

Problem Statement:

Couriers travel to restaurants to pick up orders prepared by the restaurant. After the restaurant finishes preparation and the courier picks up the order, the courier travels to the customer to deliver the order. Our goal is to eliminate wasted time for the courier and have orders delivered to customers faster and on time, while the food is warm.

Task is to identify how we can reduce the time spent by a courier on an order using the given datasets.

Data Exploration and Preprocessing:

Data Set: * **Orders:** Information on the orders created.

* **Order stages:** Order stages from a courier's perspective based on system logs related to couriers' activity in the Bolt courier app between 15 October 2021 and 19 November 2021.

order_state	
delivered	99.830751
failed	0.169249

vehicle_type	
motorbike	71.721866
bicycle	20.196292
car	8.081842

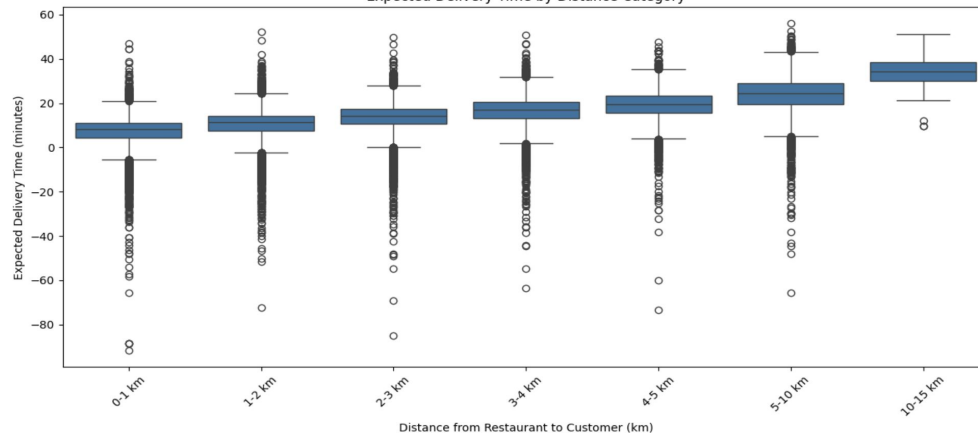
Basic Statistical Measures:

	count	unique	top	freq
order_id	65525	65525	1	1
customer_id	65525	43633	36243	16
restaurant_id	65525	1505	1460	682
courier_id	64228	3034	2528	125
city	65525	1	Bucharest	65525
order_state	65525	2	delivered	65473

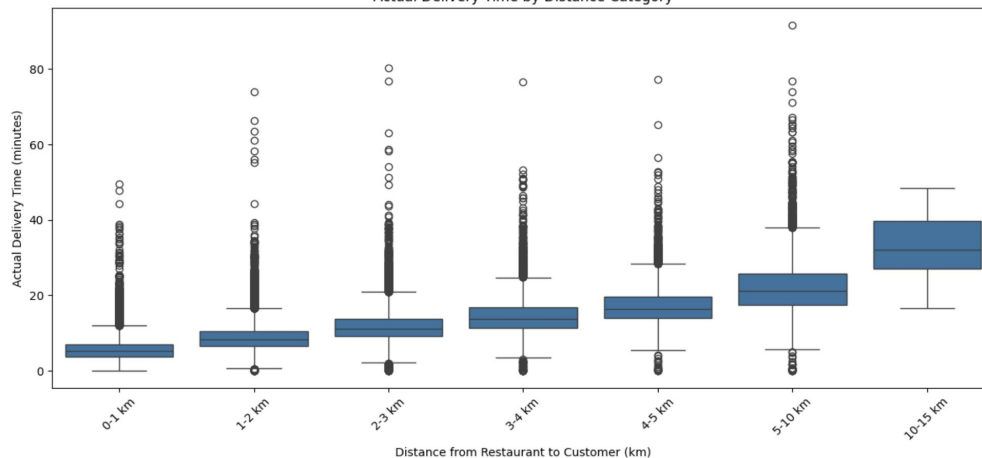
order_stage	
order_proposed_to_courier	64205
courier_accepts_order	64178
courier_arrived_at_restaurant	64169
courier_picked_up_order	64136
courier_arrived_at_customer	64125
courier_delivered_order	64124

