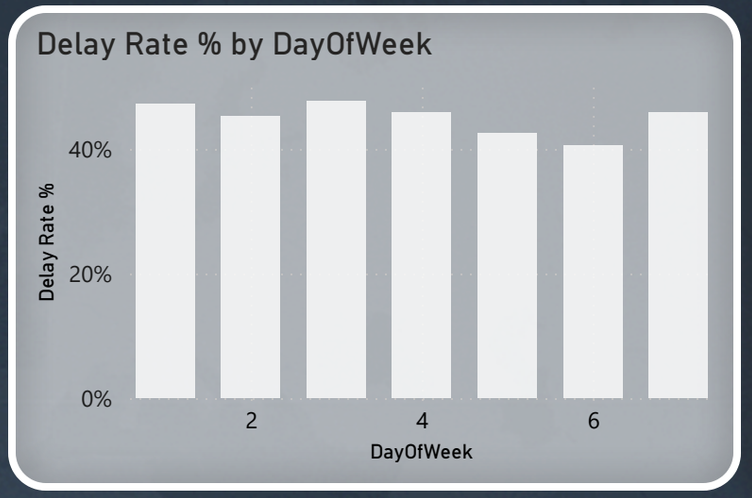
518.56K
Total Flights

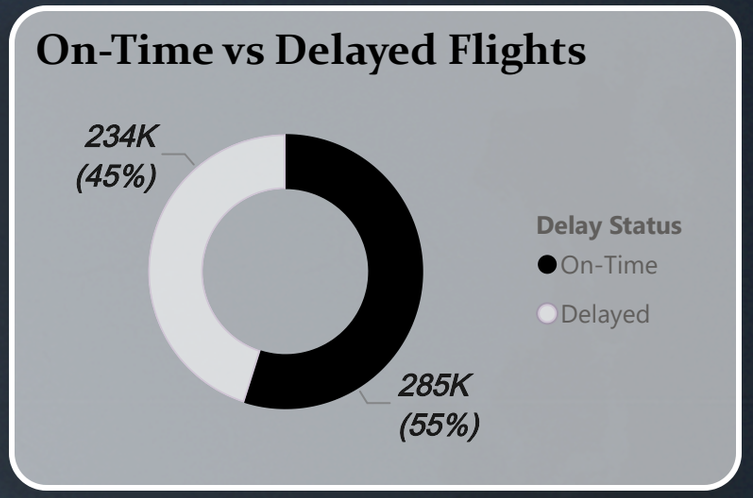
234.0K
Delayed Flights

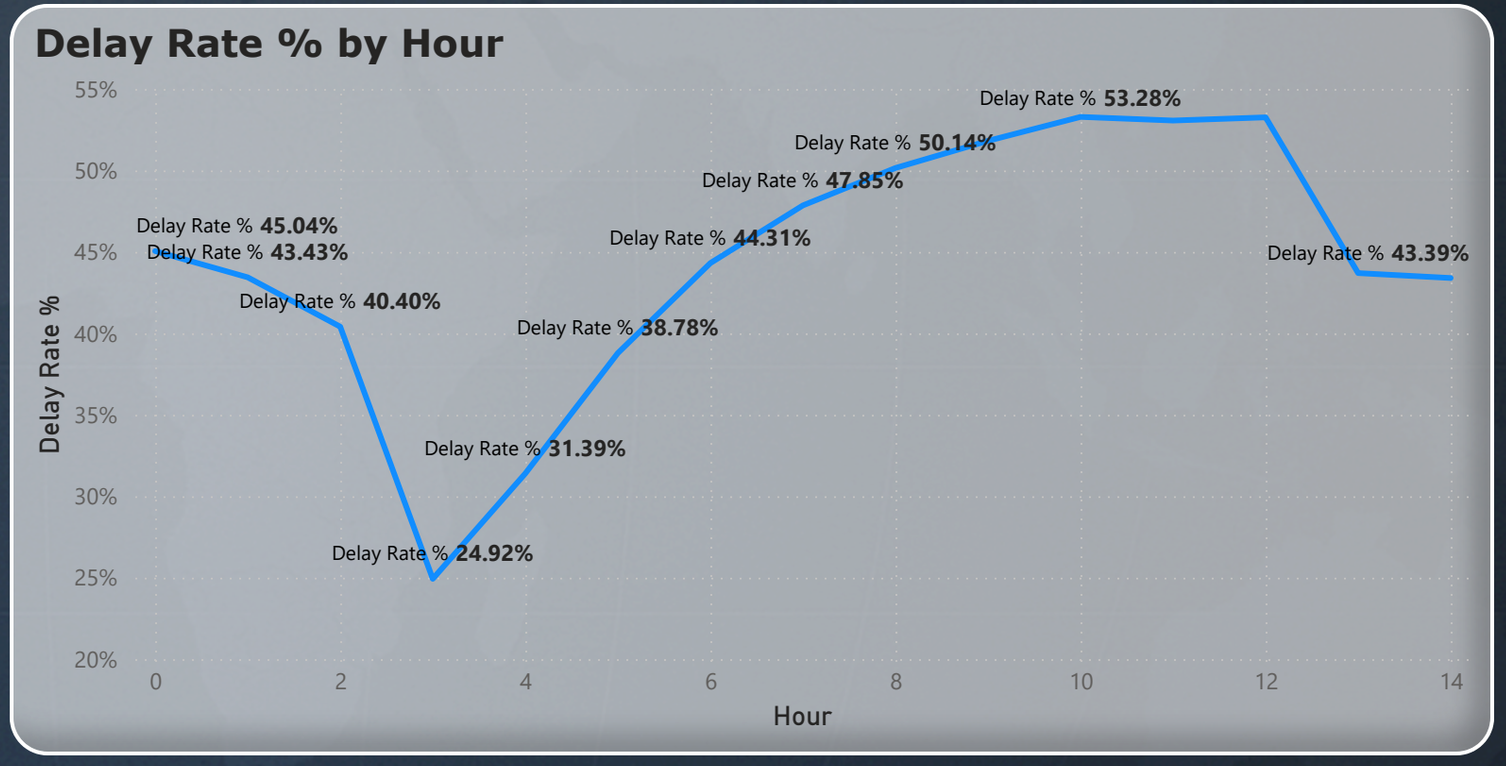
132.22
Avg Flight Dur...

