

Airline Performance Analysis and Travel Recommendations

1. Statement of the business problem

The travel industry grapples with challenges concerning flight cancellations and mishandled baggage, significantly affecting customer satisfaction and travel plans. This report aims to delve into historical data from United Airlines and American Eagle Airlines. The objective is to empower travel agents with insights for advising customers on their travel plans in the initial half of 2011. The travel agent seeks to comprehend the relationship between variables like the number of passengers traveling and the frequency of flight cancellations concerning the likelihood of baggage claims. Furthermore, the agent is keen on accurate forecasts, particularly for baggage claims. Should there be a correlation between the number of canceled flights and baggage claims, the agent also desires a forecast for canceled flights. These insights are crucial for providing valuable guidance to customers, ensuring a seamless travel experience.

2. Overview of the data

The dataset contains operational data from 2004 to 2010 for United Airlines and American Eagle Airlines in domestic travel. The data is recorded on a monthly basis and includes various variables such as airline, date, month, year, baggage claims, scheduled flights, canceled flights, and enplaned passengers.

3. Presentation of the results for both United Airlines and American Eagle.

3.1 United Airlines

a. Factors Influencing Baggage Claims

Baggage claims exhibit seasonality and are influenced by the number of canceled flights, passengers enplaned, and Scheduled Flights

By examining the correlation between the number of baggage claims and the number of canceled flights, passengers enplaned, and flights scheduled.

1) There is a moderate positive correlation (Correlation: 0.61) between the number of canceled flights and the number of baggage claims. This suggests that when airlines experience more flight cancellations, there is a tendency for an increase in baggage claims. Possible explanations could include disruptions in travel plans leading to mishandled baggage or re-routing of luggage causing delays and issues.

2) The correlation between baggage claims and Scheduled Flights (Correlation: 0.54) signifies a moderately positive relationship. The positive sign indicates that as the number of scheduled flights increases, the number of baggage claims also tends to increase. An increase in scheduled flights could mean more passengers, leading to more baggage being handled and, consequently, more baggage claims.

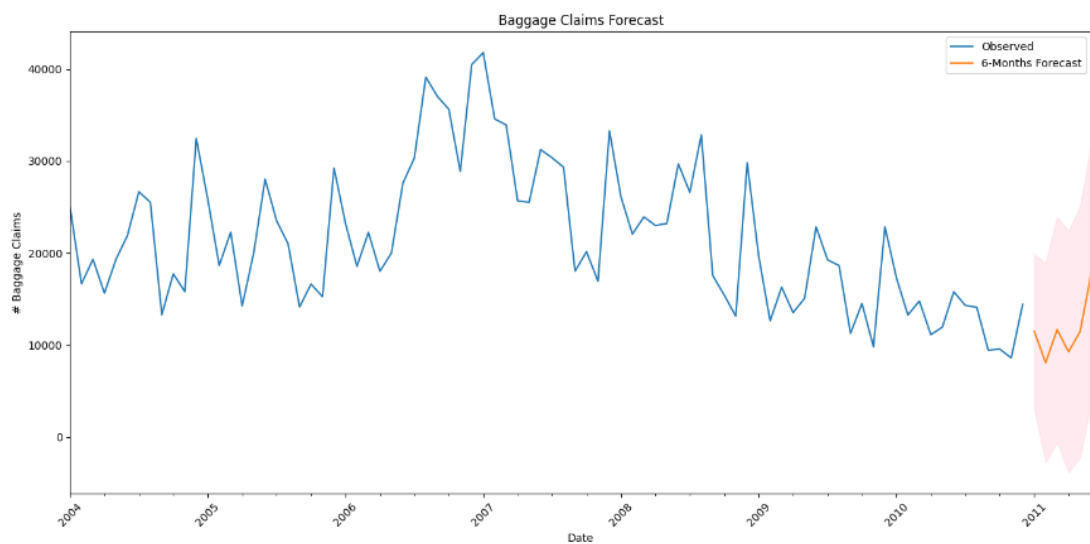
3) The correlation between baggage claims and Enplaned Passengers (Correlation: 0.51) signifies a moderate positive relationship. The positive sign indicates that as the number of enplaned passengers increases, the number of baggage claims also tends to increase. Airlines with higher passenger numbers might experience a proportional increase in both enplaned passengers and baggage claims.

b. 6-month forecast for baggage complaints

MAPE = 17.942%

RMSE = 5,462.825

	Forecasted_CPI	Lower_Bound	Upper_Bound
2011-01-01	11517.989987	3166.755574	19869.224401
2011-02-01	8070.936387	-2757.702057	18899.574831
2011-03-01	11672.924016	-560.511295	23906.359327
2011-04-01	9262.037189	-3843.209135	22367.283512
2011-05-01	11463.779642	-2204.058916	25131.618201
2011-06-01	17903.990424	3865.490787	31942.490060

