicle Route History

Vehicle ID	Capacity	Time Moving (%)	Final Location	Route History
0	100	65.5%	28	0 → 14 → 4 → 14 → 16 → 17 → 16 → 24 → 16 → 24 → 25 → 18 → 19 → 3 → 27 → 3 → 1
1	100	67.8%	7	0 → 17 → 18 → 8 → 19 → 18 → 19 → 28 → 19 → 3 → 19 → 8 → 18 → 17 → 7 → 19 → 28

- Full route of each vehicle

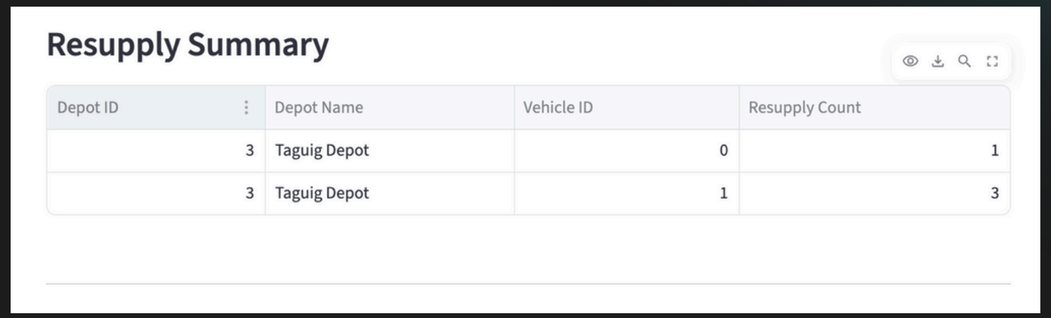
Service Summary

Time	Node ID	Node Name	Vehicle ID	Amount Delivered
16.00	4	Evac Center A	0	100.0
24.00	8	Evac Center E	1	100.0
96.00	8	Evac Center E	1	10.0
116.00	7	Evac Center D	1	90.0
426.00	11	Evac Center H	1	80.0

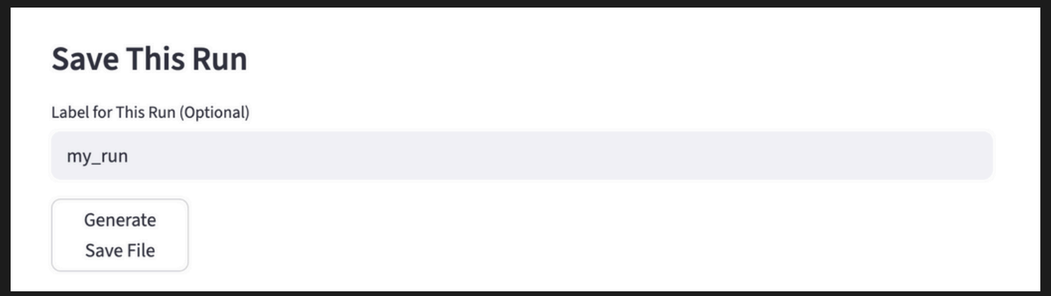
- Summary of at what time stamp a shelter has been served