45.12%
Delay Rate %

Flight Delay Analysis
Overview

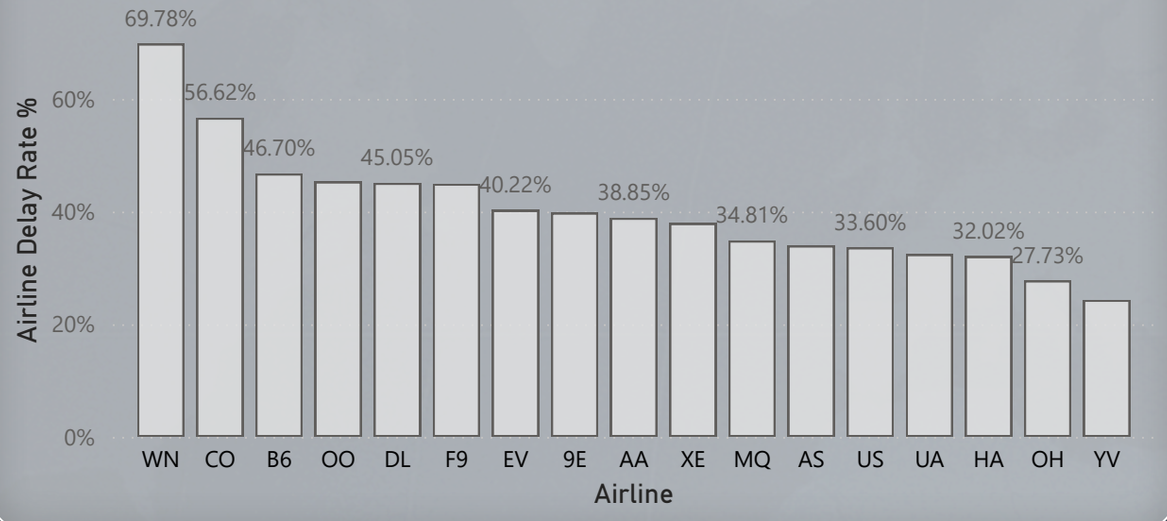




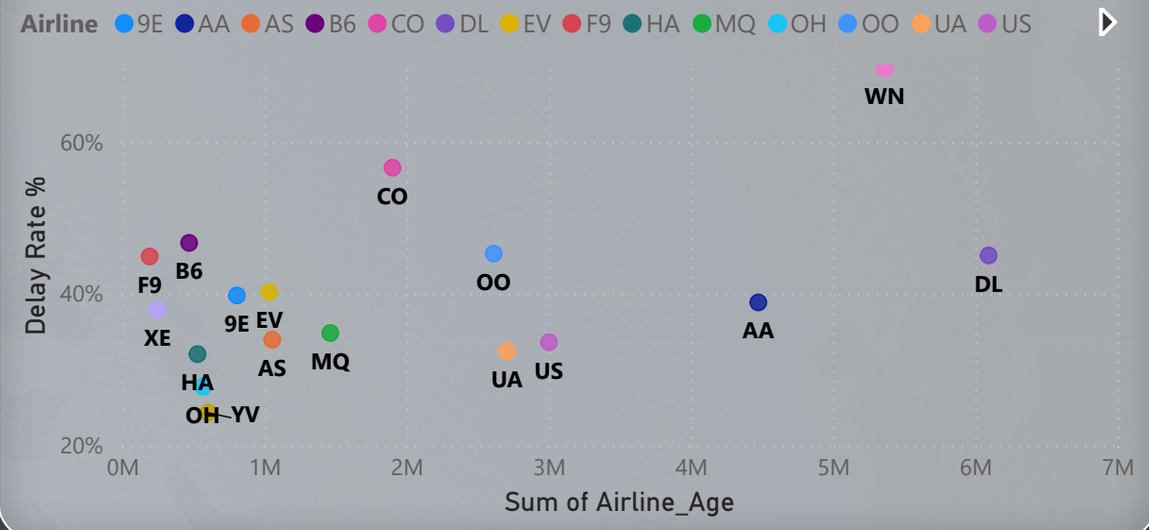


Next

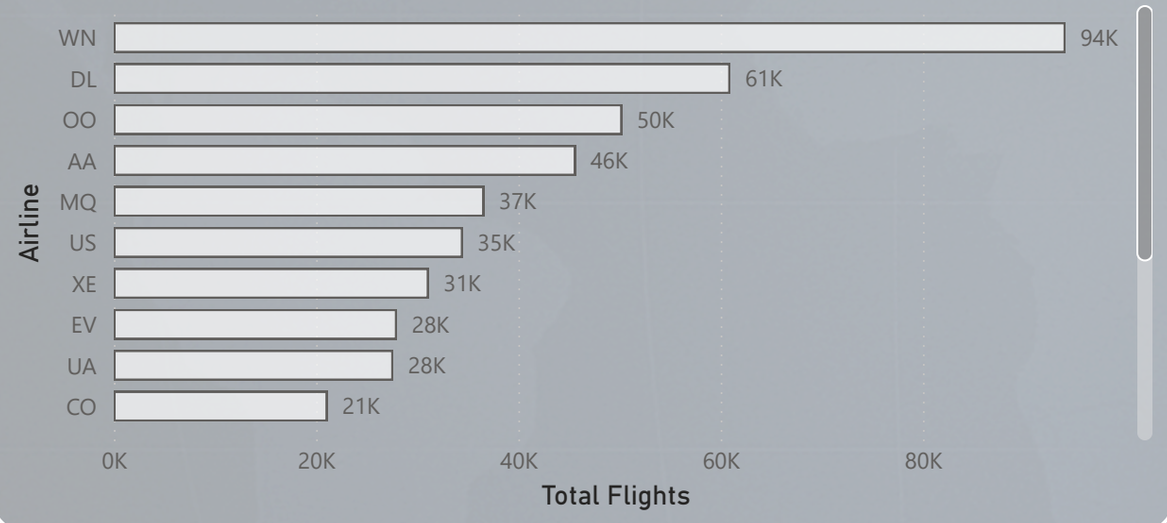
Airline-wise Delay Rate (%)



