

Mishandled Baggage Forecasting

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6025 – Predictive Analytics

Section: Wake

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# Business Problem:

Our data analytics team was tasked with helping the travel agency analyze how different factors influence complaints about lost, damaged, or misrouted baggage for United and American Eagle Airlines. The goal is to recommend the airline that will better see baggage to its appropriate destination, as well as the best month to travel in, by producing a forecast of baggage complaints and cancelled flights for the first 6 months of 2011.

# Overview of Data:

The data used comes from the USDOT, “Air Travel Consumer Report,” the Office of Aviation Enforcement and Proceedings, Aviation Consumer Protection Division. It contains seven years of monthly data for the two airlines of interest: United and American Eagle. The four columns of interest are Baggage (number of complaints about lost, damaged, or misrouted baggage), Scheduled (number of scheduled flights for that month), Cancelled (number of cancelled flights that month), and Enplaned (number of passengers who boarded a plane that month).

# Results of Analysis:

Relationships Between Variables:

When comparing the relationship of baggage with the other three variables of interest, we found that there was a moderately strong, positive linear relationship for both United and American Eagle. This means that as the number of scheduled flights, enplaned passengers, and cancelled flights **increases**, it can be expected that the number of complaints about baggage will also **increase**. It is important to note that the relationships for all three variables with baggage complaints were stronger for **American Eagle**.

Six Month Forecast:

Using a statistical forecasting method known as ARIMA, we were able to produce a 6-month forecast for the baggage complaints and cancelled flights for both airlines.

A screenshot of a computer screen

Description automatically generatedAmerican Eagle Baggage Forecast United Baggage Forecast

A black and white screen with numbers

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We can see that the forecasted baggage complaints for American Eagle are slightly less than those of United, with **February** and **April** both being the months with the least expected complaints.

American Eagle Cancelled Forecast United Cancelled Forecast

**A screenshot of a computer screen

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Here we see that the forecasted cancelled flights for United are slightly lower, with **April** and **May** being the two months with the least expected number of cancelled flights.

When forecasting, it is always important to take into consideration the accuracy of the forecasted values. To do this, we can look at the Mean Absolute Percentage Error (MAPE), which tells us, on average, how far our predictions will be off.

For baggage complaints, the American Eagle forecast has a MAPE of **14.7%** and the United forecast has a MAPE of **17.9%**.Comparing these values shows us that the forecast for American Eagle will be slightly more accurate.

For cancelled flights, the American Eagle forecast has a MAPE of **40.9%** and the United forecast has a MAPE of **48.7%**. Again, we see that the forecast for American Eagle will be more accurate than United.

# Recommendations and Conclusion:

Our general recommendation would be to use **American Eagle,** as the forecasted baggage complaints are lower than that of United, and even though the forecasted cancelled flights are higher it is not by that much. It is also valid to point out that the models used for American Eagle both had **less error** than United. Based on our forecast, we also recommend travelling in the month of **April**, as it is the month with the lowest forecasted cancelled flights and second lowest forecasted baggage complaints.

We have included two additional recommendations to assist customers in specialized situations.

1. If customers are travelling without checked luggage and are most concerned with their flight not getting cancelled, we would recommend choosing **United** as their forecasted cancelled flights are lower than those of American Eagle.
2. If customers are most concerned with their luggage getting lost, damaged, or misrouted, we recommend travelling in **February**, as it is the month with the lowest number of forecasted complaints for both airlines.