Data Dictionary for Flight Route Optimizer

Introduction

This data dictionary defines the structure, attributes, and types of data elements used in the Flight Route Optimizer project. It includes details about the database schema, the API data, and any other significant data components.

1. Database Schema

Table: `routes`

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id	origin_airport	destination_airport	distance
1	JFK	LAX	2475
2	JFK	ORD	740
3	LAX	JFK	2475
4	LAX	ORD	1744
...	...	...	...

2. CSV Data (Input/Output)

Input CSV: `Flight_delay.csv`

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Origin	Dest	Distance
JFK	LAX	2475
JFK	ORD	740
LAX	JFK	2475
LAX	ORD	1744
...	...	...

Output CSV: `cleaned_routes.csv`

Origin	Dest	Distance
JFK	LAX	2475
JFK	ORD	740
LAX	JFK	2475
LAX	ORD	1744
...	...	...

Flask Web Application

Data Structures

Graph Representation

A dictionary where the keys are airport codes and the values are lists of tuples representing connected airports and distances.

```python
graph = {
    'JFK': [('LAX', 2475), ('ORD', 740)],
    'LAX': [('JFK', 2475), ('ORD', 1744)],
     ... other airports
}
```

Dijkstra's Algorithm Output

A tuple containing the total cost (distance) and the path (list of airport codes).

```python
result = (cost, path)
```

Flask Routes

Home Route: `/`

Description: Renders the home page with the input form.
Methods: `GET`

Route Calculation: `/route`

Description: Handles route calculation requests.
Methods: `POST`
Request Data Format:

```json
{
    "origin": "JFK",
    "destination": "LAX"
}
```

```

Response Data Format:

```json
{
    "cost": 2475,
    "path": ["JFK", "LAX"]
}
```

4. RealTime Data Updates

API Data (RealTime)

Endpoint: External API for realtime data updates

Description: Provides realtime updates for estimated time remaining and health checks.

API Data Format:

Estimated Time Remaining:

```json
{
    "estimated_time_remaining": "2 hours 30 minutes"
}
```

Health Check:

```json
{
    "fuel": "75%",
    "engine_status": "Good"
}
```

RealTime Update Interval: Every 50 seconds
```

Data Handling

Dummy Data

Fuel Status: Dummy data representing fuel level as a percentage.
Engine Status: Dummy data representing engine status.

5. Frontend Components

HTML Elements

Input Form

Description: Form for users to input origin and destination airports.
Fields:
`origin`: Text input for origin airport code.
`destination`: Text input for destination airport code.

Result Display

Description: Section to display the shortest route, its cost, estimated time remaining, and health check information.
Elements:
`Shortest Route`: List of airport codes.
`Cost`: Total distance in miles.
`Estimated Time Remaining`: Realtime data.
`Health Check`: Fuel and engine status.

Map Controls

Description: Buttons for zoom in, zoom out, and scrolling functionality.
Elements:
`Zoom In`: Button for zooming in.
`Zoom Out`: Button for zooming out.
`Scroll`: Functionality for scrolling the map.