Test Assignment

Forecasting number of agents and describing market health

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Market Health and Tickets Per Ride

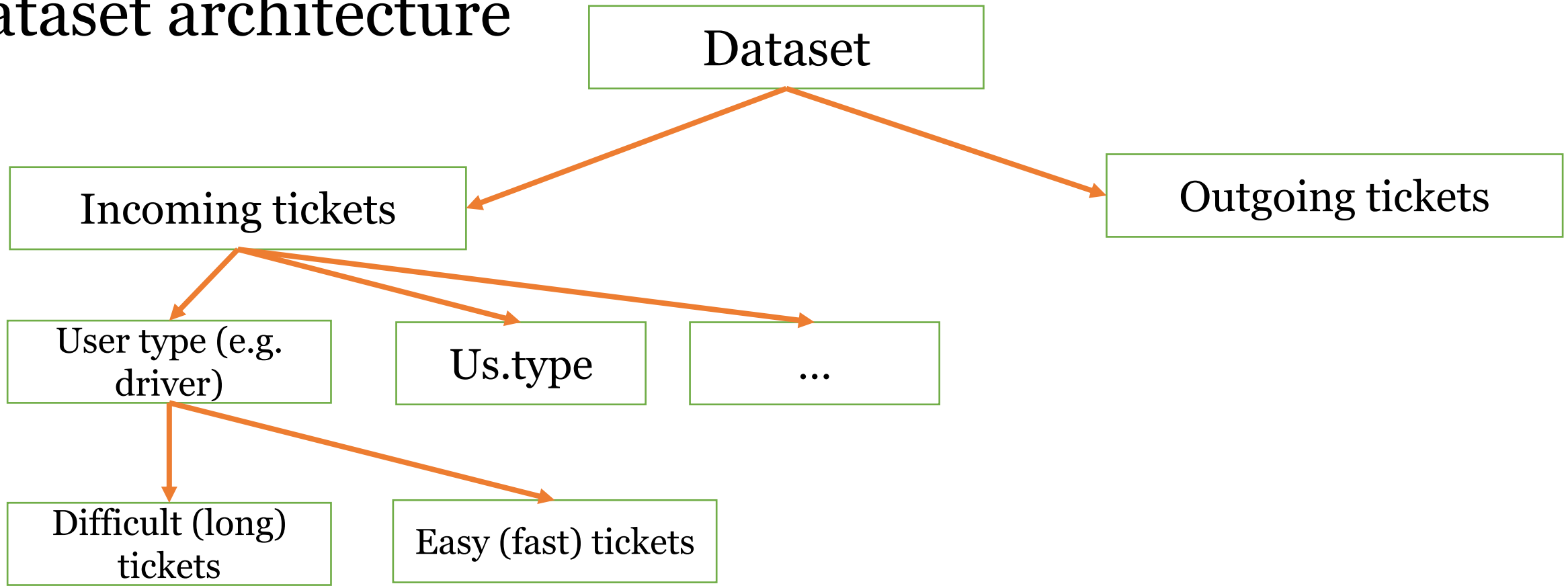
Forecasting number of agents for 31 days

Agent’s 8 hours working day includes:

1. Working with incoming tickets
    1. Working with fast tickets
    2. Working with long tickets
2. Working with outgoing tickets
3. Personal needs and other shrinkage* reasons.

*Shrinkage refers to all stops and distractions from actual work

Dataset architecture



Possible solutions:

1. Number of agents = Expected ticket hours per day/working day
2. Erlang C approach: first, raw number (N = Traffic intensity) and then according to Erlang's formula of traffic probability and grade of service
3. Simple Erlang: First response time * Number of tickets/working day

Methodology
(simplified Erlang approach)

