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A Mobile Robot System based on Stream Computing

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Abstract

A real-time ship route scheduling analysis method based on big data includes wind resistance analysis module, satellite positioning module, cloud server, data analysis module and satellite communication module. The cloud server communicates and connects the database through the satellite communication module. The wind resistance analysis module includes wind direction analysis module and wind force analysis module. The data analysis module includes data acquisition module, database, data download terminal and data analysis terminal. The database includes the original route and route information on the original route. Through the data acquisition module to collect the navigation information of the ship, according to the mutual transmission and analysis of cloud data under the background of big data to avoid the possibility of collision between ships, through the corresponding data to adjust and analyze the optimal real-time route, to provide the fastest and safest navigation route for the ship, and improve the safety of the ship navigation.

Keywords

Real Time Scheduling; Data Analysis; Stream Computing ; Satellite Communication.

1. Introduction

With the development of international trade in full swing, the degree of large-scale and rapid development of ships has been continuously developed. Ships in narrow waterways are dense and frequent. The route is more narrow and congested in the face of faster large-scale ships and super large ships [1-2]. The difficulty of ship navigation and operation is greatly increased. The risk of ship collision is greatly increased, and collision accidents occur occasionally. There are some disadvantages in the use of ship collision avoidance methods. Firstly, it is not possible to collect the acceleration of the ship itself and the data of the surrounding environment, which is not conducive to the subsequent planning of the path. The information obtained during the navigation of the ship is not comprehensive. Secondly, it does not have the function of recording the collision avoidance process of the ship, and it is not possible to record the collision avoidance process feedback is not conducive to improving the whole collision avoidance method in time [3-4].

2. System Architecture

An analysis method of real-time scheduling of ship route based on big data includes a wind resistance analysis module, a satellite positioning module, a cloud server, a data analysis module and a satellite communication module. The system architecture is shown in Figure 1.

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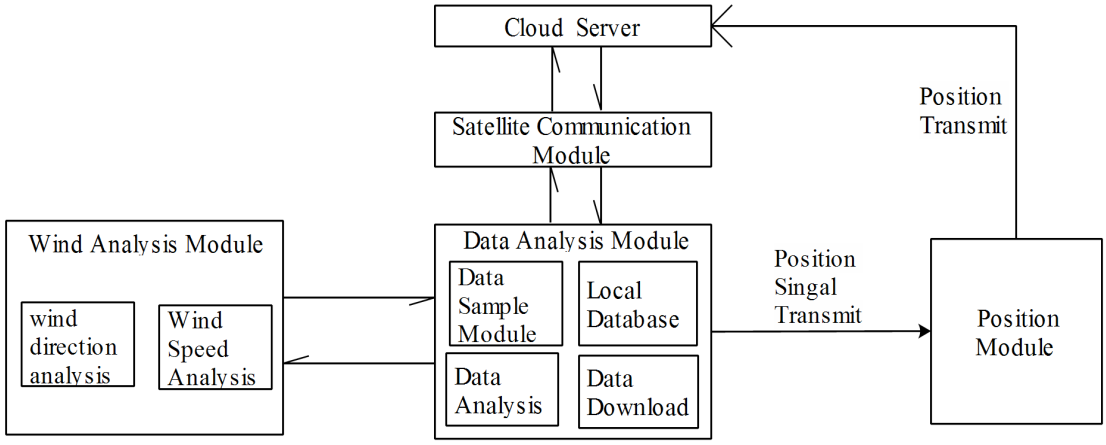

Figure. 1 System architecture

The cloud server communicates and connects a database through a satellite communication module [5]. The wind resistance analysis module includes a wind direction analysis module and a wind speed analysis module. The data analysis module includes a data acquisition module, a database, a data download terminal and a data analysis terminal, and the database includes the original navigation route and the route information on the original navigation route, and the route information mainly includes the specific coordinates of the reef and the wind wave area.

3. Data Analysis

Step 1: carry out satellite positioning for the sailing ship through the satellite positioning module, and transmit the positioning information to the cloud server through the satellite communication module; the acquisition module will summarize all the data information collected during the whole ship's voyage, and then synchronously update it to the database and cloud server.

Step 2: the data acquisition module collects the information of the ship when it is sailing, including the actual position of the ship, radar sonar detection information, speed, ship direction, wind direction, wind speed and weather [6]. The data acquisition module sends the collected real-time information to the data analysis module for data analysis.

Step 3, the data analysis module combines the information stored in the database to plan the ship's route after receiving the real-time information of the ship. The data analysis module keeps the information synchronization with the cloud server at any time through the satellite communication module. When the data in the cloud server or database changes, the other end updates the data synchronously at the first time. The data of the data analysis module is stored in the database. When the data analysis module analyzes the deviation between the ship's route and the planned route, it will give an early warning in time. When the satellite positioning module locates the ship's route to the reef area or the wind and waves area, it will also send an early warning signal. The wind resistance analysis module combines the real-time wind speed and direction as well as the wind resistance area when the ship is sailing to calculate the size of the wind resistance, and infers the deviation rate according to the direction of the ship's navigation route. The expression of the deviation rate can be expressed in degrees per minute, or it can be expressed in other ways.

Step 4: backup the data of the planned route and send it to the cloud server through satellite communication module.

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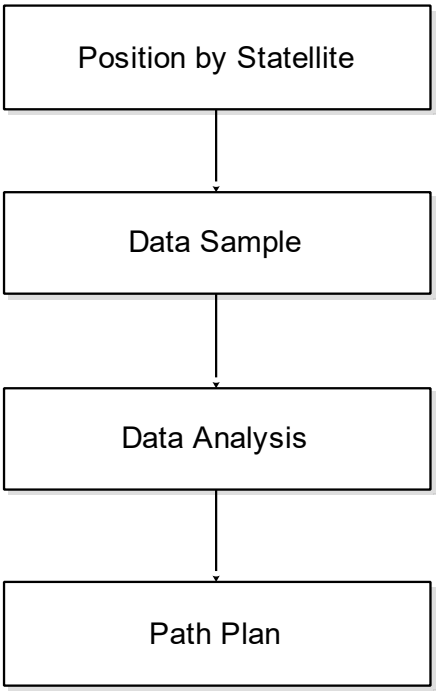

Figure. 2 data analysis flowcharts

4. Conclusion

An analysis method based on the real-time scheduling of navigation routes of big data ships collects the navigation information of ships during navigation through the data acquisition module, realizes the possibility of avoiding the collision between ships according to the mutual transmission and analysis of cloud data under the background of big data, adjusts and analyzes the optimized real-time routes according to the corresponding data, so as to provide the fastest and safest navigation for ships The safety of ship navigation is improved.

Acknowledgements

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