

AIRLINES DATA ANALYTICS FOR AVIATION INDUSTRY

Data Science And Analytics In Aviation(2020):

Authors:Sai-Ho-Chung,Hoi-Lam-ma

The researcher in this article cited that, 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, passengers 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.

Data Analytics for Air Travel Data(2021):

Authors: Haiman Tian, Yudong Tao

The researcher in this article cited that, 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. They 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. They 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.

Topological Data Analysis For Aviation Applications(2018):

Authors: Max Z. Li, Megan S. Ryerson and Hamsa Balakrishnan

Aviation data sets are increasingly high-dimensional and sparse. Consequently, the underlying features and

interactions are not easily uncovered by traditional data analysis methods. Recent advancements in applied mathematics introduce topological methods, offering a new approach to obtain these features. This paper applies the fundamental notions underlying topological data analysis and persistent homology (TDA/PH) to aviation data analytics. We review past aviation research that leverage topological methods, and present a new computational case study exploring the topology of airport surface connectivity. In each case, we connect abstract topological features with real-world processes in aviation, and highlight potential operational and managerial insights.

Operational Efficiency Versus Financial Mobility In The Global Airline Industry(2015):

Author:Hoi-Lam-ma

The researcher in this article cited that, The events of September 11th, 2001 precipitated an almost unprecedented financial crisis for the world airline industry. However, it is not clear that these events represent a discrete, industry disruption or whether, in fact, airlines were already entering a period of economic challenges that would demand new strategic orientations on their part. This study investigates the structural drivers of operational efficiency as well as the financial posture of airlines on the eve of September 11th.

A sample of 38 airlines from North America, Europe, Asia and the Middle East was utilized to investigate whether relative operational efficiency implied superior financial mobility (as defined by Donaldson). Data envelopment analysis was utilized to derive efficiency scores for individual airlines. The underlying structural drivers of efficiency were then investigated. It was found that the traditional framework developed in the literature still provided reasonable explanatory power for realized relative operational efficiency. However, the second stage of

the analysis found that relative operational efficiency did not inherently imply superior financial mobility. As such, airlines that had chosen relatively efficient operational strategies found themselves in positions of vulnerability with regard to financial mobility and thus suffered the consequences in the post-September 11th environment.

An Evaluation Of The Operational Performance And Profitability Of The U.S. Airlines(2021):

Author:Emillio Collar

The researcher in this article cited that,Since 2008, a series of mega-mergers has dramatically changed the U.S. airline industry. Despite the presence of fewer airlines in the market, the competition remains intense, which forces airlines to continually search for ways to

increase their efficiency to maintain survival and financial sustainability. To evaluate airline

performance and disentangle the causes of inefficiency, this paper applied a two-stage network data envelopment analysis approach and a truncated regression to investigate the performance of nine U.S.-based airlines from 2015 to 2019. Our empirical results reveal that during the sample period, airlines' operating efficiency steadily improved, but the efficiency in the profitability stage stagnated. Therefore, strategic resource allocations are needed for airlines to see further advances in their overall efficiency. On average, airlines operating in the low-cost business model yielded higher efficiency scores than their peers operating in the full-service framework. While an airline's size, measured in terms of total assets, has a positive influence on operating efficiency, a larger number of full-time employee equivalents hinders efficiency outcomes, which indicates the importance of enhancing labor efficiency among carriers.

The Relationship Between On-Time Performance And Airline Market Share(2020):

Author:Yoshinori Suzuki

The researcher in this article cited that,We propose a new method of modeling the relationship between on-time performance and market share in the airline industry. The idea behind the method is that the passengers' decision to remain (use same airline) or switch (use other airlines) at time t depends on whether they have experienced flight delays at time $t-1$ or not. More specifically, we posit that the passengers who experienced flight delays are more likely to switch airlines for the subsequent flight than those passengers who did not experience delays. To capture such effect, we develop an aggregate-level Markovian type model that estimates the transition probability matrices separately for the passengers who experienced flight delays at time $t-1$ and for those who did not experience delays. The model was

calibrated with the US DOT data. The study results imply that, once experiencing flight delays, passengers are more likely to switch

airlines. The results also imply that on-time performance affects a carrier's market share primarily through the passengers' experience, and not through the "advertisement" of performance.

Airline Finance(2021):

Author:Peter.S.Morel

The researcher in this article cited that, It is supported at each stage by practical airline examples and recent data, *Airline*

Finance examines the financial trends and longer term prospects for the airline industry as a whole, contrasting the developments for the major regions and airlines together with critical discussion of key issues that affect the industry as a whole. Important techniques in financial analysis are applied to the airlines as well as their investors such as banks and

other financial institutions. This book is written for employees of airlines, airports and their suppliers, and investment bank and other analysts. It is also popular for use by universities and in-house courses on air transport management, within both academia and industry.

Airline Route Profitability Analysis And Optimization Using Big Data Analytics On Aviation Data Sets Under Heuristic Techniques(2016):

Authors: Kasturi E, Prasanna Devi Sb, Vinu Kiran Sb, Manivannan Sc

Researchers in this article cited that ,applying vital decisions for new airline routes and aircraft utilization are important factors for airline decision making. For data driven analysis key points such as airlines route distance, availability on seats/freight/mails and fuel

are considered. The airline route profitability optimization model is

proposed based on performing Bigdata analytics over large scale aviation data under multiple heuristic methods, based on which practical problems are analysed. Analysis should be done based on key criteria, identified by operational needs and load revenues from operational systems e.g. passenger, cargo, freights, airport, country, aircraft, seat class etc. The result shows that the analysis is simple and convenient with concrete decision.

Analysis Of Flight Data Using Clustering Techniques For Detecting Abnormal Operations(2015)Author:Lishai Li,Santanu Das

The researcher in this article cited that,the airline industry is moving toward proactive risk management, which aims to identify and mitigate risks before

accidents occur. However, existing methods for such efforts are limited. They rely on predefined criteria to identify risks, leaving emergent issues undetected. This paper presents a new method, cluster-based anomaly detection to detect abnormal flights, which can support domain experts in detecting anomalies and associated risks from routine airline operations. The new method, enabled by data from the flight data recorder, applies clustering techniques to detect abnormal flights of unique data patterns.

Compared with existing methods, the new method no longer requires predefined criteria or domain knowledge. Tests were conducted using two sets of operational data consisting of 365 B777 flights and 25,519 A320 flights. The performance of cluster-based anomaly detection to detect abnormal flights was compared with those of multiple kernel anomaly detection, which is another data-driven anomaly detection algorithm in recent years, as well as with exceedance detection, which is the current method employed by the airline industry. Results showed that both cluster-based anomaly detection to detect

abnormal flights and multiple kernel anomaly detection were able to identify operationally significant anomalies, surpassing the capability of exceedance detection. Cluster-based anomaly detection to detect abnormal flights performed better with continuous parameters,

whereas multiple kernel anomaly detection was more sensitive toward discrete parameters.