main.rs

main

Initializes the program by loading and cleaning flight departure data from a CSV file. It ask the user for input queries in a loop, process each query to determine the user's intent, and handle the request accordingly until the user decides to stop the program.

handle_query

Process the user's input by recognizing the intent and executing the corresponding action. Depending on the intent, it performs data analysis for a specific airport or carrier, predicts future trends for a carrier, or notifies the user if the request is unclear.

recognize_intent

A helper function to help handle_query to identify user's intent.

find_first_code

Searches through the tokenized user query to find the first valid code (airport or carrier) that matches the provided synonyms and validation criteria. It assists in extracting the relevant IATA or carrier code from the user's input.

extract_code

Extracts a code from the user query based on the position of a synonym. It checks both the word following and preceding the synonym to find a valid code that meets the specified validation function.

extract_monthly_aggregates

Aggregates the filtered flight records on a monthly basis. It converts the references to flight records into owned records and then uses the analysis module to compute monthly aggregates for further processing or visualization.

filter_records

Filters the flight records based on a provided predicate function. It returns a vector of references to records that satisfy the condition defined by the predicate, enabling targeted analysis or predictions.

show_filtered_analysis

data_preparation.rs

FlightRecord

A structure that represents a single flight record with various attributes such as date, airport codes, carrier information, flight type, and flight counts.

load_data

Reads flight data from a specified CSV file and deserializes each row into a FlightRecord. It returns a vector of FlightRecord instances or an error if the data loading process fails.

clean_data

Processes a vector of FlightRecord instances by retaining only those records where the sum of scheduled and charter flights equals the total flights. This ensures the data consistency and integrity before further analysis.

analysis.rs

MonthlyAggregate

A structure that represents the aggregated flight data for a specific year and month. It includes the year, month, and the total number of flights for that period.

aggregate_by_month

Processes a list of flight records to aggregate the total number of flights for each month and year. It returns a sorted vector of MonthlyAggregate instances.

plot_monthly_aggregation

Creates a line chart visualizing the monthly flight aggregations and saves it as a PNG file. If there is no data to plot, it notifies the user accordingly.

show_monthly_aggregation_chart

Invokes plot_monthly_aggregation to generate the chart and handles any errors that may occur during the plotting process, informing the user of the result.

find_top_foreign_airports

Analyzes the flight records to identify and display the top N foreign airports based on the total number of flights. It aggregates flight counts per foreign airport and lists the top entries.

model_planing.rs

predict_future_trends

Uses historical monthly flight aggregates to fit a linear regression model and predict future flight trends for the next six months. It calculates the number of months since the start of the data, trains the model, and outputs the predicted total flights for each of the future months.