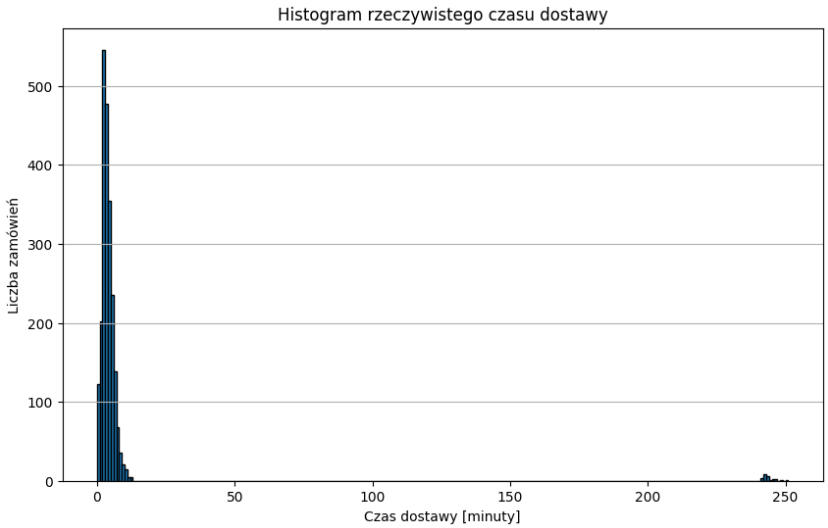
Spis treści

1. Generate a histogram showing the actual delivery length with 1 minute granularity (rounded up).

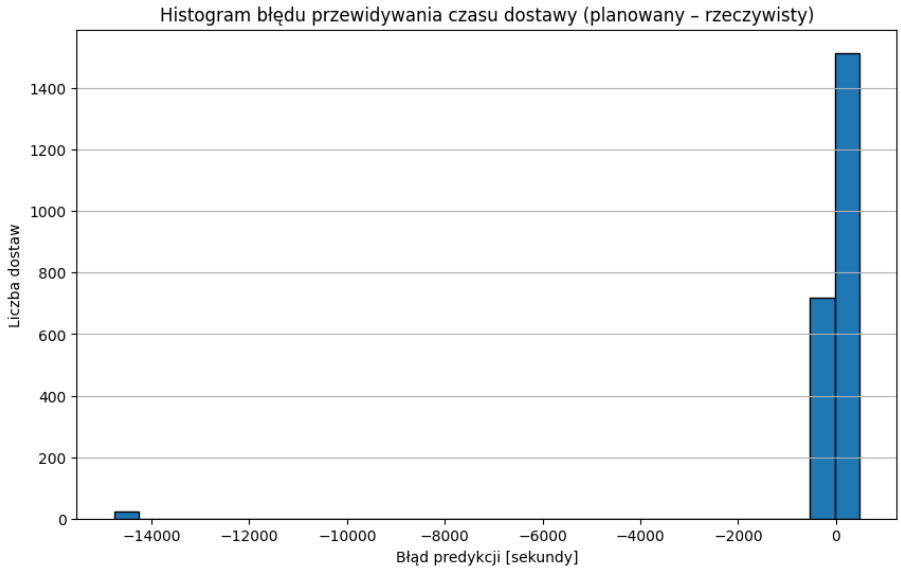


The chart above shows the distribution of delivery times, rounded up to full minutes.Delivery durations were calculated in seconds and rounded up to full minutes.

Most deliveries fall between 2 and 10 minutes, showing a clear concentration around short delivery times. However, a few extreme values exceed 200 minutes, which are likely due to data errors or exceptional cases (e.g., the driver's device did not properly register the segment end).

These outliers can distort statistical analysis and prediction accuracy, so they should be either filtered out or treated as anomalies in future modeling efforts.

