



Graphic Era
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PROJECT AND TEAM INFORMATION

Project Title

Optimized Flight Route Mapping Using Graph Traversal and Shortest Path Algorithms

Student/Team Information

Team Name: Team #DAA-IV-T204	Aviators
Team member 1 (Team Lead)	Chaudhary, Shivam – 2023617 23021459@geu.ac.in
Team member 2	Negi, Aditya – 2023199 23021549@geu.ac.in
Team member 3	Gupta, Lavdhansh – 2023432 23021433@geu.ac.in
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PROJECT PROGRESS DESCRIPTION

Project Abstract

This project involves the development of an optimized flight route planning tool using graph traversal techniques and shortest path algorithms such as BFS and Dijkstra's algorithm. The tool simulates an airport network as a weighted graph and allows users to query the shortest or most optimal path between two cities. The frontend is built with React for interactive user experience, while the backend is implemented in Python using FastAPI.

Updated Project Approach and Architecture

We are currently implementing a modular architecture with a React frontend with D3JS and a FastAPI backend. Graph data representing flights is structured in JSON format. The backend computes paths using pathfinding and Dijkstra's algorithm. Frontend communicates with backend via REST APIs. Integration of D3.js for visualizing flight paths is being implemented. We have designed the system to simulate a weighted, directed graph of airport nodes and flight edges.

Tasks Completed

Task Completed	Team Member
Set up most of the frontend in React Built Backend endpoints with FastAPI Implemented Dijkstra's algo logic Testing of the application	Shivam Chaudhary Aditya Negi Aryan Lavdhansh Gupta

Challenges/Roadblocks

One of the main challenges was modeling realistic flight data in a consistent and scalable layout. We overcame this by defining a clean system of nodes using D3JS. Another issue was integrating asynchronous backend API calls in React, which initially caused delays in data rendering. This is being resolved using React's async state management. We are also exploring efficient ways to visualize graph traversal on the frontend, which requires optimizing rendering performance.

Tasks Pending

Task Pending	Team Member (to complete the task)
DFS Algorithm Implementation Enhancing graph visualization Integrating JSON files with factual airports information Writing final project documentation	Aditya Negi Shivam Chaudhary Aryan Lavdhansh Gupta

Project Outcome/Deliverables

1. A Python backend simulating airport networks and route computation.
2. Implementation of and Dijkstra's algorithm for the pathfinding.
3. A React frontend for user interaction and graph display.

Progress Overview

About 70% of the project is completed. Core algorithm logic and backend APIs are in place. Frontend setup and basic data rendering are working. Visualization and integration tasks are in progress and expected to be completed on time. No components are significantly behind schedule. JSON format is yet to be integrated for storing the airport information and several D3js visualization bugs needs to be addressed and factual airport information of a specific region is yet to be implemented.

Codebase Information

Github Codebase: <https://github.com/monoshivam/daaProject>

Testing and Validation Status

Test Type	Status (Pass/Fail)	Notes
Unit Tests (algos)	Pass	Dijkstra's algorithms return correct results
API integration	Pass	API endpoints are functional; validation ongoing
Visual Tests	In Progress	There are a few minor visual bugs that needs to be addressed

Deliverables Progress

Deliverable	Status
Backend with FastAPI	Completed
Dijkstra's algorithm	Completed
React frontend	In Progress
Graph visualization	In Progress
Documentation & Demo video	Pending
JSON Dataset	In Progress