Numerical Attributes

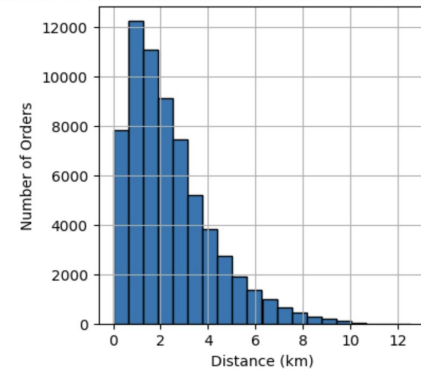
Expected Delivery Time by Distance Category



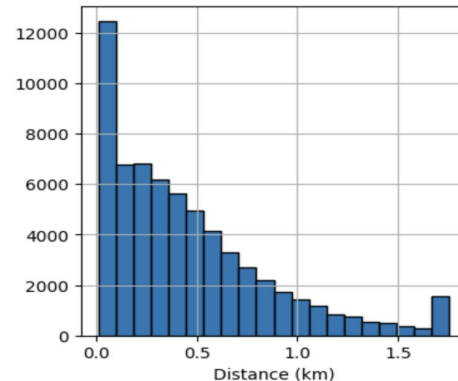
Actual Delivery Time by Distance Category



Distribution of Distances Between Restaurants and Delivery Locations



Distribution of Distances Between Restaurants and Couriers



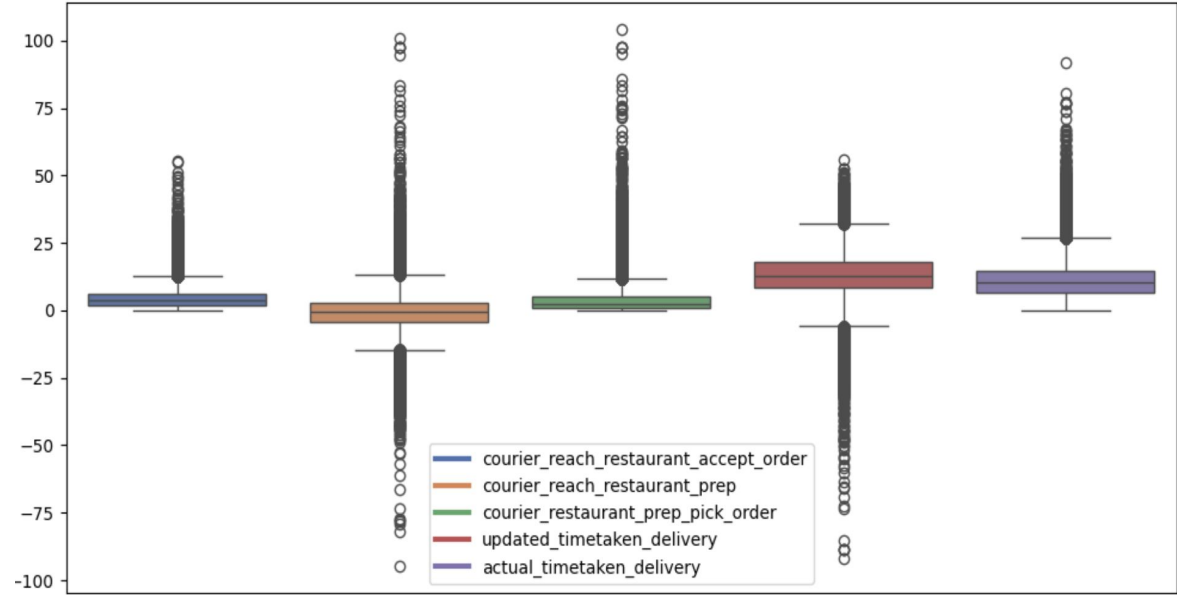
Note:

Expected Delivery Time = Updated expected delivery time / Order promised delivery - Courier pick order time

Actual Delivery Time = Courier arrived at the customer time - Courier pick order time

Exploratory Analysis:

- **courier_reach_restaurant_accept_order:** significant outliers (up to 55 minutes), indicating distance problems for some orders.
- **courier_reach_restaurant_prep:** extreme cases with wide range with couriers either arrived very early or were significantly delayed mean indicate that couriers are arriving at the restaurant early. if they arrive before or after preparation is complete, they may need to wait, increasing delivery time.
- **actual_timetaken_delivery** is lower than the updated expected time, while many deliveries are faster, but also delays.