Erlang is a unit of traffic intensity or technical unit for call hours

Intensity = number of tickets per hour * average handling time

Intensity = minimum number of agents

Used formula in our case

Raw number of agents =

(Number of tickets / working day) * average First Response Time (median) *

Adjusted number of agents =

Row number of agents / Shrinkage percentage

Shrinkage is taken as 20%, Occupancy is 80%

Median First Response Time is ~ 0.6 hours

Why median? Because outliers

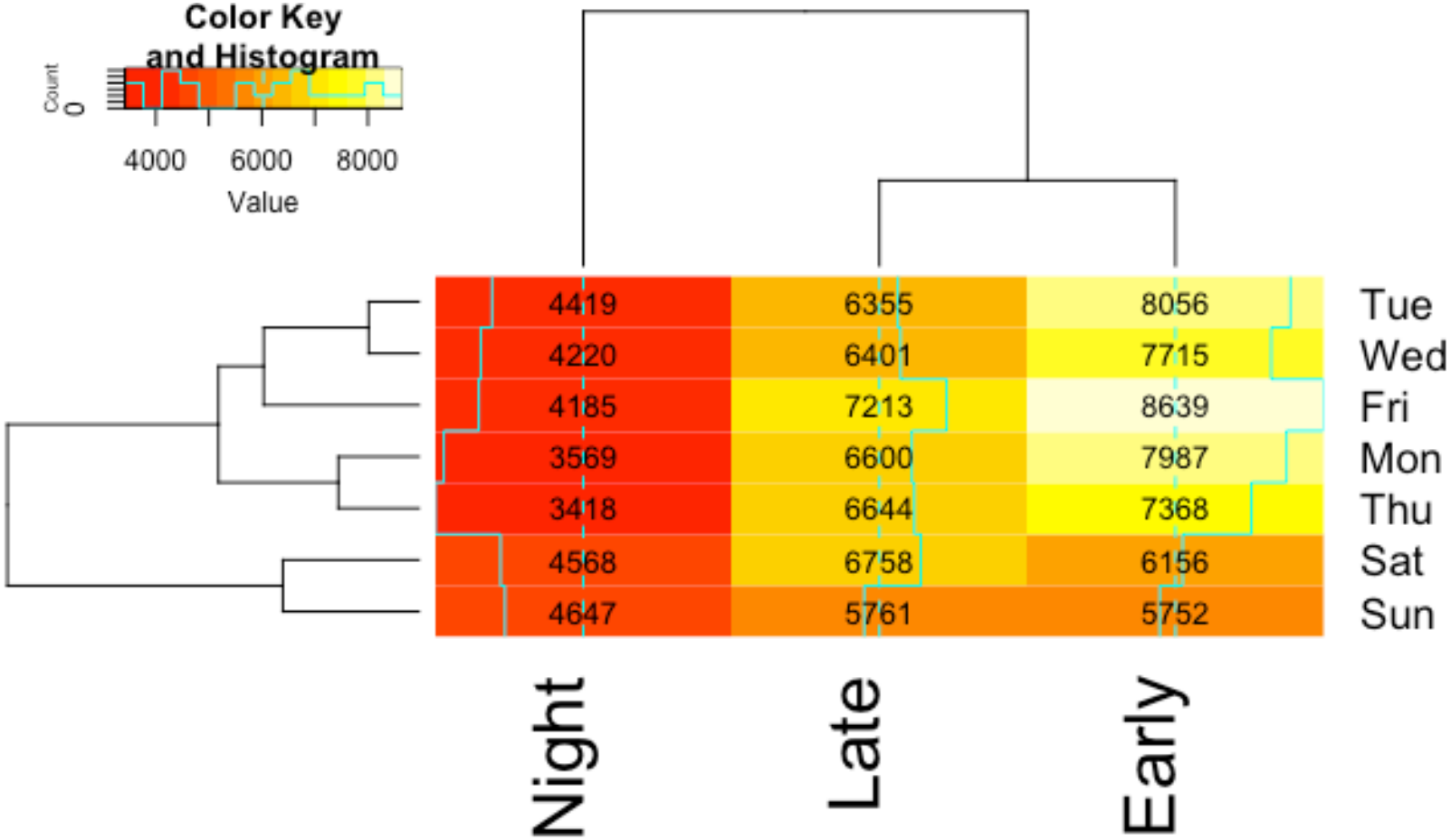
There are 16829 messages that are considered as outliers.