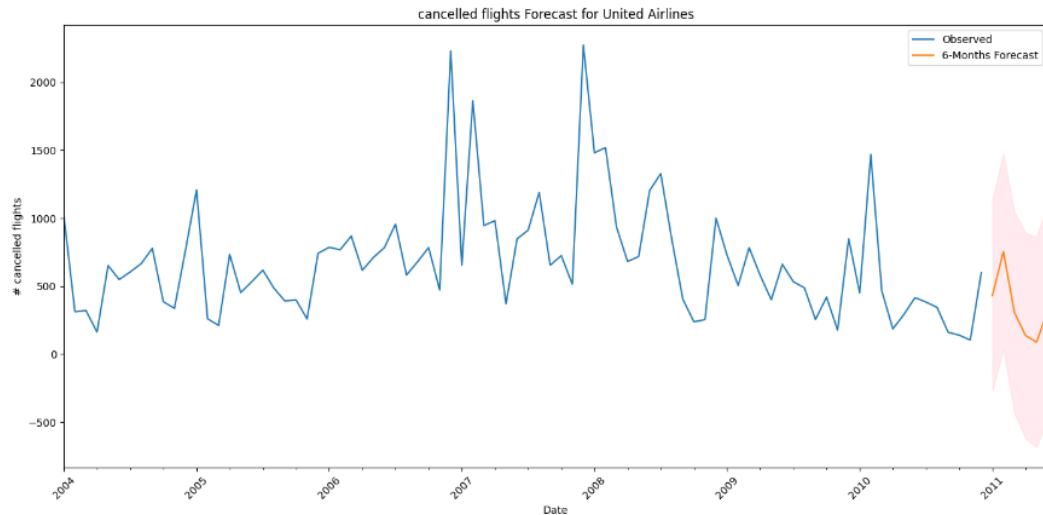


c. 6-month forecast for canceled flights

MAPE = 46.380%

RMSE = 361.895

	Forecasted_CPI	Lower_Bound	Upper_Bound
2011-01-01	430.073537	-272.558477	1132.705552
2011-02-01	754.502650	33.546969	1475.458330
2011-03-01	305.921480	-432.885259	1044.728219
2011-04-01	137.778140	-618.456895	894.013175
2011-05-01	88.436118	-684.834385	861.706620
2011-06-01	317.500803	-472.437864	1107.439469



d. Any other analysis that you believe is relevant to help the travel agent understand the data

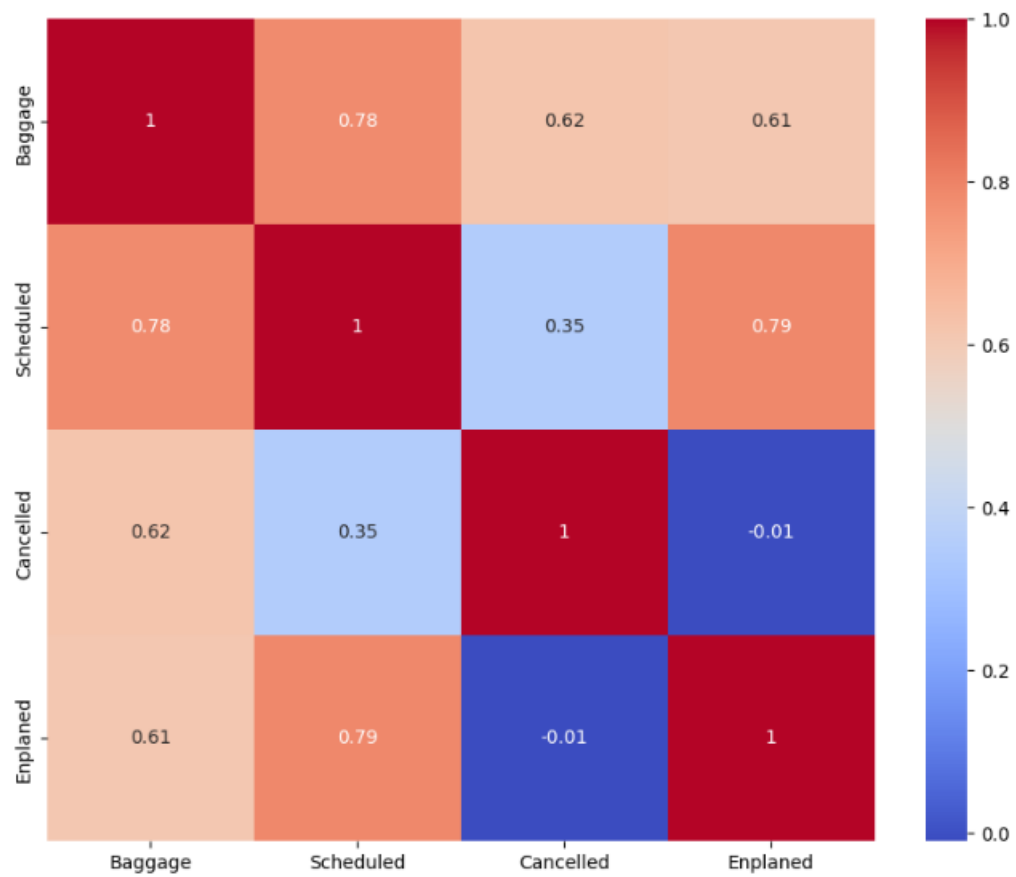
Travel agents should alert customers about potential baggage claim issues when flights are more likely to be canceled. Individual experiences can vary, and factors like weather, airport conditions, and airline policies can affect baggage handling.

