Understanding the Behavioral Patterns of a Successful Driver

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Project Introduction
The aim of the project is to identify the patterns which enable a driver to be successful on the DiDi platform. The ride hailing platform allows drivers the flexibility to choose when they start work and how long they stay online. However, it can be seen from the data that despite similar work hours and period of activity, some drivers are able to perform better than their peers. In this project, we seek to discover why.

Feature Extraction
To encode a driver’s behavior, we extract spatial and temporal features. Temporal features help us evaluate whether rush hours have an impact on driver’s performance. Spatial features help quantify the importance of pickup/drop-off location. We start with dividing Chengdu into square grids. Trying to better model the road-network, we move on to the use of hexagonal grids, and finally settle on polar coordinates to define concentric rings with equal ride-pickup densities.

Driver Active Time Estimation
One of the most critical inputs to our model is the active time of a driver - the time that the driver is online on the app. We estimate this feature through various curve fitting and probabilistic approaches. We fit a gaussian through rides counts and then sample from an exponential distribution to approximate the ‘patience’ of the driver - how long a driver will wait for a ride before going offline.

Results
In the absence of direct earnings data, we use Performance Ratio - the ratio of a driver’s ride time to active time - as the target. Random Forest Regressors are used to fit this target.

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<tr>
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<td>0.48</td>
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<td>0.79</td>
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Table 1: Model Performance

Feature Importance

Conclusions
It can be seen from the above graphs that making the threshold a function of time improves the model significantly. Temporal features play an important role in determining driver performance. All else equal, strategizing when to be online can be crucial for being successful on DiDi’s platform.

Acknowledgments
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References