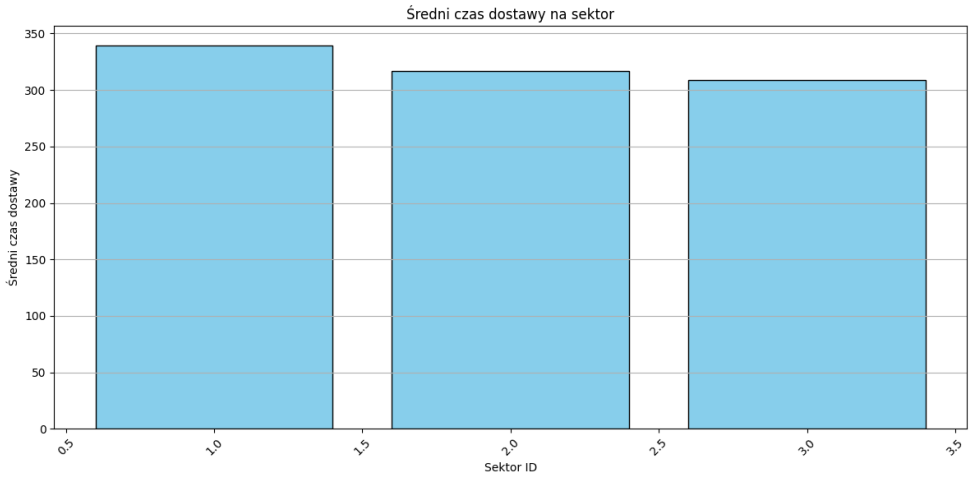
2. Generate a histogram showing prediction error (difference between planned and actual delivery times).



The chart above presents the distribution of prediction error, calculated as the difference between the planned and actual delivery times (in seconds). Most deliveries were predicted with relatively small error — the values are clustered around zero. This indicates that the current prediction method performs reasonably well in many cases.

However, there are also extreme outliers in the data, including a single case with a prediction error of nearly -14,000 seconds. These values likely result from corrupted or incorrect records and should be excluded or treated separately in future analyses to avoid skewing the results.

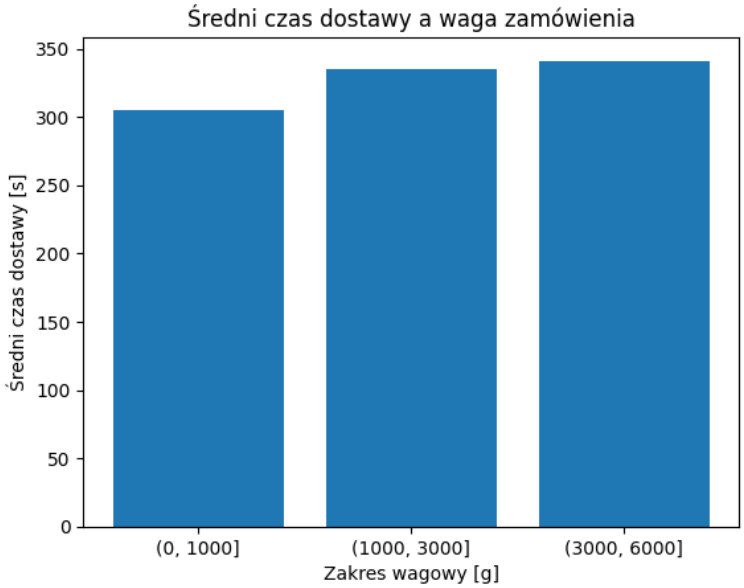
3. We received insight from our drivers that delivering in one of the sectors is significantly longer than in other sectors. Generate a chart to visualise this hypothesis.



The bar chart above shows the average delivery time for each sector. Sector 1 clearly stands out with the longest delivery duration, supporting feedback from drivers that some areas are more difficult to service. This suggests that sector-specific prediction models could improve accuracy compared to the current global approach.

4. Play with the data by grouping, aggregating and remodelling it. Are you able to find any correlations or trends that could be valuable for prediction quality improvement? Describe briefly your findings and visualise them on charts.

