

Design and Implementation of Flight Data Visualization System based on React

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Abstract

In the field of Aeronautics and Astronautics, flight information visualization system can help airlines to analyze and summarize the massive aviation data. The flight information visualization system includes three modules: flight data overview module, flight path visualization and flight data query. The system uses Python crawler technology to crawl the required flight data, analyzes and filters all kinds of data through react ES6 technology, displays functions by the Echart visualization library, and integrates and packages the project with webpack technology.

Keywords

React, ES6, Python, Echarts, Flight data visualization.

1. Introduction

Nowadays, with the rapid progress of social science, the means of transportation for walking is changing with each passing day. According to the statistical analysis results of the Academy of Social Sciences, aircraft has become an important way of travel in people's lives. It facilitates travel and improves people's quality of life [1-2]. With the advent of industry 4.0 era, intelligent system promotes industrial transformation [3]. This is especially true for the aviation industry. Through the exploration of flight information, it can intelligently analyze the status quo of all aspects of the flight, which will help aviation enterprises to solve practical problems and bring better service experience to customers

This project is mainly under the background that a large number of flight information data are becoming more and more important to the development of various fields of aviation, through the relevant collection of open flight information provided by several mainstream airline websites, and combined with the current public demand for flight information, the collected flight information is processed. Through analysis and comparison, the specific significance of the relevant values is referred to the value of data information classification statistics, analysis of its significance to customers and aviation enterprises, and the final results through the visualization chart clearly show. The general work can be divided into three important parts according to the analysis of flight information data.

2. Requirement Analysis

The system mainly includes three modules: flight data overview module, route route visualization module and flight data query module. Each module has different functional characteristics. The overall framework of the system is shown in Figure 1.

The flight data overview module is divided into three parts, namely, global aircraft type statistics, global airlines quantity statistics and global flight record statistics. In this module, we use the echarts component to display the aircraft type data in the flight data table. In order to facilitate customers to compare various aircraft types, the vertical axis is expressed as the number of aircraft types, and the horizontal axis is used to place the code of each aircraft type. For the horizontal axis, considering the large number of models and inconvenient display, the sliding bar frame can be dragged to design. When you first open the page, you can view the quantity statistics of several different models when

you drag and slide the drag box. Compared with line chart, it is more reasonable to use smooth curve to show the fluctuation of quantity. When the mouse moves to the top of the corresponding model, the specific number of the model can be floated.

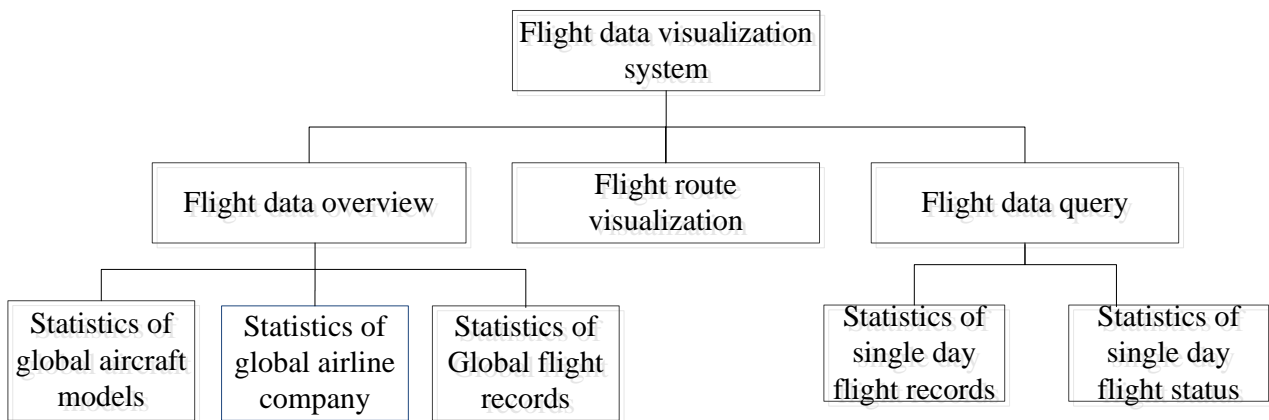


Figure 1. Overall framework of the system

The route route visualization module aggregates flight information, combines with the geographical location of the airport to simply display the flight migration, that is, the route of the route. Due to the poor stereoscopic sense of plane graphics, this module considers the dynamic changes of the route at the beginning of the design, and uses GL chart to visualize the specific route.

In the flight data query module, users can choose according to the conditions they want to query, either according to one of the two conditions of time or aircraft type for single query, or combined with the two for composite query. The query content is limited to the single day flight record status, which is divided into two parts: one is to count the number of single day flight records to be queried, and the other is the state percentage part designed to analyze the one-day delay rate.

