

LITERATURE SURVEY

AIRLINES ANALYTICS FOR AVIATION INDUSTRY

1. **Paper** : Data Analytics for Air Travel Data: A Survey and New Perspectives
Author : Haiman Tian, Maria Presa-Reyes, Yudong Tao, Tianyi Wang, Samira Pouyanfar, Alonso Miguel, Steven Luis, Mei-Ling Shyu, Shu-Ching Chen, Sundaraja Sitharama Iyengar

Publication: ACM Computing Surveys

Description:

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.

2. **Paper** : Airline Route Profitability Analysis and Optimization Using BIG DATA Analytics on Aviation Data Sets under Heuristic Techniques

Author : E.Kasturia, PrasannaDevi, VinuKiran, Manivannan

Publication : Science Direct Journal

Description : 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 Big data 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.

3. **Paper** : Towards a maturity model for big data analytics in airline network planning

Author : Iris Hausladen, Maximilian Schosser

Publication : Science Direct Journal

Description : The evaluation, acquisition and use of newly available big data sources has become a major strategic and organizational challenge for airline network planners. We address this challenge by developing a maturity model for big data readiness for airline network planning. The development of the maturity model is grounded in literature, expert interviews and case study research involving nine airlines. Four airline business models are represented, namely full-service carriers, low-cost airlines, scheduled charter airlines

and cargo airlines. The maturity model has been well received with seven change requests in the model development phase. The revised version has been evaluated as exhaustive and useful by airline network planners. The self-assessment of airlines revealed low to medium maturity for most domains. Organizational factors show the lowest average maturity, IT architecture the highest. Full-service carriers seem to be more mature than airlines with different business models.

4. **Paper** : Big Data Analytics in Airlines: Opportunities and Challenges

Author : Hamida Abd El Samie Mohamedorcid; Mahmoud Ramadan Al-Azab

Publication : Journal of Association of Arab Universities for Tourism and Hospitality

Description : Big data refers to the huge amounts of information in the structured and unstructured form that cannot be processed using traditional data systems. Big data technology facilitates the utilization of high volumes of external and internal data to create new products, services and improve business operations. In the era of big data, airlines can provide services that are more satisfying to customers and to stay competitive in their fierce marketplace. Airlines can reap many benefits from big data, but many challenges still remain. This study illustrates how airlines successfully adopt big data technology. The paper also explores the opportunities and challenges of big data in the airline industry. Based upon the qualitative approach, 27 semi-structured interviews with employees and experts at airlines in Egypt were conducted. The findings reveal that big data has a great importance in providing broad opportunities for airspace management, enhancing flexibility in dealing with each passenger, boosting problem solving, supporting decision, providing safe flights, boosting predictive maintenance, and improving performance. The findings illustrate a range of challenges that airlines may face when dealing with big data, such as shortage of qualified human resources, absence of data-driven culture, dealing with and processing huge amounts of data, as well as data privacy and security issues. Finally, implications for practice as well as future researches are discussed.

5. **Paper** : A new approach of social media analytics to predict service quality: evidence from the airline industry

Author :Xin Tian, Wu He, Chuanyi Tang, Ling Li, Hangjun Xu, David Selover

Publication : Journal of Enterprise Information Management

Description : Research on how to use social media data to measure and evaluate service quality is still limited. To fill the research gap in the literature, the purpose of this paper is to open a new avenue for future work to measure the service quality in the service industry by developing a new analytical approach of using social media analytics to evaluate service.

6. **Paper** : Big data analytics platform for flight safety monitoring

Author : Bo Li; Xinguo Ming, Guoming Li

Publication : 2017 IEEE 2nd International Conference on Big Data Analysis (ICBDA)

Description : The conventional methods of data analytics for flight safety monitoring have met many bottlenecks. This paper analyzes the insufficiencies of the preliminary business process of an airline. For the purpose of meeting requirements of efficiency and accuracy and avoiding the drawbacks encountered before, the architectural framework of the flight safety monitoring platform utilizing big data technology is proposed and demonstrated by the function module structure and logical structure. The platform is implemented by dividing the system into five subsystems, namely data acquisition, data decoding, data storage, data analysis and visualization.

7. **Paper** : Applying Machine Learning to Aviation Big Data for Flight Delay Prediction
Author : Yushan Jiang; Yongxin Liu; Dahai Liu; Houbing Song
Publication : IEEE

Description : Flight delay has been a serious and widespread problem that needs to be solved. One promising solution is the flight delay prediction. Although big data analytics and machine learning have been applied successfully in many domains, their applications in aviation are limited. This paper presents a comprehensive study of flight delay spanning data pre-processing, data visualization and data mining, in which we develop several machine learning models to predict flight arrival delays. Two data sets were used, namely Airline On-Time Performance (AOTP) Data and Quality Controlled Local Climatological Data (QCLCD). This paper aims to recognize useful patterns of the flight delay from aviation data and perform accurate delay prediction. The best result for flight delay prediction (five classes) using machine learning models is 89.07% (Multilayer Perceptron). A Convolution neural network model is also built which is enlightened by the idea of pattern recognition and success of neural network method, showing a slightly better result with 89.32% prediction accuracy.