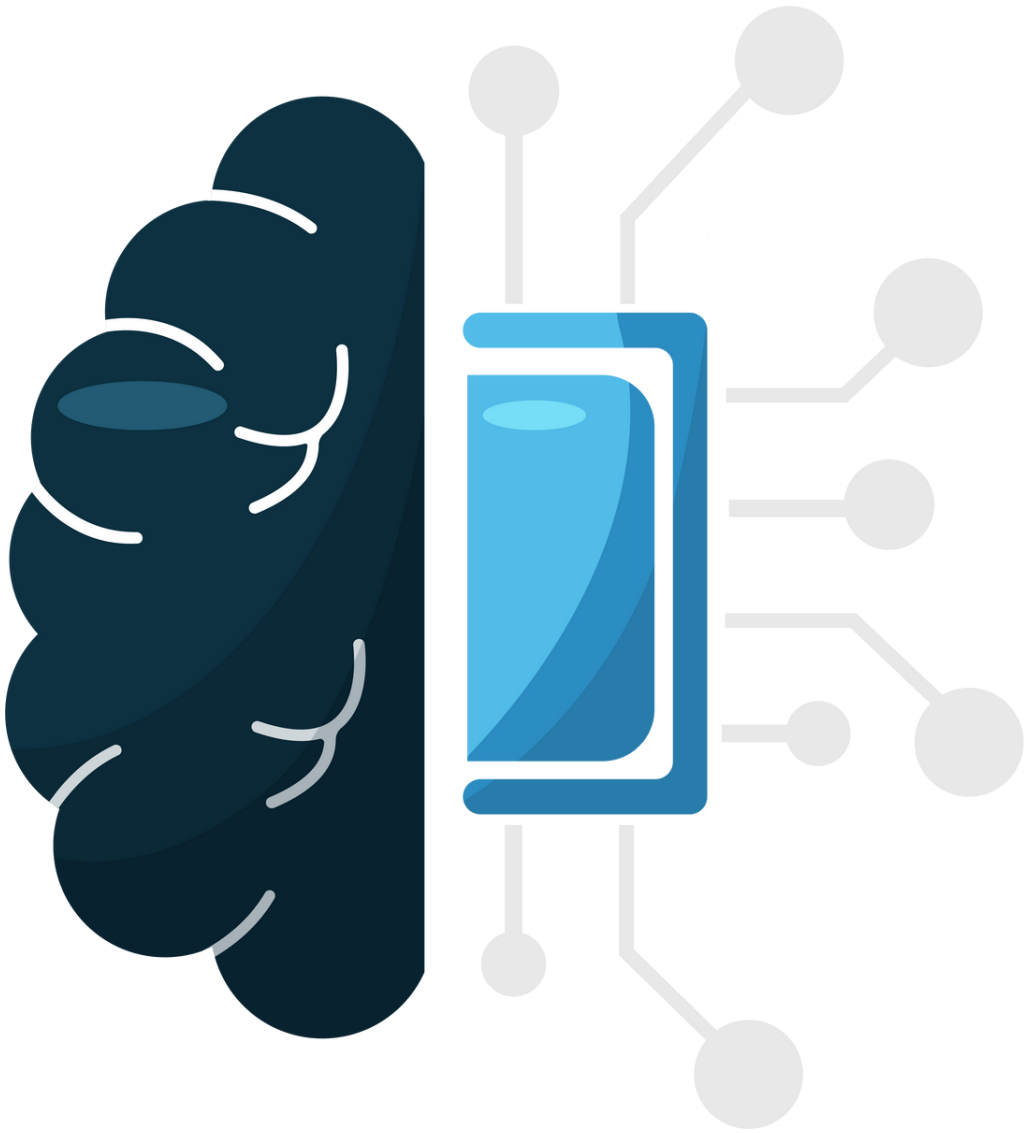
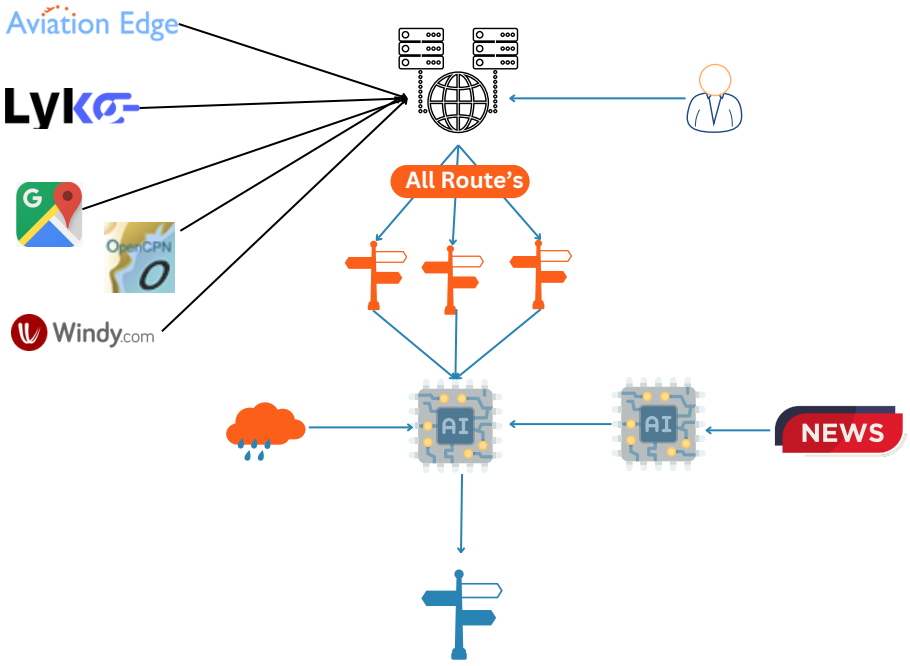


