Machine Learning Model Outcomes (Milestone 6)

Executive summary report for the Taxi Company
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Overview

The taxi company has asked to build a machine learning model to predict whether a taxi company 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 ≥ 20%. This decision was made to balance the sometimes competing interests of taxi drivers and potential passengers.

Solution

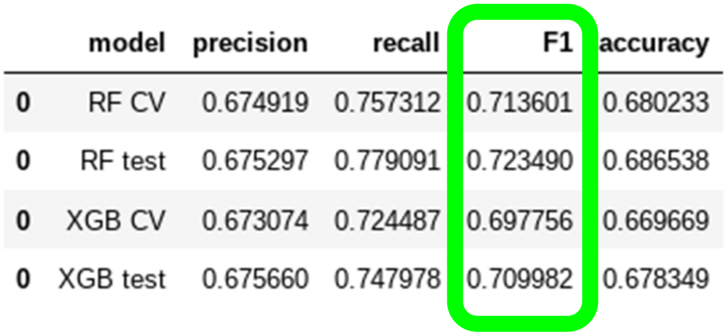
Two different modeling architectures were used and compared their results. Both models performed acceptably, with a random forest architecture yielding slightly better predictions. As a result, beta testing with taxi drivers would be recommended to gain further feedback.

Details

Behind the data

- The assumption was that a trip’s itinerary, predicted fare amount, and time of day may have a strong enough relationship with tip amount that we could accurately predict generous tipping.

- After the identified models were built and performed the testing, it is clear that these factors do indeed help predict tipping. The model’s F_1 score was 0.7235.



	model	precision	recall	F1	accuracy
0	RF CV	0.674919	0.757312	0.713601	0.680233
0	RF test	0.675297	0.779091	0.723490	0.686538
0	XGB CV	0.673074	0.724487	0.697756	0.669669
0	XGB test	0.675660	0.747978	0.709982	0.678349

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 resulting algorithm is usable to predict riders who might be generous tippers, with reasonably strong precision, recall, F_1, and overall accuracy scores. Refer to the “next steps” section for suggestions.

Next Steps

As a next step, the taxi company can be consulted on to share the model results and recommend that the model could be used as an indicator of tip amount. However, additional data would be needed to realize significant improvement to the model.