**IBM Team 4**

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**Domain Name**: Logistic & Transport (L & T)

**Use case Name**: Airlines Data Analytics For Aviation Industry

***Paper 1***

*Authors:* Saba Firdous, Haseeba Fathiya, Lipsa Sadath

*Year :* 2021

*Title:* Exploratory Data Analysis on Aviation Dataset

*Methodology:* The usage of big data analytics is booming today, with its ability to be used to draw useful insights from past data research. Its uses in the aviation industry have a wide array of applications ranging from predicting flight delays to detecting faults in airplane parts. In this paper, we conducted exploratory data analysis on flight dataset to draw inferences on arrival and departure delays and to identify relationships between flight timings and delays.

*Advantage:* Using the flight delay data, we identified which flight is mostly prone to delays. The arrived upon conclusions are useful for selecting flights in the future.

*Disadvantage*: If not perform properly EDA can misguide a problem.EDA does not effective when we deal with high-dimensional data.

***Paper 2***

*Authors:* P. H. K Tissera, A. N. M. R. S. P. llwana, K. T. Waduge, M. A. l. Perera, D. P. Nawinna and D. Kasthurirathna

*Year :* 2020

*Title:*Predictive Analytics Platform for Airline Industry

*Methodology*: The research is to develop accurate demand forecasting model to control the availability in Airline industry. The primary outcome of the model is that the Airline organization can maximize the revenue by controlling the availability.

*Advantage:* This paper minimizes the overall time taken to make decisions by manually and this identifies the passenger demand and it makes easier for the arrangement of flights by allocating optimum flights to the predicted results. This saves Airline’s money.

*Disadvantage:* With the limitation of the predictors because of the sensitivity of the data and limited access to the data, it may have impacted the models and the accuracy level of the system.

***Paper 3***

*Authors:* S. Weerasinghe and S. Ahangama

*Year :* 2018

*Title*: Predictive Maintenance and Performance Optimisation in Aircrafts using Data Analytics

*Methodology:* The study critically reviews the techniques and tools, infrastructure and general application architecture for discussing the applicability of data analytics based on both batch processing and real time stream data in general aviation for health monitoring and predictive analysis in order to predict maintenance and optimize the performance of aircrafts.

*Advantage:* Aviation big data analytics has promoted the viability for performance optimisation of aircrafts through predictive maintenance at a cheaper and effective manner for the airline industry, also providing operational and financial advantages over limited infrastructural operational modifications

*Disadvantage:.* Although the technique adopts a heuristic technique based on statistical inference on traditional flight performance data, scalability of the system has been considered a limitation.

***Paper 4***

*Authors:*S. Ayhan, J. Pesce, P. Comitz, D. Sweet, S. Bliesner and G. Gerberick

*Year :* 2020

*Title:* Predictive analytics with aviation big data.

*Methodology:*In this paper, we describe a novel analytics system that enables query processing and predictive analytics over streams of big aviation data. As part of an Internal Research and Development project, Boeing Research and Technology (BR&T) Advanced Air Traffic Management (AATM) built a system that makes predictions based upon descriptive patterns of massive aviation data.

*Advantage:*With the ASDI data correlated to flight plans and stored in a structured fashion, meaningful data can be extracted. The extracted data can then be used as input for analytics tools. The entire ASDI archival service has been developed, tested, and deployed entirely on commodity hardware. This hardware allows for easy maintenance and scalability as the database grows.

*Disadvantage:*Even if a company has sufficient data, critics argue that computers and algorithms fail to consider variables—from changing weather to moods to relationships—that might influence customer-purchasing patterns when anticipating human behavior.

***Paper 5***

*Authors:* J. Pulido, D. Moore and W. Hill.

*Year :* 2018

*Title:* Life Data Analysis with Applications for the Airline Industry.

*Methodology:* This paper presents a methodology for using Life Data Analysis (LDA) techniques for evaluating new product innovation and projecting product performance due to several failure modes. The paper presents an application for a brake design where the technique was used in determining the right failure mode based on failure mechanisms.