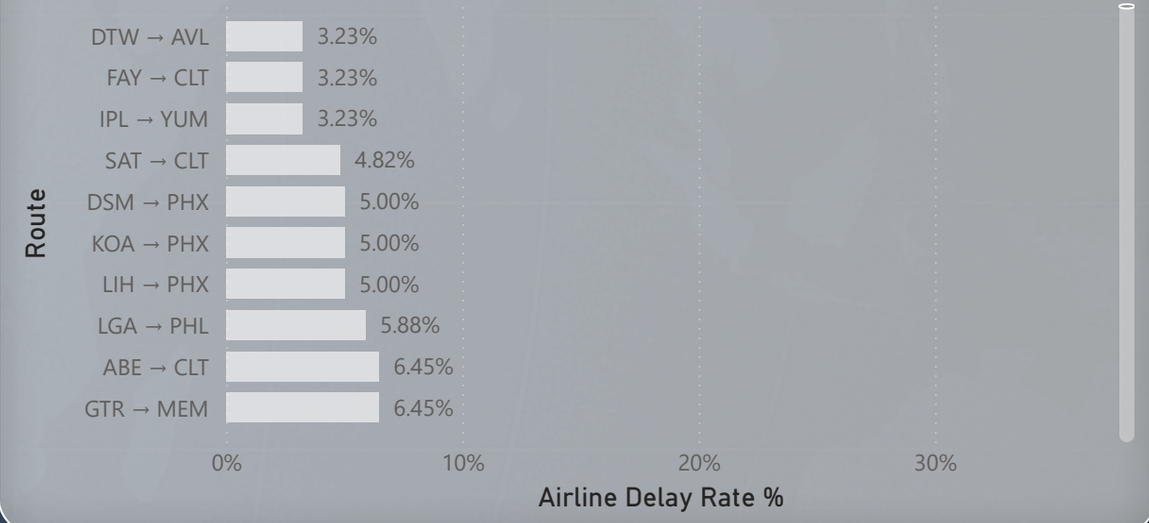
Airline Age vs Delay Rate



Airline Flight Volume



Airline Delay Rate % by Route



