PREDICTING PRICES OF FLIGHTS TO AND FROM ATL

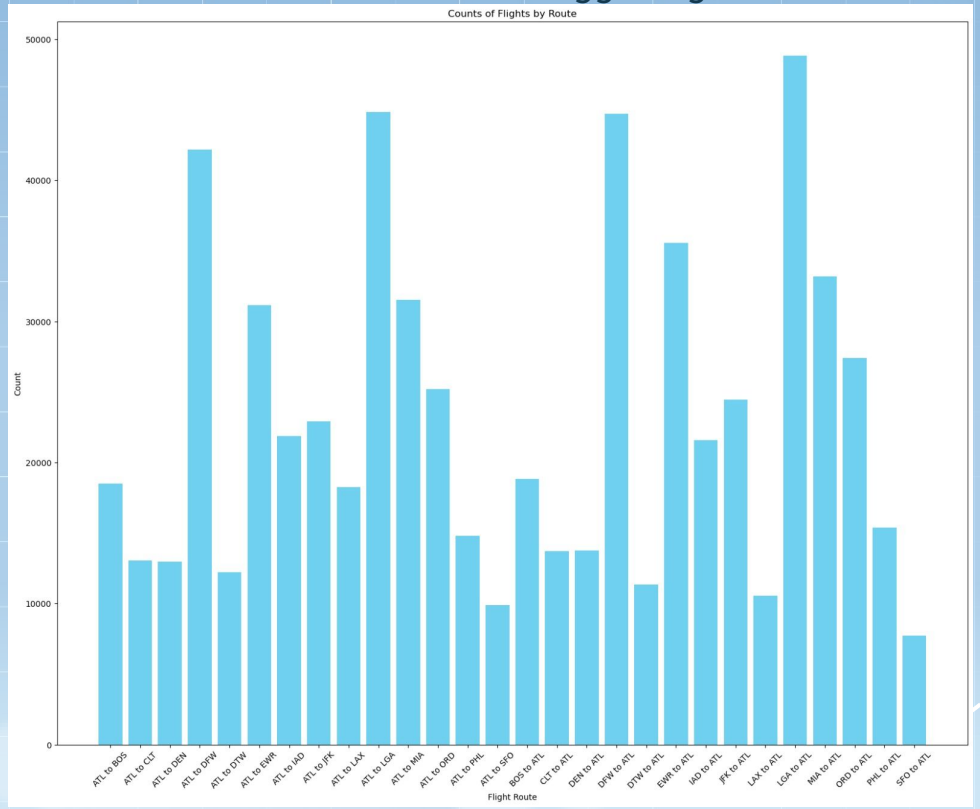
CS 4641 Group 31 Final Presentation

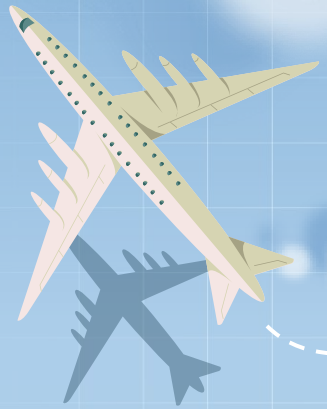
PROJECT DEFINITION

- Accurate flight cost prediction is vital in today's dynamic travel industry.
- Anticipating flight ticket prices significantly influences consumer choices and travel experiences.
- Our project aims to develop a machine learning model for effective flight cost prediction.
- Specifically geared towards Georgia Tech students, we focus on predicting costs for flights to and from ATL airport.
- To enhance specificity, our project excludes unrelated flights and is limited to economy-class seats.

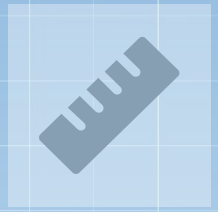
DATASET

from a Kaggle Flight Prices Dataset





CLEANING

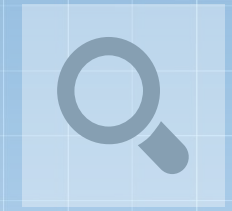


NORMALIZATION

- Numerical representations
- Feature extraction

PRUNING

- Removing features representing the same data
- Removing data irrelevant to our problem definition