*Advantage:*The paper presents an application for a brake design where the technique was used in determining the right failure mode based on failure mechanisms.

*Disadvantage*: The challenge relates to failure modes that show after the warranty period of the part. A Design for Reliability (DFR) or Design Based Asset Management (RBAM) programs should account for ways to collect data after warranty programs. This could be a challenging activity but necessary to demonstrate or model potential long term failure modes.

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| **S.No** | **Author** | **Title of the Paper** | **Methodology** | **Pros (Advantage)** | **Cons**  **(Disadvantage)** |
|  | Saba Firdous, Haseeba Fathiya, Lipsa Sadath | Exploratory Data Analysis on Aviation Dataset | In this paper, we conducted exploratory data analysis on flight dataset to draw inferences on arrival and departure delays and to identify relationships between flight timings and delays. | Using the flight delay data, we identified which flight is mostly prone to delays. The arrived upon conclusions are useful for selecting flights in the future. | If not perform properly EDA can misguide a problem.EDA does not effective when we deal with high-dimensional data. |
|  | S. Weerasinghe and S. Ahangama | Predictive Analytics Platform for Airline Industry | The research is to develop accurate demand forecasting model to control the availability in Airline industry. The primary outcome of the model is that the Airline organization can maximize the revenue by controlling the availability. | This paper minimizes the overall time taken to make decisions by manually and this identifies the passenger demand and it makes easier for the arrangement of flights by allocating optimum flights to the predicted results. This saves Airline’s money. | With the limitation of the predictors because of the sensitivity of the data and limited access to the data, it may have impacted the models and the accuracy level of the system. |
|  | S. Weerasinghe and S. Ahangama | Predictive Maintenance and Performance Optimisation in Aircrafts using Data Analytics | The study critically reviews the techniques and tools, infrastructure and general application architecture for discussing the applicability of data analytics based on both batch processing and real time stream data in general aviation for health monitoring and predictive analysis in order to predict maintenance and optimize the performance of aircrafts. | Aviation big data analytics has promoted the viability for performance optimisation of aircrafts through predictive maintenance at a cheaper and effective manner for the airline industry, also providing operational and financial advantages over limited infrastructural operational modifications | Although the technique adopts a heuristic technique based on statistical inference on traditional flight performance data, scalability of the system has been considered a limitation. |
|  | S. Ayhan, J. Pesce, P. Comitz, D. Sweet, S. Bliesner and G. Gerberick | Predictive analytics with aviation big data. | In this paper, we describe a novel analytics system that enables query processing and predictive analytics over streams of big aviation data. As part of an Internal Research and Development project, Boeing Research and Technology (BR&T) Advanced Air Traffic Management (AATM) built a system that makes predictions based upon descriptive patterns of massive aviation data. | With the ASDI data correlated to flight plans and stored in a structured fashion, meaningful data can be extracted. The extracted data can then be used as input for analytics tools. The entire ASDI archival service has been developed, tested, and deployed entirely on commodity hardware. This hardware allows for easy maintenance and scalability as the database grows. | Even if a company has sufficient data, critics argue that computers and algorithms fail to consider variables—from changing weather to moods to relationships—that might influence customer-purchasing patterns when anticipating human behavior. |
|  | J. Pulido, D. Moore and W. Hill. | Life Data Analysis with Applications for the Airline Industry. | This paper presents a methodology for using Life Data Analysis (LDA) techniques for evaluating new product innovation and projecting product performance due to several failure modes. The paper presents an application for a brake design where the technique was used in determining the right failure mode based on failure mechanisms. | The paper presents an application for a brake design where the technique was used in determining the right failure mode based on failure mechanisms.. | The challenge relates to failure modes that show after the warranty period of the part. A Design for Reliability (DFR) or Design Based Asset Management (RBAM) programs should account for ways to collect data after warranty programs. This could be a challenging activity but necessary to demonstrate or model potential long term failure modes. |