This is around 13% of dataset.

And thus logic is following

- Change outliers to medians
- Find a Ticket Growth Rate (to know approximate number of tickets for next month)
- Adjust next 31 days (based on weekdays) by a ticket growth rate.
- Allocate these tickets according to workload percentage across shifts (early, late, night)
- Apply following formula to get an expected number of agents:

Workload percentage across shifts



Predicted number of agents if First Time Response is median (~0.6 hour)

	Night	Early	Late
Sun	27.84313	34.46388	34.51781
Mon	21.38414	47.85519	39.54479
Tue	26.47703	48.26861	38.07684
Wed	25.2847	46.22546	38.35245
Thu	20.47941	44.14636	39.80842
Fri	25.07499	51.76173	43.21766
Sat	27.36979	36.8845	40.49147

Predicted number of agents if First Time Response is 6 minutes.

	Night	Early	Late
Sun	4.4683	5.5308	5.5394
Mon	3.4317	7.6798	6.3462
Tue	4.249	7.7462	6.1106
Wed	4.0577	7.4183	6.1548
Thu	3.2865	7.0846	6.3885
Fri	4.024	8.3067	6.9356
Sat	4.3923	5.9192	6.4981

Missing information

Categorized content information on tickets, at least, outliers that have a long First Response Time and Total Resolution Time

Target First Response Time

Shrinkage information (breaks, time spent on trainings, leaves and etc.)

Market Health and Tickets Per Ride

What is Tickets Per Ride (TPR)

Tickets Per Ride is a measure indicating a ratio of incoming tickets to all completed rides.

In the dataset TPR constitutes around **2-3%.**

Statistical facts about markets

In 3 months (Nov, Dec, Jan)

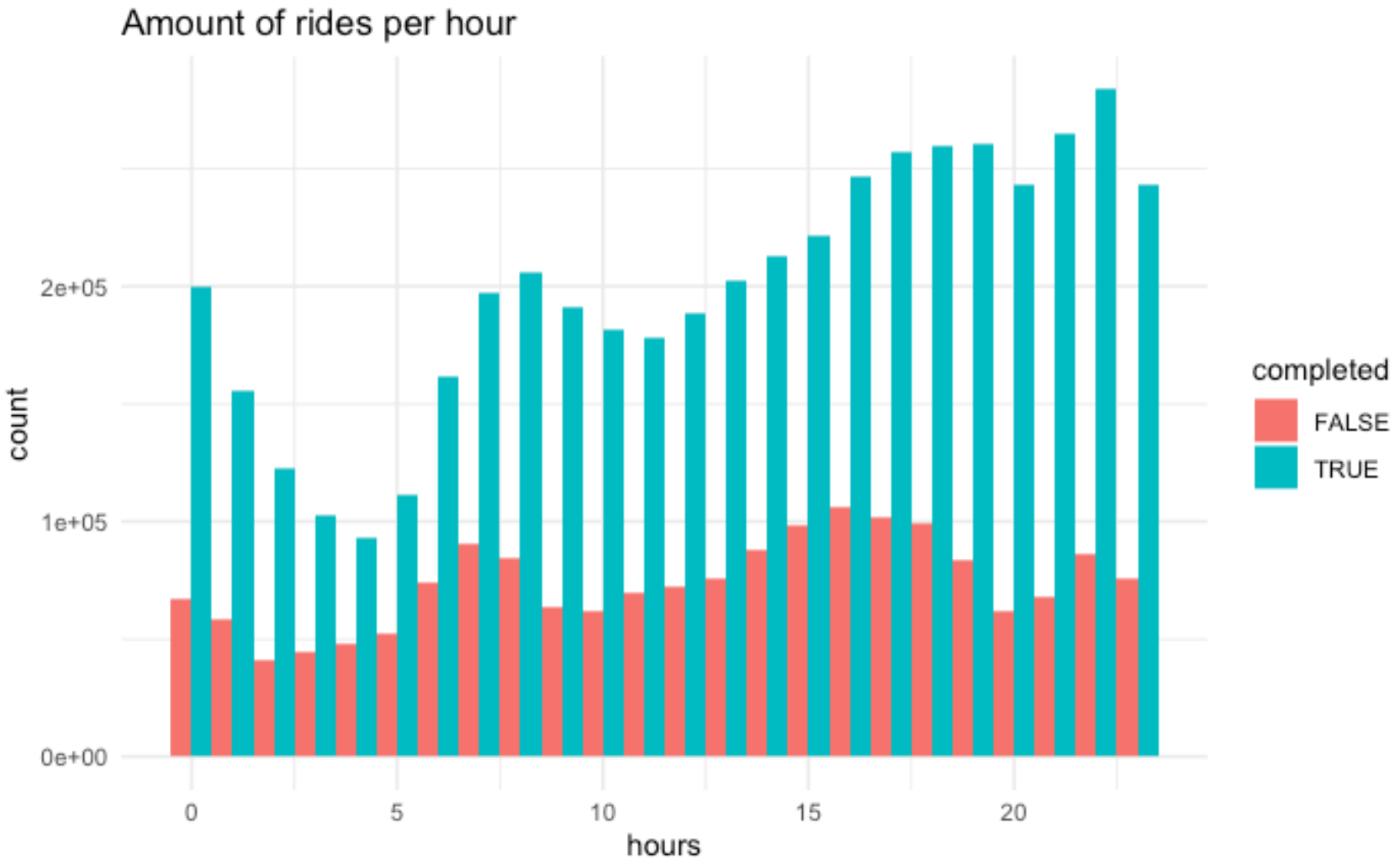
Around **4.8 million** rides was completed, while **1.8 million** rides was canceled or uncompleted.

