

AIRLINES DATA ANALYTICS FOR AVIATION INDUSTRY

TITLE: Big Data Analytics on Aviation Social Media: The Case of China Southern Airlines on Sina Weibo

AUTHORS: Sien Chen, Yinghua Huang, Wengqiang Huang

This study proposes a passenger value model based on a social media platform. Using the case of China Southern Airlines on Sina Weibo, this study illustrates how big social data analysis can help an airline company to understand better the passengers and improve customer relationship management. The objectives of this study are threefold: (1) developing a model of passengers' social media value, (2) discussing the possible application scenarios for the proposed model, (3) using sentiment analysis to study the case of China Southern Airlines on Sina Weibo, and illustrating Weibo users' attitudes toward China Southern Airlines. This study also discusses the practical implications for airlines to manage their social media platforms. With the combination of a passenger's social media value and passenger's other offline behavior information, we can establish a comprehensive profile for travelers.

TITLE: Data Analytics for Air Travel Data: A Survey and New Perspectives

AUTHORS: Haiman Tian, Maria Presa-Reyes, Yudong Tao

From the start, the airline industry has remarkably connected countries all over the world through rapid long-distance transportation, helping people overcome geographic barriers. Consequently, this has ushered in substantial economic growth, both nationally and internationally. The airline industry produces vast amounts of data, capturing a diverse set of information about their operations, including data related to passengers, freight, flights, and much more. Analyzing air travel data can advance the understanding of airline market dynamics, allowing companies to provide customized, efficient, and safe transportation services. Due to big data challenges in such a complex environment, the benefits of drawing insights from the air travel data in the airline industry have not yet been fully explored. This article aims to survey various components and corresponding proposed data analysis methodologies that have been identified as essential to the inner workings of the airline industry. We introduce existing data sources commonly used in the papers surveyed and summarize their availability. Finally, we discuss several potential research directions to better harness airline data in the future. We anticipate this study to be used as a comprehensive reference for both members of the airline industry and academic scholars with an interest in airline research.

TITLE: Data science and analytics in aviation

AUTHORS: Sai-Ho Chung, Mark Hansen, Tsan-Ming Choi

Data science and analytics are attracting more and more attention from researchers and practitioners in recent years. Due to the rapid development of advanced technologies nowadays, a massive amount of real time data regarding flight information, flight performance, airport conditions, air traffic conditions, weather, ticket prices, passenger's comments, crew comments, etc., are all available from a diverse set of sources, including flight performance monitoring systems, operational systems of airlines and airports, and social media platforms. Development of data analytics in aviation and related applications is also growing rapidly. This paper concisely examines data science and analytics in aviation studies in several critical areas, namely big data analysis, air transport network management, forecasting, and machine learning. The papers featured in this special issue are also introduced and reviewed, and future directions for data science and analytics in aviation are discussed.

TITLE: Analytics on big aviation data: turning data into insights

AUTHORS: Akerkar, Rajendra

The business world is undergoing a revolution driven by the use of data and analytics to guide decision-making. While many forces are at work, a major reason for the business analytics revolution is the rapid proliferation of the amount of data available to be analyzed. Recent days, big data is beginning to have a major impact on air travel with more data being created both through the plane sensors and the passengers on board; the opportunities to use this data will only increase. It provides innovative companies with the opportunity to improve major aspects of their business, from using data to improve customer retention through to making planes safer and more reliable. In this paper we discuss a big data concept, definitions, and further present some cases for aviation industry to analyse data from every conceivable channel, for instance, customer data to create a unique profile for each customer based on a wide range of demographic data, behaviours, and preferences.

TITLE: Anomaly Detection in General-Aviation Operations Using Energy Metrics and Flight-Data Records

AUTHORS: Tejas G. Puranik, Dimitri N. Mavris

Among the operations in the general-aviation community, one of the most important objectives is to improve safety across all flight regimes. Flight-data-monitoring or flight-operations-quality-assurance programs have percolated in the general-aviation sector with the aim of improving safety by analyzing and evaluating flight data. Energy-based metrics provide measurable indications of the energy state of the aircraft, and can be viewed as an objective currency to evaluate various safety-critical conditions. The use of data-mining techniques for safety analysis, incident examination, and fault detection is gaining traction in the aviation community. In this paper, a generic methodology is presented for identifying anomalous flight-data records from general-aviation operations in the approach-and-landing phase. Energy-based metrics, identified in previous work, are used to generate feature vectors for each flight-data record. Density-based clustering and one-class classification are then used together for anomaly detection using energy-based metrics. A demonstration of this methodology on a set of actual flight-data records from routine operations, as well as simulated flight data, is presented, highlighting its potential for retrospective safety analysis. Anomaly detection using energy metrics, specifically, is a novel application presented here.