**Food Delivery Dispatch System**

**Performance Modelling**

**MP- Deliverable 01**

EEX5362 Performance Modelling

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# **Selected System and Description**

A Food Delivery Dispatch System, which is a service-based logistics service that coordinate order from customers, restaurant, and delivery drivers. In this system, when a customer places an order the restaurant prepares the food while the dispatch system assign a delivery driver. The driver picks up the order and delivers it to the customer. Basic(main) elements include restaurant(which prepare the order), drivers(who deliver orders), customers(who receive orders) and the dispatch steps(which decides which driver should handle each order).

This system is a complex because many things happen at the same time. Orders comes in at random times. Food preparation times are different depending on the restaurant and the types of order. Delivery time depends on driver location and traffic conditions. Sometimes many orders arrive at the same time, and there may not be enough drivers nearby. This can cause delays, long waiting times or delivery bottlenecks.

We can measure many things in this system, like how long orders tak3 to deliver, how busy drivers are, and how many orders are waiting. Studying this system can help us find problems and make it work faster and more efficiently. By using modelling and simulations, we can test different ways of assigning drivers, predicting delivery times and managing order flow also. This makes the system suitable for performance analysing.

# **Performance Objectives**

The main objective of this study is to understand(analyse) and improve the system’s performance. We can focus on these aspects,

* Delivery Time : How long it takes from when the customer places the order until it is delivered, Here we want to reduce the delay.
* Prediction Accuracy : Different between the predicted delivery time and the actual delivery time. If there is small difference better predictions.
* Drivers Utilisation : How much time drivers append on delivering compared to waiting. If better utilisation means drivers are used efficiently.
* Order Throughput : Numbers of orders delivered in a certain time, such as per hour to get better higher throughputs.
* Pending Orders : Numbers of orders waiting for drivers. If there is few orders the system is working smoothly.

With all this we want to reduce delivery delay and prediction errors while increasing drivers’ efficiency and throughput. Expect that delivery time will be longer when there are too many orders or not enough drivers. By studying these, we can identify bottlenecks and ways to use resources better.

# **Dataset Details**

Here we are using DoorDash historical delivery dataset. This dataset contains information about 197,429 food deliveries from early 2025 in several cities. Each row gives one delivery including details about the order, restaurant, driver, and times(delivery process) . The dataset shows real situation where orders arrive at different times and restaurants and drivers available.

**Some Important features :**

**Time Information are,**

* market\_id : City or region of the order.
* created\_at : Time when the customer placed the order.
* actual\_delivery\_time : Time when the order was delivered.

**Restaurant Information are,**

* store\_id : Unique restaurant id.
* store\_primary\_category : Types of restaurants.
* order\_protocol : how the restaurant receive the order.

**Order information are,**

* total\_items : total items in the order.
* subtotal : total cost of the order in cents.
* num\_distinct\_items : Number of different items.
* min\_item\_price/max\_item\_price : Price of the cheap and most expensive items.

**Driver Information are,**

* total\_onshift\_dashers : Drivers available near the restaurant.
* total\_busy\_dashers : Drivers already delivering the orders.
* total\_ outstanding\_orders : Orders waiting nearby.

**The predictions are,**

* estimated\_order\_place\_duration : Predicted time for the restaurant to receive the order.
* estimated\_store\_to-customer\_driving\_duration : Predicated travel time to the order.

GitHub repo link : <https://github.com/Yadurah/MP_Performance_Model__EEX5362.git>