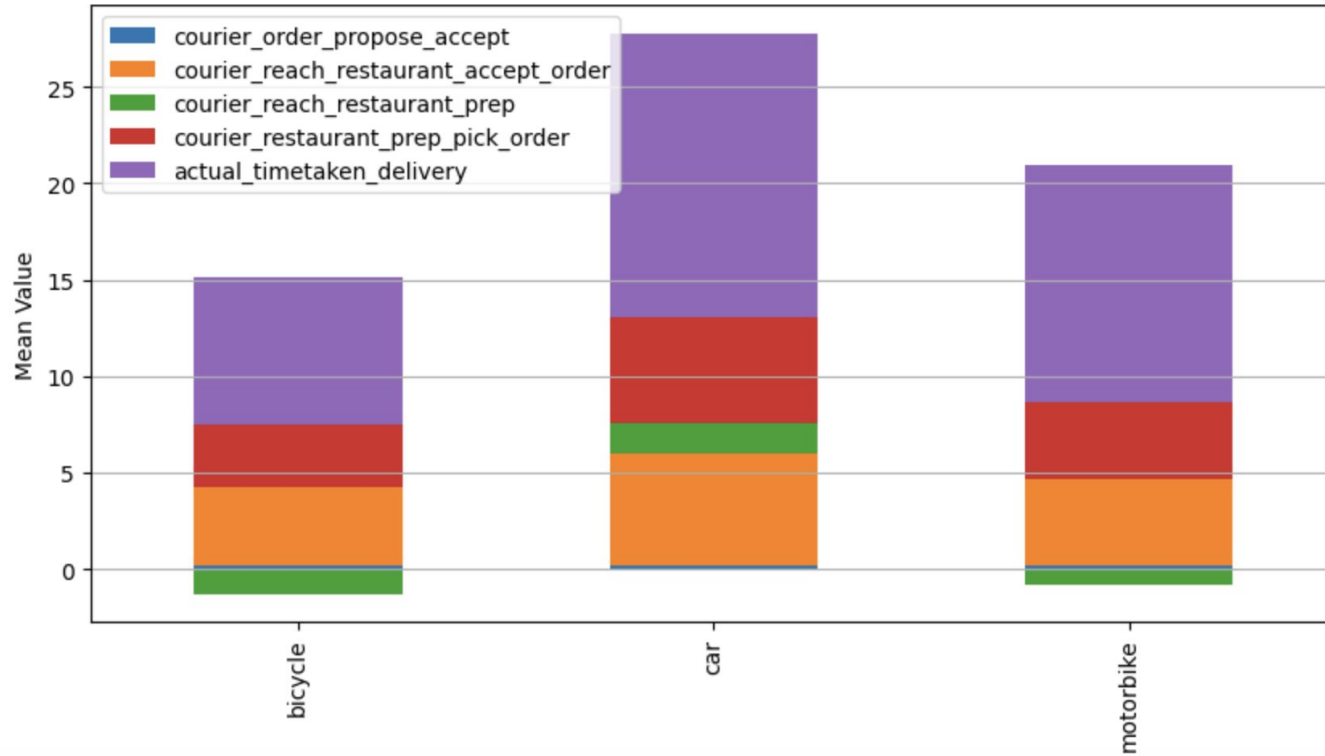


Note:

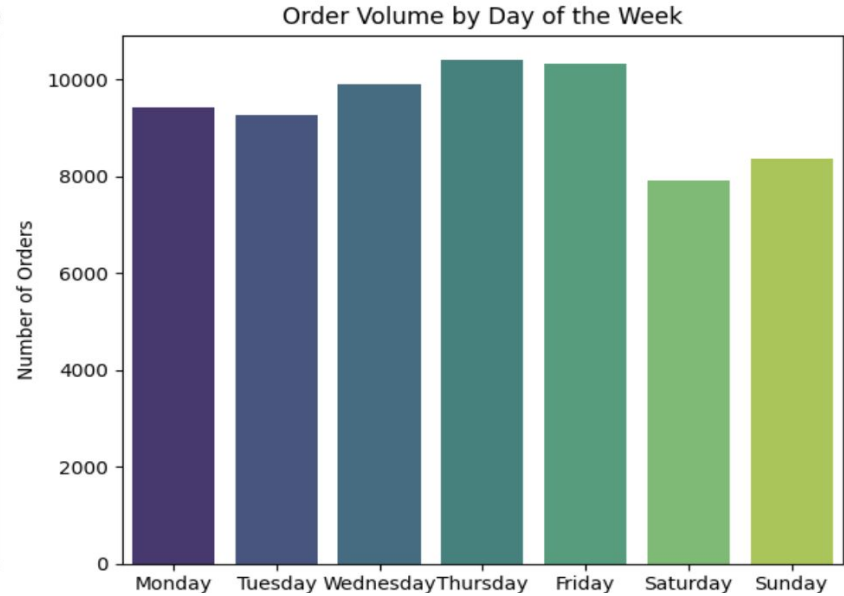
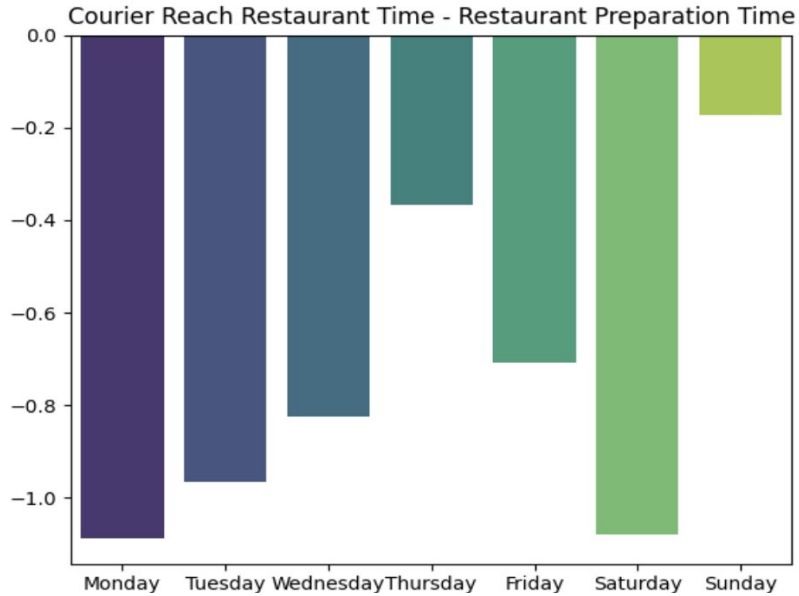
courier_reach_restaurant_accept_order = courier_reach_restaurant_time - courier_accept_order_time

courier_reach_restaurant_prep = courier_reach_restaurant_time - restaurant_finished_preparation time

courier_restaurant_prep_pick_order = courier_pick_order_time - restaurant_finished_preparation_time



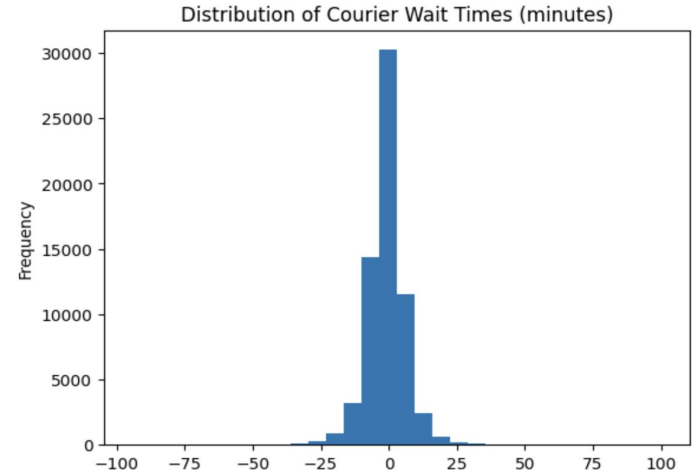
Mean time taken longer to reach restaurant for all three vehicle types and also mean time from order preparation to picking the order for delivery is also longer.



- Couriers arrive before the food is ready, leading to potential wait times, especially on Monday and Saturday.
- Order volumes show variation across the week, with Thursday and Friday being the highest.
- High order volumes on weekdays indicate peak demand that may influence delivery performance.

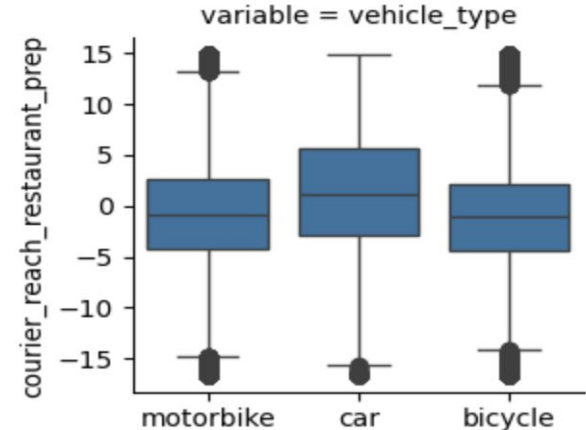
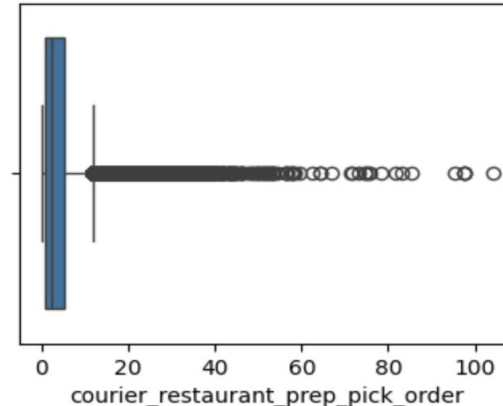
Mismatch between order preparation time and when couriers are scheduled to arrive?