Median amount of ride distance is **5.5 km**

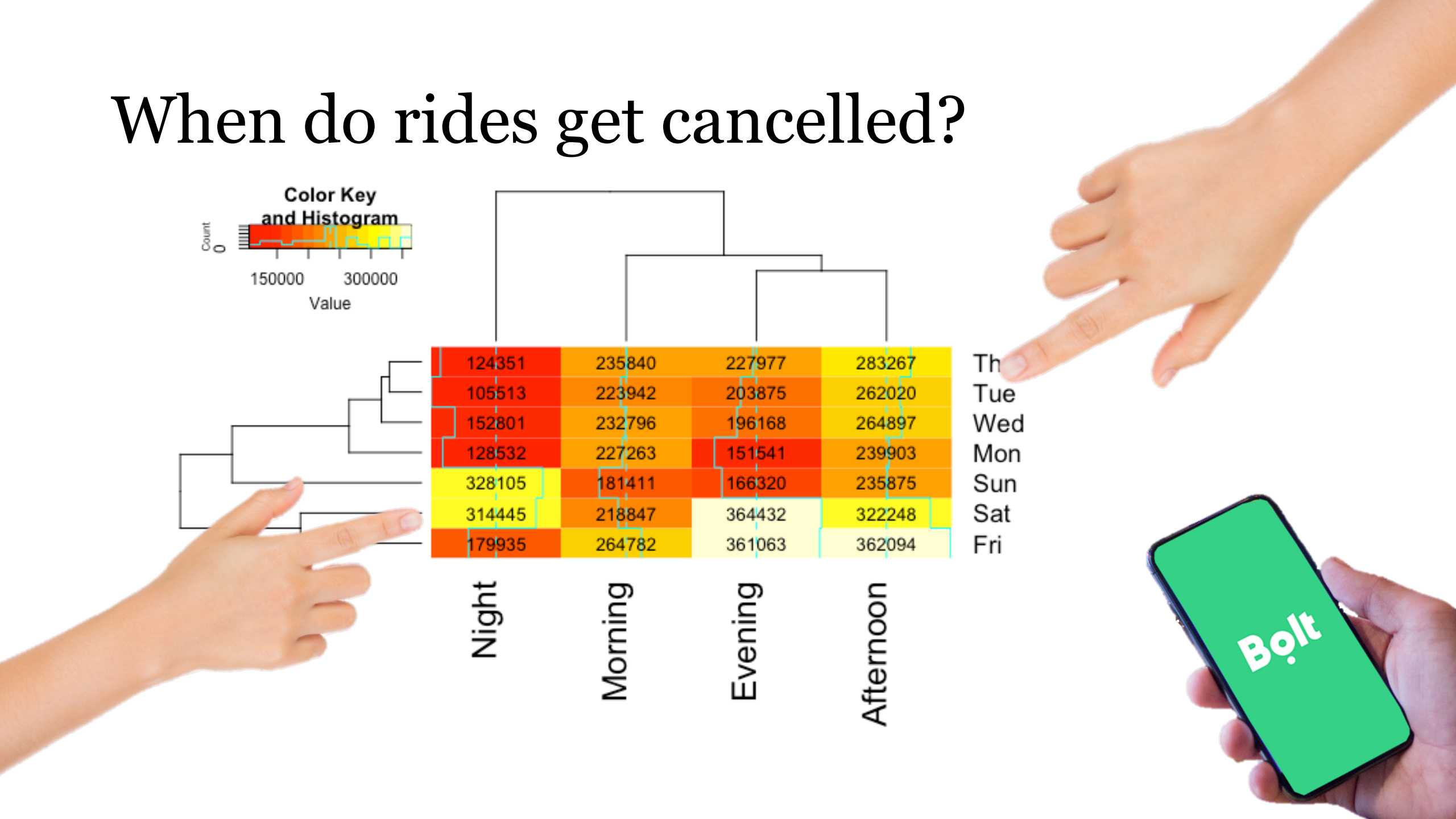
On average, **27%** of rides is uncompleted

