

Machine Learning Model Outcomes

Executive summary report for the New York City Taxi and Limousine Commission

Prepared by Automatidata

Overview

New York City Taxi & Limousine Commission has contracted the Automatidata data team to build a machine learning model to predict whether a NYC TLC taxi cab rider will be a generous tipper.

Problem

After rejecting the initial modeling objective (predicting non-tippers) out of ethical concern, it was decided to predict “generous” tippers—those who tip $\geq 20\%$. This decision was made to balance the sometimes competing interests of taxi drivers and potential passengers.

Solution

The data team employed two distinct modeling techniques and evaluated their outcomes. Regrettably, neither approach yielded robust predictions. Consequently, the team suggests utilizing this model as a means to gain deeper business insights or, at most, a rough guide for taxi drivers. The subsequent steps section proposes ideas for further analysis that could enhance the practicality of the findings.

Details

- The data team assumed that trip details, fare predictions, and time of day could accurately predict generous tipping.
- The team constructed and evaluated both models on test data, but the results were unsatisfactory, with an F1 Score of only 0.35.

	model	precision	recall	F1	accuracy
0	RandomForest Test	0.478605	0.279371	0.352804	0.637078
0	XGBClassifier Test	0.454135	0.279371	0.345934	0.625942

Image Alt-Text: F1 scores for random forest and XGboost models

Future model suggestions

- Collect/add more granular driver and user-level data, including past tipping behavior.
- Cluster with K-means and analyze the clusters to derive insights from the data

Results Summary

The model is useful in providing taxi drivers with an indication of customers who are at least 20% likely to give a tip. However, it is not suitable for making informed business decisions.

Next Steps

The Automatidata data team will consult the New York City Taxi and Limousine Commission to share the model results and recommend using it as an uncertain indicator of tip amount, although gathering additional data is vital for significant improvements.