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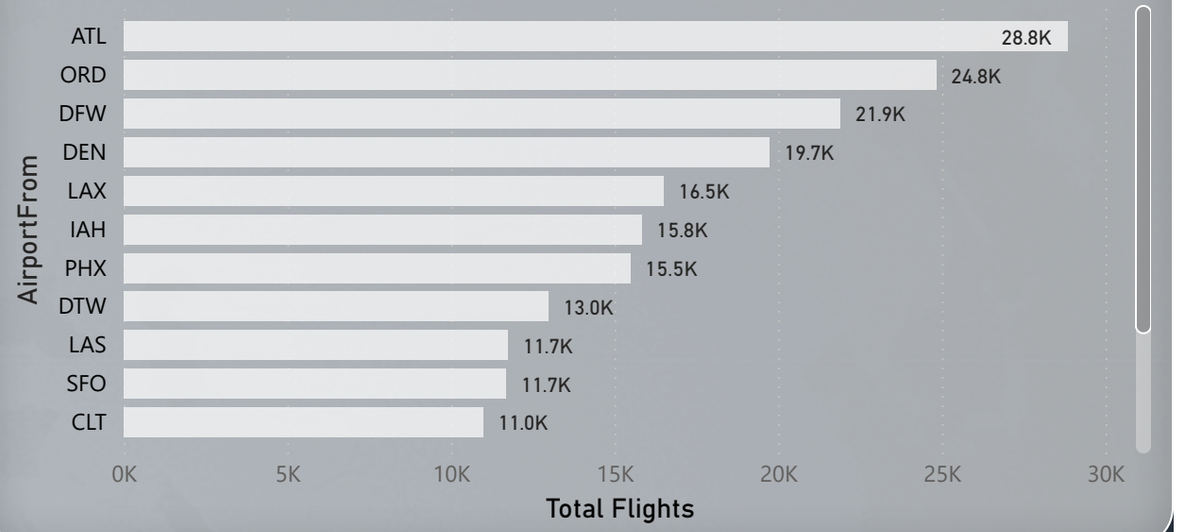
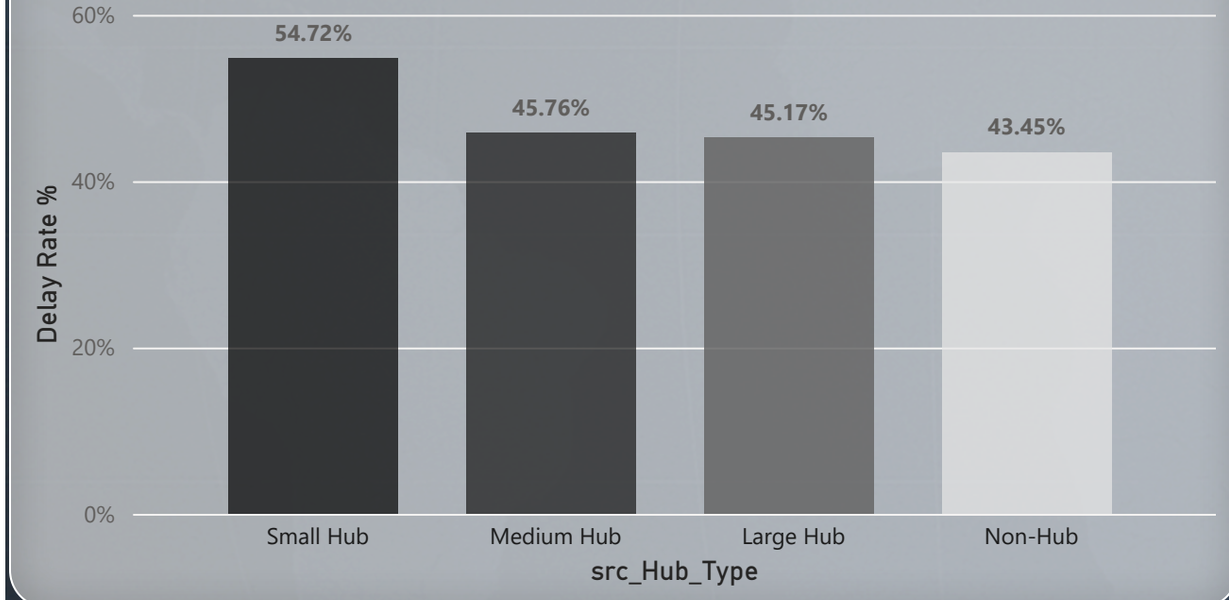
Airport Delay Rate % (Departure Airports)

