

An aerial photograph of a tropical agricultural landscape. In the foreground, there are large, brownish-gold fields, likely rice, with some green patches. A dirt road winds through the fields. In the middle ground, there are more green fields and some trees. In the background, there is a dense forest covering a hillside, and a river or lake is visible on the left side. The sky is clear and blue.

# AGRIROUTE



# OPTIMIZATION ALGORITHM

Agriculture supply chains involve various stages from farm to distribution, often constrained by perishability, transport limitations, and the need for cost minimization. In many cases, inefficiencies in routing, resource allocation, and scheduling lead to higher operational costs and spoilage. The challenge is to design an optimized multi-stage supply chain algorithm that minimizes cost while meeting dynamic requirements such as perishability, limited capacity, and traffic disruptions. The goal is to create a scalable and robust algorithm that optimizes both routing and resource allocation, ensuring efficient delivery with minimal spoilage.





# SIMULATION

Simulation played a crucial role in testing and validating the optimization algorithm by creating realistic agricultural supply chain scenarios. A dataset generator was developed to simulate real-world logistics conditions, including:

- Farm Locations & Produce Characteristics: Generated farms with different produce types, perishability windows, and supply quantities.
- Storage Hubs & Distribution Centers: Simulated capacity limits, storage costs, and demand fulfillment deadlines.
- Vehicle Fleet & Transport Dynamics: Included small and large vehicles with different capacities, fuel efficiency, and operating costs.





# GENETIC ALGORITHM

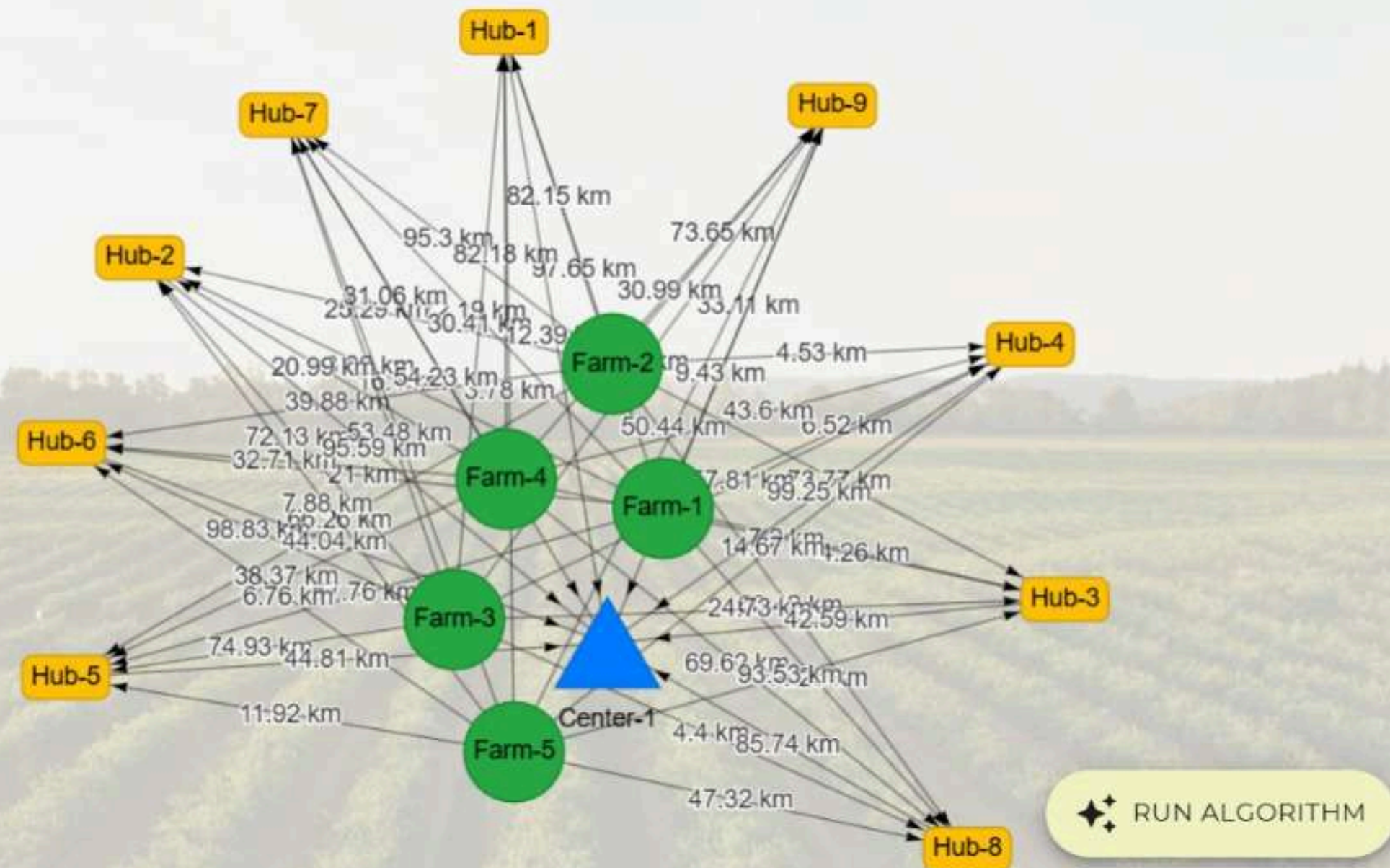
- The Genetic Algorithm (GA) implemented in the code is used to solve the farm-to-hub-to-center assignment problem by minimizing transportation costs.
- GA is a heuristic optimization technique inspired by the principles of natural selection and evolution.
- The Genetic Algorithm (GA) can be applied in route optimization, scheduling, AI training, and supply chain logistics.