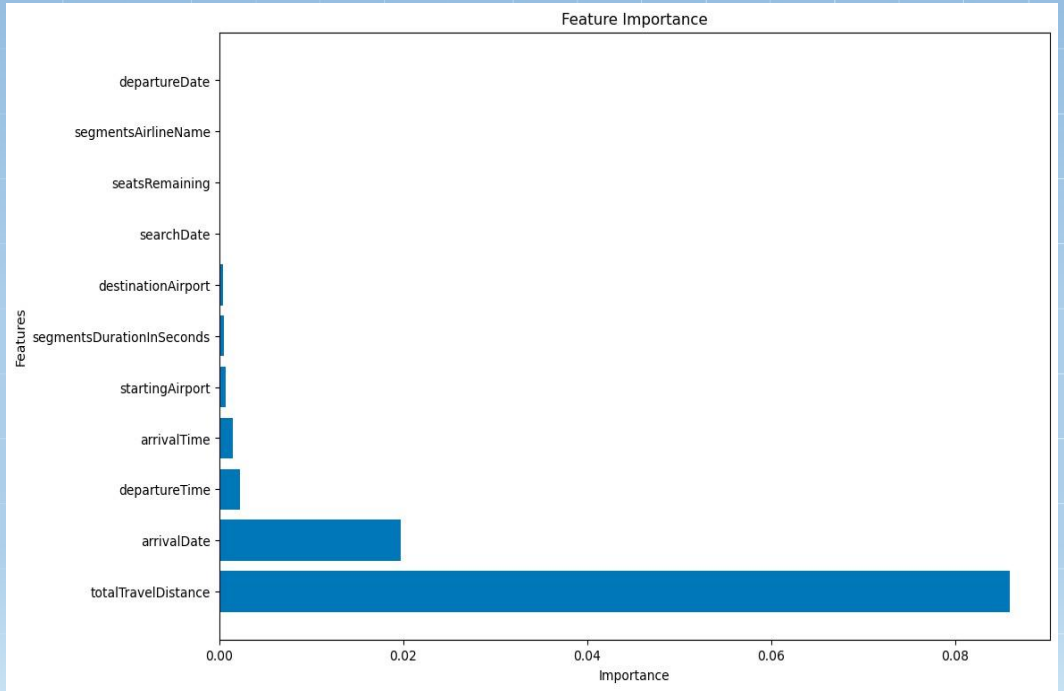
MISSING DATA

- Filling in missing values

PREPROCESSING

Lasso Feature Selection

- Determine feature importance
- Feature reduction



FINAL FEATURES

(in order of importance)

totalTravelDistance	Total travel distance in miles
arrivalDate	A number between 1-365 corresponding to the day of the year
departureTime	A number between 0-1439 corresponding to the time of the day in minutes
arrivalTime	A number between 0-1439 corresponding to the time of the day in minutes
startingAirport	Three-character IATA airport code for the initial location
segmentsDurationInSeconds	String containing the duration of the flight, in seconds, for the trip
destinationAirport	Three-character IATA airport code for the arrival location