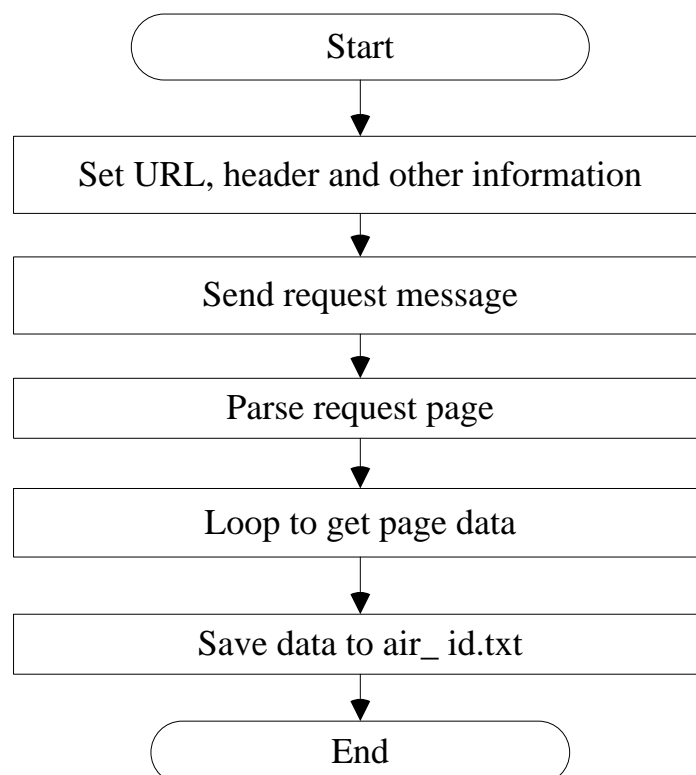


Figure 2. The flow chart of flight data crawling

3. System Implementation

3.1 Data crawling

Flight data is very important for this project and is the basis of data analysis. With Python crawler technology, we can crawl Flightaware.com, which is the public data of the official website. Of course, these data can also be obtained from websites of other platforms, such as Ctrip, openflights.org wait.

On the official website page of flightware, we crawled the dynamic history data of its flights in the past few months. The data items of flight history mainly include date, aircraft type, flight time, airport of departure and arrival, etc. There are three steps to crawl the historical dynamic data of flight;

Step 1: According to the aircraft type, we go to get the flight number, and then save it in air_id.txt Medium.

Step 2: From air_id.txt Read the flight information in, according to these flight information, to obtain the flight history data.

Step 3: Save the flight data in air into info.csv file.

The flight data crawling process is shown in Figure 2.

3.2 Data filtering

After the flight data is crawled, the obtained air_info.csv The file is saved in JSON format and added to the project folder for development and call. In fact, the JSON file is used as a local server to transmit data to the node server. All data are analyzed and filtered by componentdidmount() function [4].

3.3 Data visualization

The system completes the visualization process through echards component. Directly in the react project App.js The various functions in the file complete all visual chart operations. The echarts chart needs to set its option style and series parameters, and inject it through the function interface which returns to div with the help of function. Finally, the react rendering mechanism automatically loads the div tag to create a good HTML page reconstruction display [5]. The steps to create the echarts diagram are shown in Figure 3.

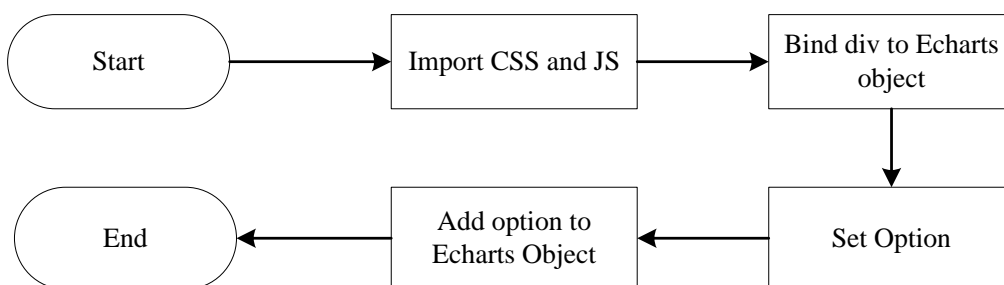


Figure 3 The flowchart of ECharts creation



Figure 4. The visualization of flight route

For the route visualization module, it is a display map of the starting and ending routes. It directly loads the existing JSON data, loads routes data through the `getoption()` function, and draws a 3D map to show the route. The effect is shown in Figure 4.

4. Conclusion

Through the exploration of flight information data, intelligent analysis of the status quo of all aspects of the flight, which helps to solve the practical problems in aviation related fields. And the related functions of the flight data visualization system based on react are basically completed. The flight data visualization system is divided into three modules: flight data overview module, route visualization module and flight data query module. Among them, the flight data overview module shows the statistical data of aircraft type, airline company and flight records, the route visualization module shows the flight route of the flight, and the flight data query module completes the record and status statistics of single day flights. The overall effect of the page is beautiful, dynamic and static, which enhances the sense of human-computer interaction. This system has certain reference value for airlines and customers, and provides ideas for solving some problems in aviation field. The project integrates python, react ES6, WepackNode.js and Echarts related technology, to achieve all the processes from data collection to data filtering to data visualization.

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