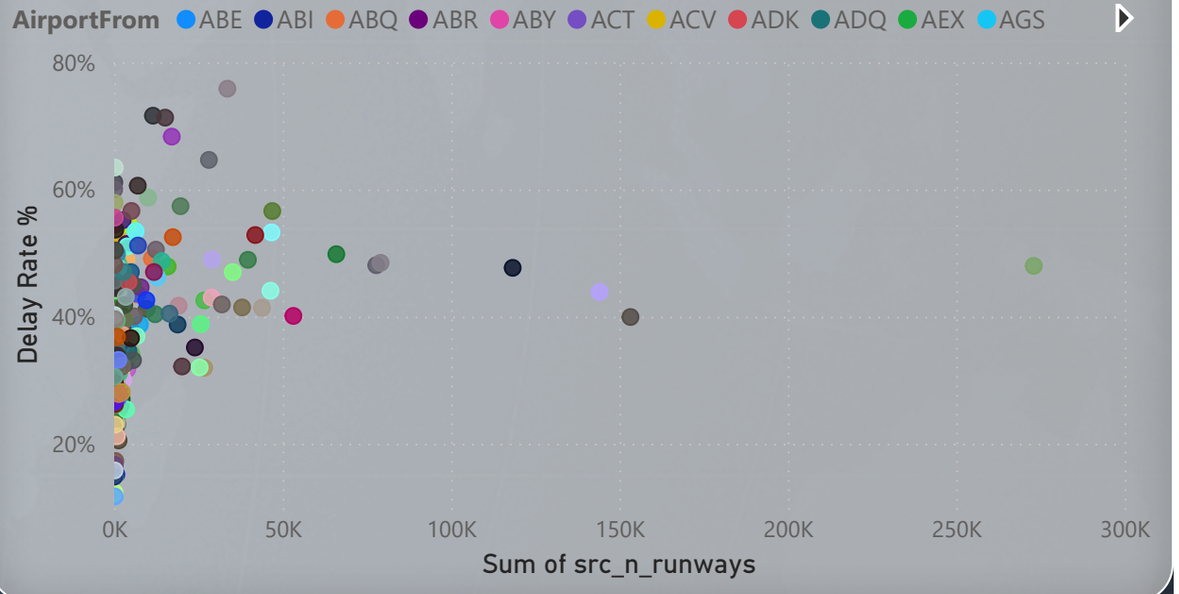
Top Airports by Total Flights



Departure Hub Type vs Delay Rate %