METHODS

01

KNN

Supervised

02

LINEAR REGRESSION

Supervised

03

RANDOM FOREST

Supervised

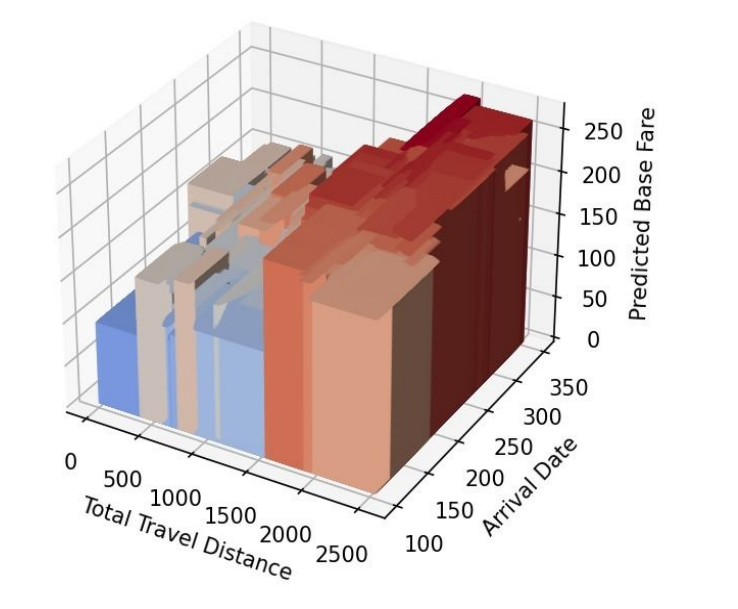
01

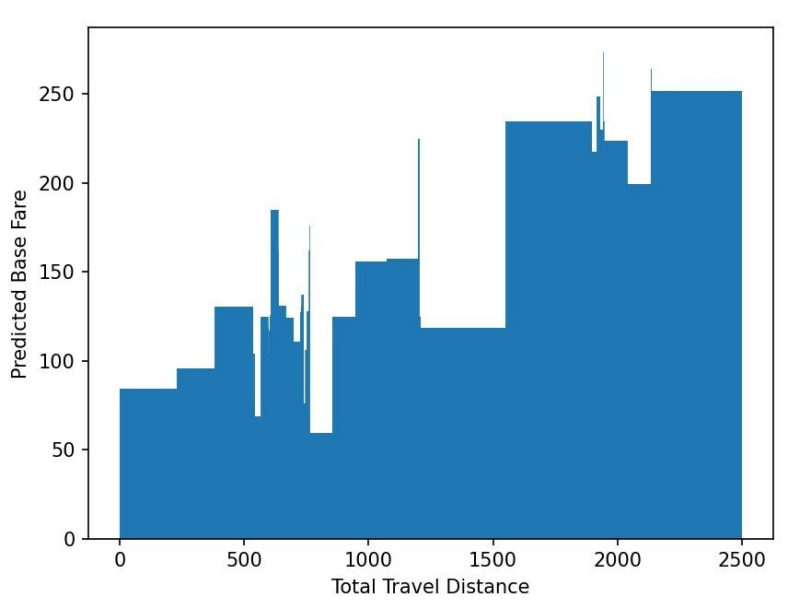
K NEAREST NEIGHBORS

Accuracy: ≈90%

KNN: RESULTS & ANALYSIS

- MSE: 208.86 - 211.54
- R-squared: 0.9041 - 0.9065





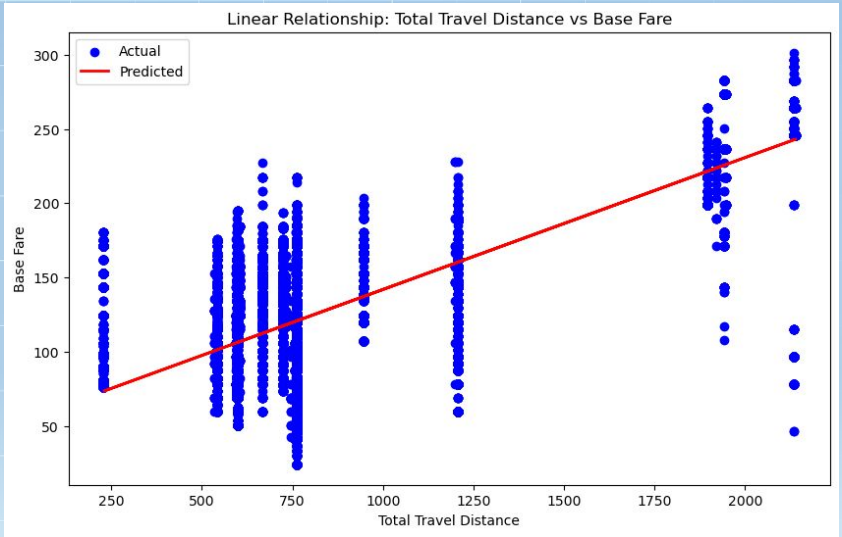
02

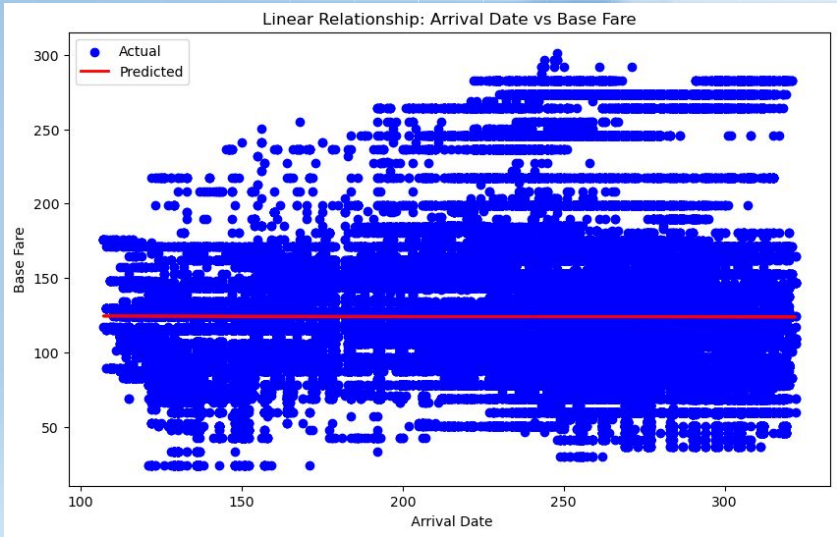
LINEAR REGRESSION

Accuracy: ≈50%

LR: RESULTS & ANALYSIS

- MSE: 1076
- R-squared: 0.51
- Reason for inaccuracy: non-linear relationships for some features