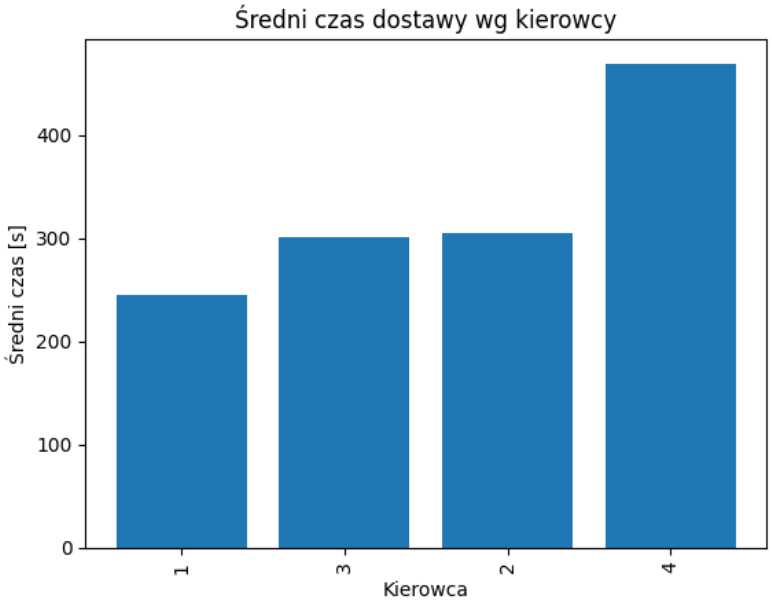
a. Impact of Order Weight on Delivery Time



The chart above illustrates the relationship between order weight and average delivery time. Orders were grouped into weight ranges, and the average delivery duration was calculated for each group.

The data shows a clear trend: heavier orders tend to take longer to deliver. Deliveries of orders weighing over 3 kg took on average about 40 seconds longer than lighter orders. This suggests that order weight could be a relevant factor for improving delivery time predictions.

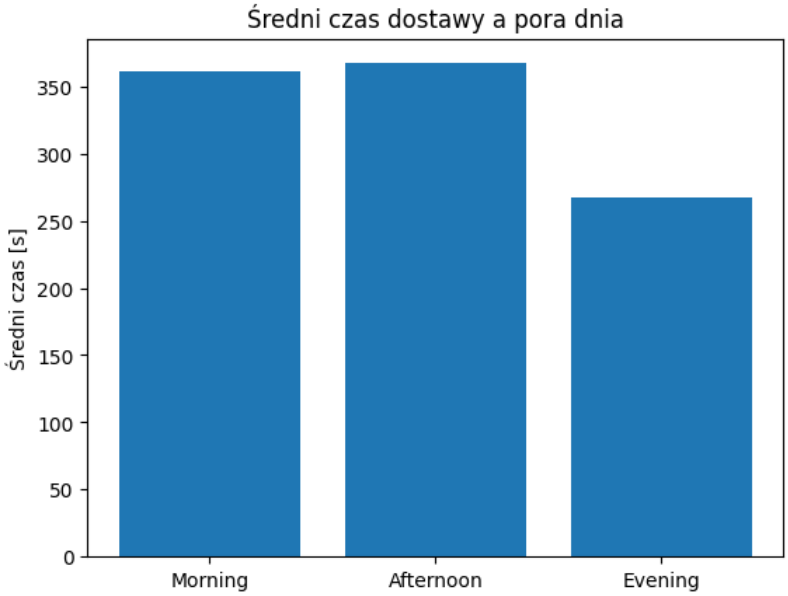
b. Delivery Performance by Driver



The chart above compares the average delivery time between drivers. While most drivers have similar average times (around 300 seconds), Driver 4 stands out with significantly longer delivery durations. This may be due to experience level, route difficulty, driving habits, or other external factors.

Incorporating driver ID into delivery time prediction could help increase accuracy, especially in cases where some drivers consistently perform faster or slower than others.

c. Average Delivery Time by Time of Day



This chart shows the average delivery duration across three time-of-day periods: Morning, Afternoon, and Evening. Surprisingly, deliveries in the evening are completed significantly faster than those in the morning or afternoon.

This could be due to reduced traffic or fewer active orders in the evening hours. Time of day may be an important variable to consider when improving delivery time predictions.

5. Methodology

a. Delivery time was calculated as the difference between `segment_end_time` and `segment_start_time` from the `route_segments` table, rounded up to full minutes when needed.
b. Records were filtered to include only `STOP` segments with valid `order_id` and positive duration.
c. Additional grouping and aggregation were done using `sector_id`, `driver_id`, order weight, and time of day.
d. Visualizations were used to better understand patterns and identify potential features for model improvement.