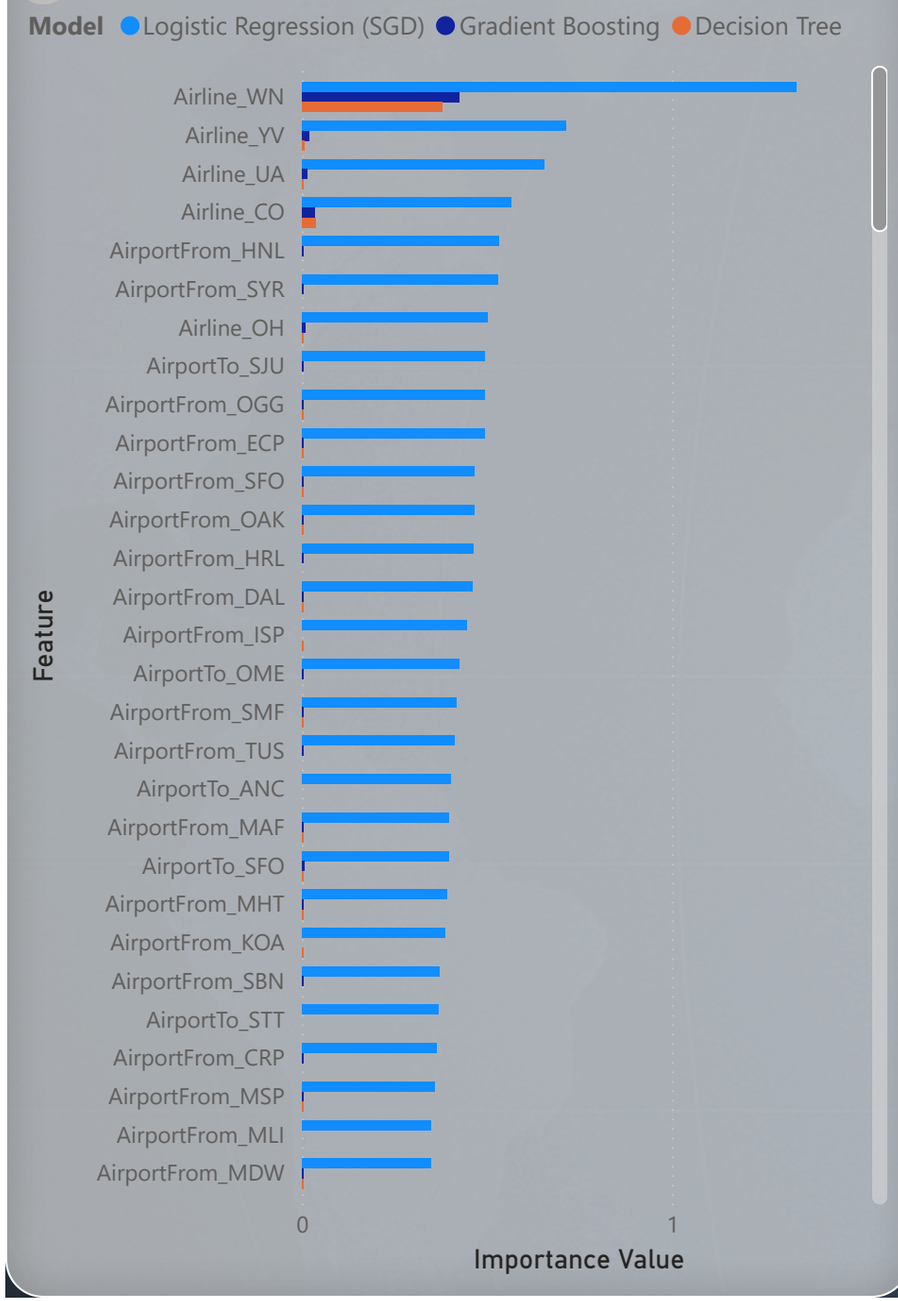


Runways vs Delay Rate % (Source Airports)