Only **4.4%** of rides were rated less than 5

Statistical facts about markets



When do rides get cancelled?



Indicators that define current state

Tickets Per Ride Growth Rate = 1.07

Tickets Growth Rate is predicted to be 0.8 in February

What does it say?

Month	Nov	Dec	Jan	February	March	April
Actual or Predicted	Actual	Actual	Actual	Predicted	Predicted	Predicted
Total	2277898	2422448	1859897	1553399	1297410	1083607
Completed rides	1762571	1647900	1376338	1149527.45	960093.644	801877.156
Uncompleted rides	515327	774548	483559	403871.975	337316.795	281729.427
Tickets (total)	44588	43248	38595	30837.5085	25755.7101	21511.3554
Incoming	39300	38296	34365	27457.7271	22932.8923	19153.7176
Outgoing	5288	4952	4230	3379.78134	2822.81782	2357.63787
Outgoing/Total	0.11859693	0.1145024	0.10959969	0.10959969	0.10959969	0.10959969
First Response Time (median)	0.62313	0.62313	0.62313	0.62313	0.62313	0.62313
Total Resolution time (median)	3.407665	6.72414	3.564152	4.56531872		
Ticket Growth Rate	1	0.97445293	0.8973522	0.79900268	0.83520723	0.83520723
Rides Growth Rate Ratio of completed rides per certain month to previous month (here: Jan / Dec)	0.83520723					
Ticket Per Ride Ratio of incoming tickets to completed rides	0.02229697	0.02323927	0.02496843	0.02682625	0.0288223	0.03096687
TPR Growth Rate Ratio of TPR of certain month to the previous (here: Jan/ Dec)	1.07440665					

Predicted number of rides = Prior Month * Rides Growth Rate
Predicted TPR = Prior Month * TRP Growth Rate
Predicted number of tickets = Completed rides * Ticket Per Ride
Ticket Growth Rate = Incoming tickets per month / Incoming tickets per prior month

Conclusion

Amount of rides and tickets decreases. This may be caused by the Coronavirus.

However, TPR (Tickets Per Ride) shows a slight increase over next months. From 2 to 3%.

This means that there is a need to optimize customer support and work out faster solutions to added tickets.

Thank you for attention!