# DATASET GENERATION

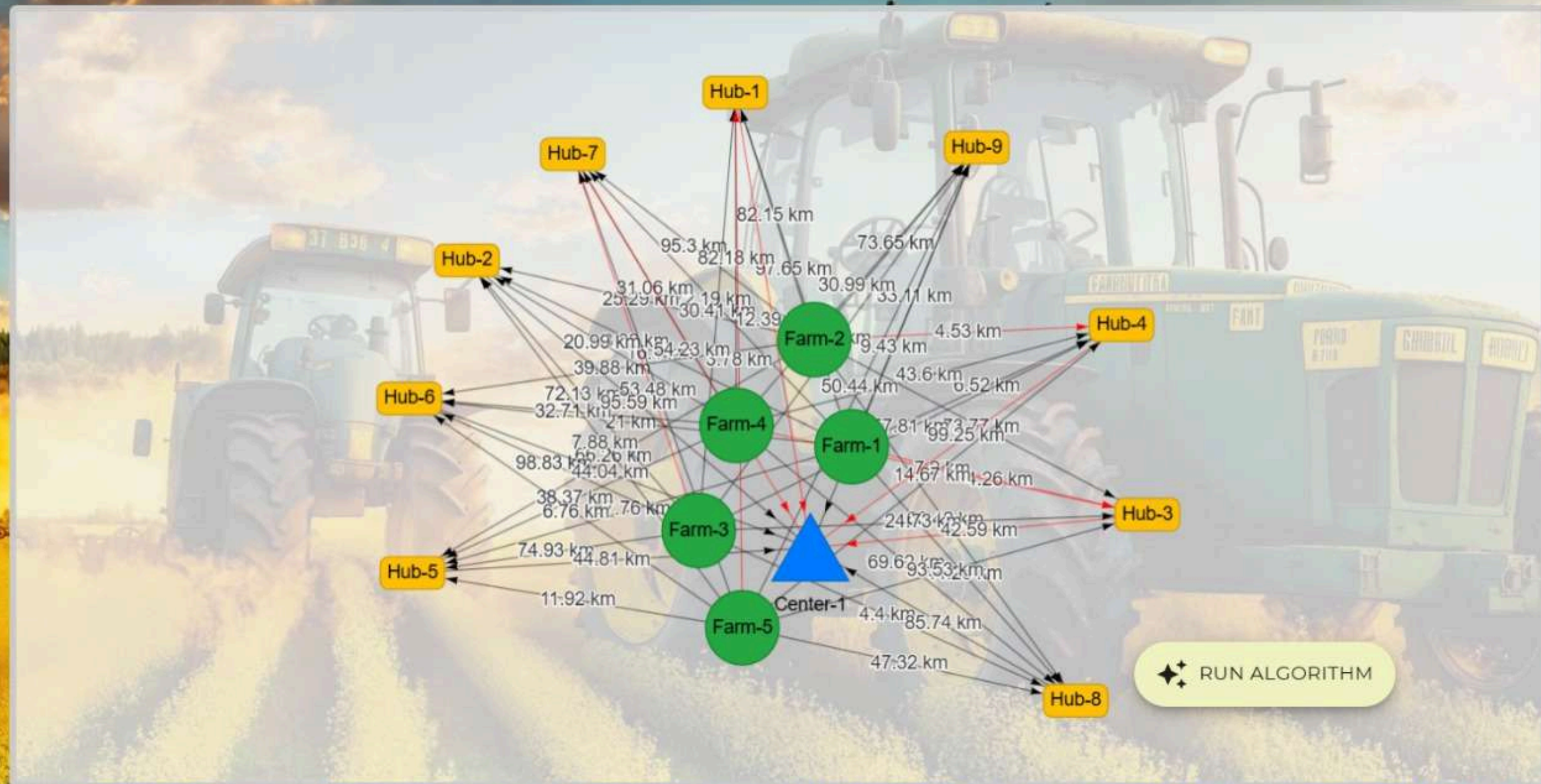
## Generated Graph





# DATASET VISUALIZATION

## Generated Graph





# ALGORITHM BENCHMARKING

## Results:

### Genetic Algorithm:

Cost: 80.8500000000000001

Execution Time: 0.2391350269317627

#### Path:

Farm 1 -> Hub 3 -> Center 1

Farm 2 -> Hub 4 -> Center 1

Farm 3 -> Hub 7 -> Center 1

Farm 4 -> Hub 3 -> Center 1

Farm 5 -> Hub 1 -> Center 1

### Greedy Heuristics:

Cost: 274.1400000000000004

Execution Time: 0

### Linear Programming:

Cost: 5888.28

Execution Time: 0.03889656066894531



# DELIVERABLES IN AGRIRROUTE

- Optimization Algorithm
- Simulation and Dataset Generator
- Performance Benchmarking Tool
- Interactive Visualization Dashboard





# OUR TEAM

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A close-up, slightly blurred photograph of a field of green leafy plants, likely Swiss chard or a similar vegetable. The plants are growing in dark soil. The lighting is warm and golden, suggesting a sunset or sunrise, with a soft glow emanating from the upper center of the frame. Overlaid in the center of the image is the text "THANK YOU" in a large, bold, white, sans-serif font.

**THANK YOU**