

Research on Short-term Forecast of Airspace Flow

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Abstract

Air traffic safety has received extensive attention from people, the main reason being that traffic safety is directly related to personal and property safety. With the rapid development of society and economy, airlines such as civil aviation and military aviation have developed rapidly, and their flight traffic has also increased significantly. At this time, flight contradictions are becoming increasingly prominent, and the risk factor in the operation of flight system equipment is also increasing. Faced with severe air traffic control safety issues, this article will conduct research on the short-term regional flight flow forecasting problem, aiming to improve the safety and economy of air traffic control.

Keywords

Short-term Area; Flight Flow; Trajectory Prediction Algorithm; Flow Prediction Model.

1. Introduction

1.1 Regional air traffic characteristics

Airspace refers to the range of activities of air vehicles in the atmospheric space, which can also be called aerospace rooms. In the process of air traffic management, the controlled airspace is divided, mainly including high altitude, medium and low altitude, and airport control areas.

The operation of regional aircraft has certain characteristics, which are mainly reflected in the following two aspects: On the one hand, the aircraft has a higher flight altitude and a faster flight speed [1]. On the other hand, aircrafts have changeable flight conditions. Therefore, area controllers must use control methods for air traffic management, such as radar guidance and air waiting. Regional aircraft operation conflicts are mainly divided into three categories, namely, lift conflicts, convergence conflicts, and transcendence conflicts.

1.2 Air traffic flow forecast

Aviation traffic management includes many branches, and aviation traffic forecasting belongs to one of them. It mainly predicts and counts the number of aircraft in the airspace. From the perspective of forecasting, it is of positive significance for air traffic controllers and flow managers. It can not only fully grasp the actual operating conditions of air traffic flow, but also manage it scientifically and efficiently.

2. Short-term regional traffic forecast

2.1 Regional traffic forecast

Intra-regional air traffic flow can also be referred to as intra-regional air traffic flow. The forecast is mainly based on the airspace structure, route configuration and control rules, etc., within a certain space and time range, to achieve the prediction and statistics of the number of aircraft flights. Short-

term regional traffic forecast is a part of tactical traffic forecast. It is a real-time dynamic regional traffic forecast method.

Short-range regional flow prediction is one of microscopic real-time predictions, and the method used is quantitative prediction. This method can be used to predict the trajectory and flow. The model is mainly based on the flight, radar and other data to establish the corresponding track, flow and other prediction models [2]. There are three main short-term regional structures: waypoints, flight segments, and sectors. Traffic statistics can be established for traffic prediction based on the short-term regional structure.

China's domestic airspace has a wide range and complex structure, and the problem of flight conflicts is also more prominent. The short-term regional traffic forecast can make judgments about the congestion that may occur in the air, and the controller can make appropriate adjustments to the air traffic based on this to make the aircraft flight safer and more effective.

2.2 Aircraft trajectory prediction algorithm

Flight trajectory mainly refers to the motion trajectory of the aircraft during flight. Predicting the flight trajectory is mainly to make scientific and reasonable predictions of the future flight trajectory of the aircraft. The basis of trajectory prediction mainly includes flight status, flight weather, flight intention and aircraft performance. Trajectory prediction has been applied in different technologies, such as conflict detection technology. This prediction has positive significance for air traffic management and flight planning. At the same time, it is the most critical technology in air traffic control automation systems. It guides the establishment of the air traffic management system and lays a solid foundation for the safe and efficient management of air traffic. The method mainly includes the path prediction filter algorithm based on maneuvering target and the path prediction algorithm based on flight intention. Trajectory prediction systems can be divided into two categories, which are divided according to the effectiveness of predictions, namely real-time trajectory prediction and non-real-time trajectory prediction. The former method is mainly to predict the flight trajectory of the aircraft in the next few minutes, and the latter method is to simulate the flight process of the aircraft according to the flight plan before take-off.

3. Traffic forecast model design

Among them, the regional passenger flow forecasting and statistical model is the most critical part of the regional passenger flow forecasting and statistical system. Its research objects are the waypoints, flight segments and sectors on the route. It can predict and count the number of flights in the airspace. For the forecast of short-term regional flow, the short-term forecasting method is mainly adopted [3]. The specific measures are as follows: First, the original flow forecasting method is used to realize the short-term regional flow prediction; the second is to use the short-term flow forecasting method to calculate the current flow rate within 5 minutes. The third is to use the local long-term flow forecasting method to make corrections.

4. Conclusion

In short, aviation safety issues have received extensive attention. In order to realize the automation, rationalization and scientific management of air traffic flow, a short-term regional air traffic flow prediction method has been proposed to make it safer and more effective. Route prediction is the basis of short-distance passenger flow prediction and an important facility for air traffic control automation. Therefore, this article introduces the overview of trajectory prediction and analyzes the design of the trajectory prediction model. It is believed that on this basis, the trajectory prediction will be Get faster development, so as to maximize the comprehensive benefits of the aviation industry.

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