Dashboard walkthrough

Summary Statistics

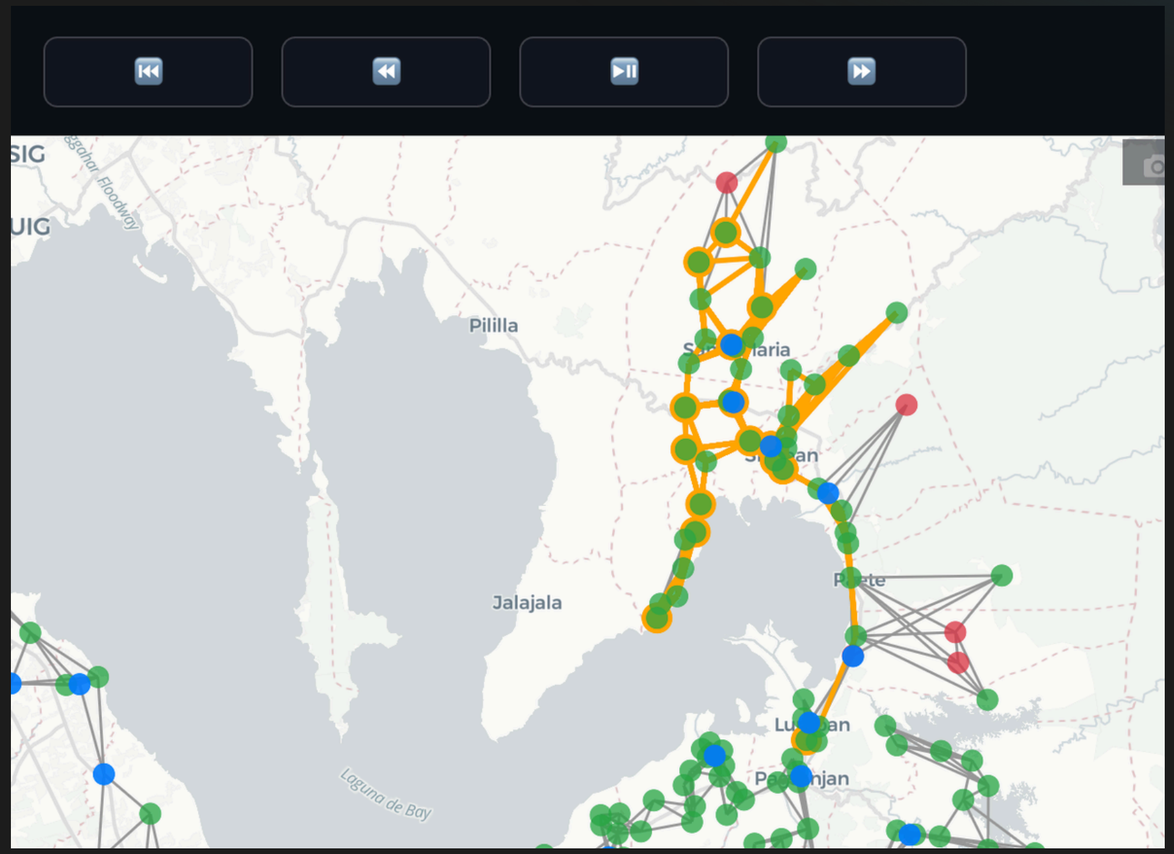


- Summary of the number of times a vehicle had to refill at a certain depot



- Option to generate a JSON save file that can be later be used to load for later use

Limitations



- **Processing power**

  Running the algorithm requires significant amount of time due to the sheer number of possibilities that it is calculating.

- **Data Acquisition**

  Data needed for the project were either incomplete or did not exist at all, leading to certain metrics being arbitrarily defined (damage and demand)

- **Technical and Data Limitations**

  Certain aspects of the project such as using actual roads in the map were not realized due to computational limitations.

Challenges and future plans

- **Optimizatioin**

  If given more time, optimizing the code to be able to output a solution within a reasonable time would be the first priority.

- **Use of accurate data**

  Should more time had been available, usage of more data for attributes such as vehicle capacity, shelter capacity, and finer road data would have benefitted this project greatly.

- **Typhoon predictions**

  One of the main features missing would have been a typhoon path prediction which would have noted the affected shelters, allowing for more the dashboard to be more useful

THANK YOU!

REFERENCES

Anuar, W. K., Lee, L. S., Seow, H.-V., & Pickl, S. (2022). A Multi-Depot Dynamic Vehicle Routing Problem with Stochastic Road Capacity: An MDP Model and Dynamic Policy for Post-Decision State Rollout Algorithm in Reinforcement Learning. Mathematics, 10(15), 2699. https://doi.org/10.3390/math10152699

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