3.2 American Eagle

a. Factors Influencing Baggage Claims

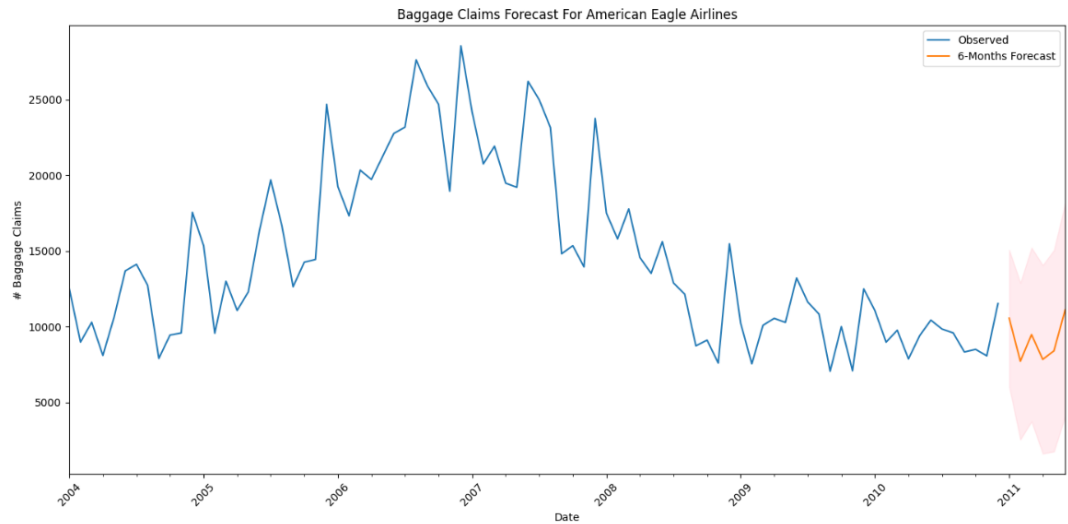
By analyzing the correlation between the number of baggage claims and the number of canceled flights, passengers enplaned, and flights scheduled, we got that:

- 1) There is a moderate positive correlation (Correlation: 0.62) between the number of canceled flights and the number of baggage claims. This suggests that when airlines experience more flight cancellations, there is a tendency for an increase in baggage claims. Possible explanations could include disruptions in travel plans leading to mishandled baggage or re-routing of luggage causing delays and issues.
- 2) The correlation between baggage claims and Scheduled Flights (Correlation: 0.78): A correlation of 0.78 signifies a strong positive relationship. The positive sign indicates that as the number of scheduled flights increases, the number of baggage claims also tends to increase. During periods of highly scheduled flights (such as holiday seasons or peak travel times), there is likely to be a corresponding increase in baggage claims.
- 3) The correlation between baggage claims and Enplaned Passengers (Correlation: 0.61): A moderate positive relationship. The positive sign indicates that as the number of enplaned passengers increases, the number of baggage claims also tends to increase. Airlines with higher passenger numbers might experience a proportional increase in both enplaned passengers and baggage claims.



- b. 6-month forecast for baggage complaints
 MAPE = 14.014%
 RMSE = 2,880.493

	Forecasted_CPI	Lower_Bound	Upper_Bound
2011-01-01	10558.880550	6047.453083	15070.308016
2011-02-01	7716.470919	2537.663582	12895.278256
2011-03-01	9475.082087	3734.462212	15215.701962
2011-04-01	7834.568862	1607.491752	14061.645972
2011-05-01	8397.925840	1742.128457	15053.723223
2011-06-01	11098.022980	4059.863838	18136.182121