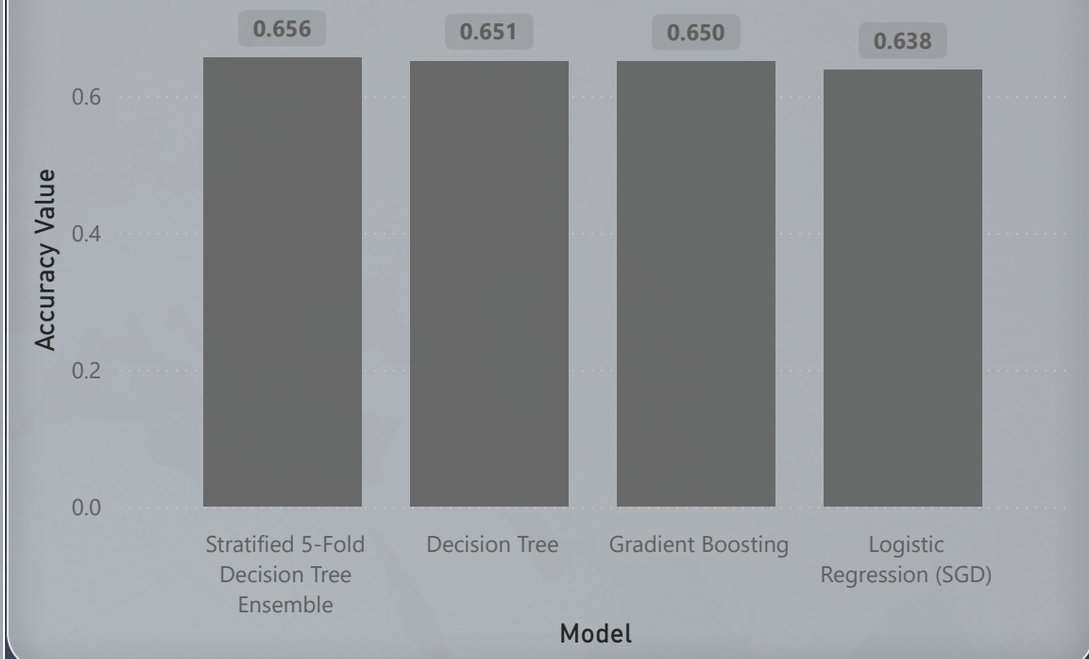


Next

Feature Importance by Model



Accuracy Value by Model



Model

- [ ] Decision Tree
- [ ] Gradient Boosting
- [ ] Logistic Regression (S...

Model Performance

Feature Importance

How to Read

📊 Model Performance Summary

- We trained 4 machine learning models to predict whether a flight will be On-Time (0) or Delayed (1).
- Accuracy values are between 0 and 1 – for example, 0.65 ≈ 65% correct predictions.
- Among these models, the Stratified 5-Fold Decision Tree Ensemble gives the highest accuracy (~65.6%).
- Logistic Regression (SGD) performs slightly lower, which shows that delay patterns are not purely linear.
- Gradient Boosting and single Decision Tree perform close to each other and slightly below the ensemble model.

Next

Final Storytelling Summary — Why Do Flights Get Delayed?

📌 Story: What We Discovered

- Evening flights (5 PM – 10 PM) have the highest delay risk.
- Airline WN shows the highest delay rate due to heavy traffic volume.
- Small airports with fewer runways face more operational delays.
- Long-haul flights tend to be delayed more often.
- Weekends see more delays compared to weekdays.

🤖 How ML Helps in Reducing Delays

- Best model: Stratified Decision Tree Ensemble (65.6% accuracy).
- Predicts delay risk before departure.
- Helps airports prepare resources earlier.
- Supports better flight scheduling.
- Guides long-term infrastructure planning.

✈ Airport Case Study (Example: Denver Airport – DEN)

Why delays happen:
- High elevation → weather instability
- Heavy passenger traffic
- Limited runway availability
- High evening traffic

How to reduce delays:
- Optimize peak-hour scheduling
- Add operational staff during busy windows
- Improve runway traffic flow
- Better weather-based planning using ML predictions

✓ Final Recommendations

- Airlines must revise schedules around peak delay hours.
- Airports should consider infrastructure capacity expansion.
- ML predictions should be used to reduce last-minute chaos.
- Real-time dashboards must be used by the operations team.

Back to Dashboard
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