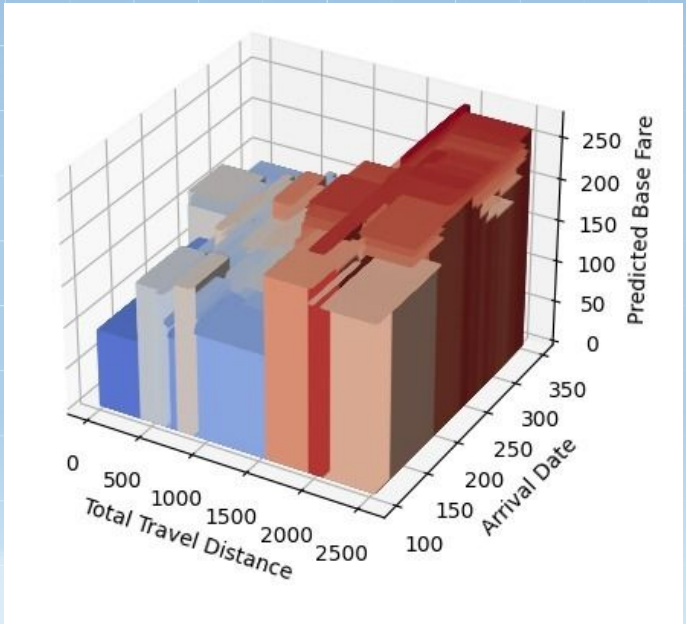
03

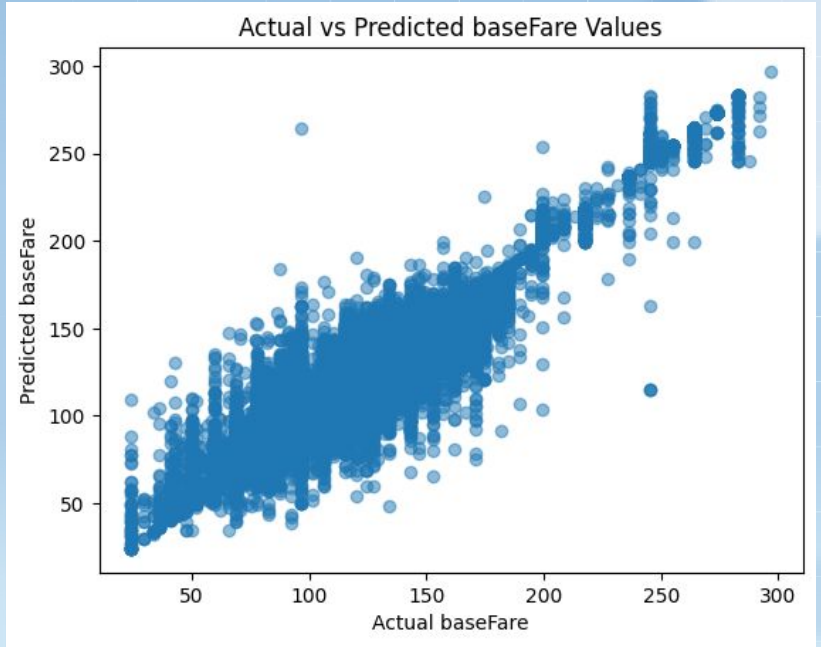
RANDOM FOREST

Accuracy: ≈96%

RF: RESULTS & ANALYSIS

- MSE: 88.46
- R-squared: 0.9599





MODEL COMPARISON

Aspect	KNN	Linear Regression	Random Forest
Non-linearity Handling	Effective in capturing complex, non-linear relationships in flight features.	Assumes a linear relationship between variables, may struggle with non-linear correlations.	Capable of capturing non-linear relationships, robust performance observed.
Prediction Accuracy	Achieved over 90% accuracy with optimized k-value and feature selection.	Achieved approximately 50% accuracy, reliable predictor despite non-linear correlations.	Achieved outstanding accuracy up to 95.99%, with consideration for computational costs.
Interpretability	Limited interpretability due to the complex nature of the algorithm.	May struggle with interpretability, especially in the presence of non-linear correlations.	Limited interpretability, challenging to explain the decision-making process.
Overfitting Concerns	Prone to overfitting, especially with small k-values. Requires careful tuning.	Potential for overfitting, especially with correlated features.	May exhibit overfitting, but observed performance on testing data alleviated concerns.

DISCUSSION & CONCLUSION

DISCUSSION

- KNN: showed high accuracy, but lacked interpretability
- Linear Regression: not reliable w/ less accuracy
- Random Forest: high accuracy, but at the expense of some interpretability

FUTURE WORK / NEXT STEPS

Test on future flight prices and explore prices for flight routes outside Atlanta

REFERENCES

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M. Mulkalla, Deepika and A. Joshi, "Predicting the Fare of a Flight Ticket with Machine Learning Algorithms," 2022 International Conference on Cyber Resilience (ICCR), Dubai, United Arab Emirates, 2022, pp. 1-5, doi: 10.1109/ICCR56254.2022.9995886.

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