- **Increase Courier Efficiency:** Less idle time means couriers can handle more orders in the same time frame.
- **Reduce Fuel and Labor Costs:** Less waiting means couriers spend less time and fuel, which cuts operational costs.
- **Enhance Customer Experience:** Timely delivery ensures fresher food, leading to higher customer satisfaction and fewer complaints.
- **Boost Courier Retention:** Less frustration from unnecessary wait times improves job satisfaction, reducing turnover.



Courier Pick Time after order preparation?

- **Faster Deliveries:** Quicker pick times lead to faster overall deliveries.
- **Increased Courier Deliveries:** Couriers can complete more deliveries in less time.



Order Preparation Progress Monitoring for Couriers

Provide couriers who are already at the restaurant with **real-time updates** on the order preparation progress.

Goal: **Minimize waiting time and allow couriers to manage their time more effectively while waiting at the restaurant.**

Order Preparation Status Display:

1. **Live Order Progress:** Couriers will have access to a **real-time countdown or status update** showing exactly when the order will be ready for pick-up. The system can show stages like "**Cooking in progress**," "**Almost ready**," and "**Ready for pick-up**."
2. **Preparation Estimate Updates:** If there are any delays in food preparation, the estimate is dynamically updated to reflect the revised expected completion time.

Live Order Progress:

- **Order Received:** The restaurant has received the order.
- **Cooking in Progress:** The kitchen has started preparing the order.
- **Almost Ready:** The order is in the final stages of preparation.
- **Ready for Pick-Up:** The order is complete and ready for the courier.

A **countdown timer** showing the expected remaining time for the current stage can be included, giving couriers an exact idea of when they can expect to pick up the order.

Live Order Progress: Design and Steps

To evaluate the effectiveness of a **Live Order Progress** feature for courier if it reduces waiting times.

The goal is to determine whether providing real-time updates on the status of order preparation (Live Order Progress) to couriers reduce **average courier waiting time** at the restaurant (in minutes) and improves courier satisfaction and efficiency.

Metrics for measure the success:

Primary Metrics:

- * **Average Courier Waiting Time** at the restaurant (in minutes).
- * **Courier Satisfaction Score** (via surveys or app ratings).
- * **On-Time Delivery Rate** (courier's ability to pick up the order on time and deliver promptly).

Secondary Metrics:

- * **Number of Orders Completed per Courier.**
- * **Courier Revisit Rate** (whether couriers return more frequently to restaurants using the feature).
- * **Frequency of Notifications** (to ensure notifications aren't overwhelming).

H0: There is no statistically significant difference between control (without live updates) and variant (with live updates) groups with respect to difference in average courier waiting times.

H1: There is statistically significant differences between control and variant groups with respect to the difference in average courier waiting time.

- Dividing the couriers into groups: show the live order progress stages and no live updates randomly into two equally sized groups.
- Experiment to be rolled out at **5%, 20%, 50%, 100%**. Control Group: 90% of couriers (no live updates), Test Groups: 10% of couriers divided equally between Variant 1 and Variant 2. **Control [90%], variant 1[5%], variant 2[5%]**.
- Formulating the hypothesis; set **two-tailed test** or **one-tailed test**.
- Determine sample size using power analysis.
- Larger the sample size the more precise our estimates; higher chance to detect a difference in the two groups.
- Analyze A/B test results and make sure our results are repeatable, robust and can be generalized to the entire population.

Limitations

- It does not take into account the different types of couriers (e.g., those who work full-time vs. part-time, or more experienced vs. new couriers).
- Make assumptions about the relationship between various metrics (e.g., that reducing wait time directly leads to improved productivity) without considering the complexity of operational dynamics.
- Generalizing findings from a specific sample to the broader population of deliveries may lead to inaccuracies.