Machine learning Model

Documentation

Overview of Architectural



Real-time Data Collection: Utilize APIs or data feeds provided by sea ports and airports to gather information such as weather conditions, flight schedules, ship details, and traffic conditions.

Origin-Destination Coordinates: Use geolocation services or databases to obtain the coordinates for both origin and destination points for each journey. Geopolitical and Weather Conditions: Integrate with external APIs or databases that provide geopolitical information and real-time weather data for the regions involved in the transportation routes.

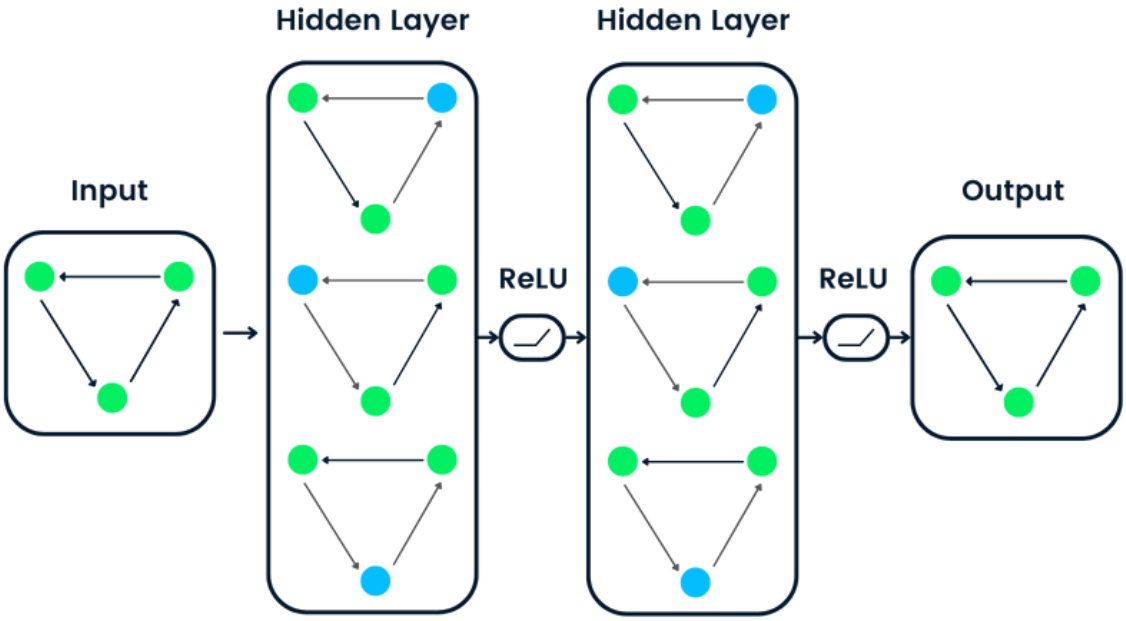
Traffic Conditions: For land-based transportation segments, incorporate traffic data from relevant sources such as traffic management authorities or navigation apps.

Multiple Route Planning via Outer Factors: Develop algorithms that consider various factors such as weather conditions, geopolitical stability, traffic congestion, and transportation mode availability to generate multiple route options.

Deploy Graph Neural Network (GNN) Model: Design and train a GNN model to analyze the transportation network graph, incorporating factors like route length, transportation mode, weather conditions, and geopolitical stability to optimize route planning.

Suggested Route Coordinates: Use the output of the GNN model to generate suggested route coordinates based on the optimized routes considering various factors.

Graph Neural Network



Graph Representation:

In dynamic route optimization, the road network can be represented as a graph, where intersections are nodes and roads are edges connecting these nodes.

Each node and edge in the graph can have associated features such as traffic volume, speed limits, historical congestion data, etc.

By representing the road network as a graph, GNNs can exploit the spatial relationships between different parts of the network and capture the topology of the road system.

Temporal Aspects:

In dynamic route optimization, temporal aspects such as traffic fluctuations over time are crucial .
GNN architectures can be extended to incorporate temporal information by using recurrent or temporal convolutional layers.

By processing historical traffic data over time, GNNs can learn patterns and trends in traffic flow, allowing them to predict future congestion and optimize routes accordingly.