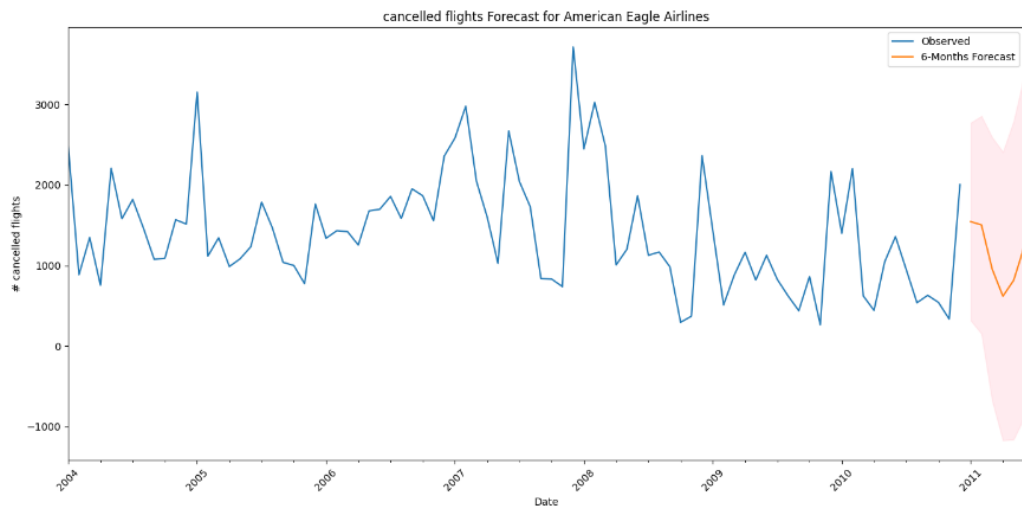


c. 6-month forecast for canceled flights

MAPE = 41.615%

RMSE = 636.062

	Forecasted_CPI	Lower_Bound	Upper_Bound
2011-01-01	1544.285559	317.452779	2771.118340
2011-02-01	1504.084563	153.544092	2854.625033
2011-03-01	956.224310	-678.463101	2590.911721
2011-04-01	619.023610	-1170.811512	2408.858732
2011-05-01	815.993164	-1157.983579	2789.969906
2011-06-01	1238.974997	-882.293256	3360.243250



d. Any other analysis that you believe is relevant to help the travel agent understand the data

Predicting canceled flights is a difficult task due to the large forecast error (>41%) as well as the high variability in the data. There are many factors that can influence canceled flights, and it is not possible to predict their occurrence without considering current airline policies and weather forecasts, as these factors greatly affect flight

operations and baggage handling.

4. Recommendations and conclusion

United Airline canceled(left) vs American Eagle canceled(right)

	Forecasted_CPI	Lower_Bound	Upper_Bound		Forecasted_CPI	Lower_Bound	Upper_Bound
2011-01-01	430.073537	-272.558477	1132.705552	2011-01-01	1544.285559	317.452779	2771.118340
2011-02-01	754.502650	33.546969	1475.458330	2011-02-01	1504.084563	153.544092	2854.625033
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United Airlines baggage claim(left) vs American Eagle Baggage claim(right)

	Forecasted_CPI	Lower_Bound	Upper_Bound		Forecasted_CPI	Lower_Bound	Upper_Bound
2011-01-01	11517.989987	3166.755574	19869.224401	2011-01-01	10558.880550	6047.453083	15070.308016
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4.1 The expectation from each airline in terms of canceled flights and baggage claims over the next six months

United Airlines:

- 1)Canceled Flights: we might expect a higher risk of canceled flights during the holiday season (January and February) due to increased travel demand and potential weather disruptions. Traveling in April and May might offer a slightly lower risk of encountering canceled flights based on the prediction.
- 2)Baggage Claims: United Airlines has exhibited varying patterns in baggage claims. February and April have fewer baggage claims.

American Eagle Airlines:

- 1)Canceled Flights: like United Airlines, American Eagle Airlines has experienced fewer canceled flights in April and May.
- 2)Baggage Claims: American Eagle Airlines has shown lower baggage claims in February and April.

4.2 A recommendation for which airline is more likely to get your bags to their final destination without issue.

Predicting canceled flights is a difficult task due to the large forecast error (>41%) as well as the high variability in the data. There are many factors that can influence canceled flights, and it is not possible to predict their occurrence without considering current airline policies and weather forecasts, as these factors greatly affect flight

operations and baggage handling. Therefore, I would recommend using the prediction of baggage claims over the next six months to make recommendations.

I suggest choosing American Eagle since it has a lower number of baggage claims and is more likely to deliver your bags without issue.

4.3 What month(s) might be the best for travel in order to avoid canceled flights and lost baggage?

Travelers are advised to plan their trips during non-peak months. April might be the best for travel in order to avoid canceled flights and lost baggage since that month has a relatively lower number of baggage claims and flights canceled by both airlines.