FoodHub Analysis

Leah Dassler

Contents

1. Business Problem Overview and Solution Approach

- FoodHub is an app which coordinates the delivery of food from New York's restaurants to customers' drop-off location. The app generates revenue from the restaurants by charging a fixed margin of on each order cost.
- As the number of restaurants continues to grow in New York, FoodHub's Data Science team wants to understand their customer experience better:
    - Which restaurants and cuisines are most popular
    - Food ordering trends on different days of the week
    - Delivery times
    - Customers' typical expenditure on food orders
    - How customers rate their food ordering experiences
- Financial implications
    - By better understanding customers' patterns with ordering food, FoodHub can offer promotions for those factors that drive demand for FoodHub's services.

Data Overview

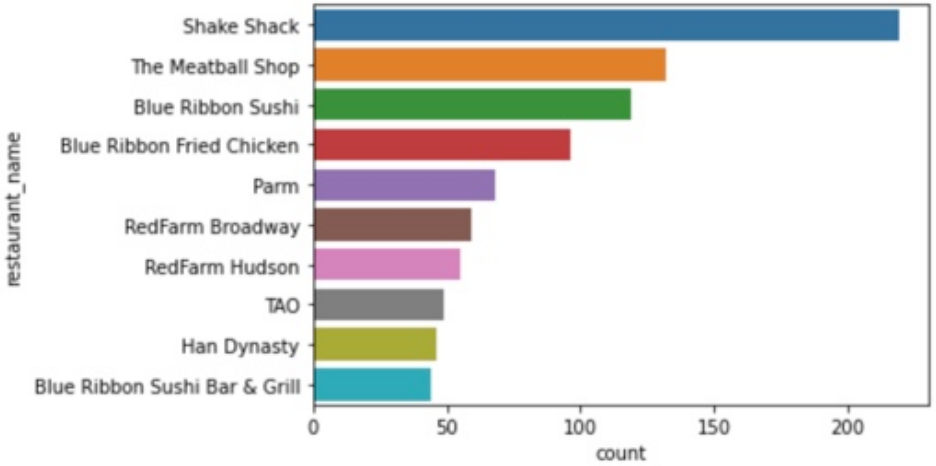
Variable	Description
order_id	Unique ID of the order
customer_id	ID of the customer who ordered the food
restaurant_name	Name of the restaurant
cuisine_type	Cuisine ordered by the customer
cost	Cost of the order
day_of_the_week	Indicates whether the order is placed on a weekday or weekend (The weekday is from Monday to Friday and the weekend is Saturday and Sunday)
rating	Rating given by the customer out of 5
food_preparation_time	Time (in minutes) taken by the restaurant to prepare the food. This is calculated by taking the difference between the timestamps of the restaurant's order confirmation and the delivery person's pick-up confirmation.
delivery_time	Time (in minutes) taken by the delivery person to deliver the food package. This is calculated by taking the difference between the timestamps of the delivery person's pick-up confirmation and drop-off information

Observations	Variables	Missing Data
1898	9	736

- The 736 missing values are missing from the “rating” variable (referred to as “Not given” in the analysis).
- The rating variable only contains 3, 4 and 5-star reviews
- “Day of the week” is a categorical variable that groups orders into whether they were ordered on weekdays or weekends

Exploratory Data Analysis (EDA): Univariate Analysis

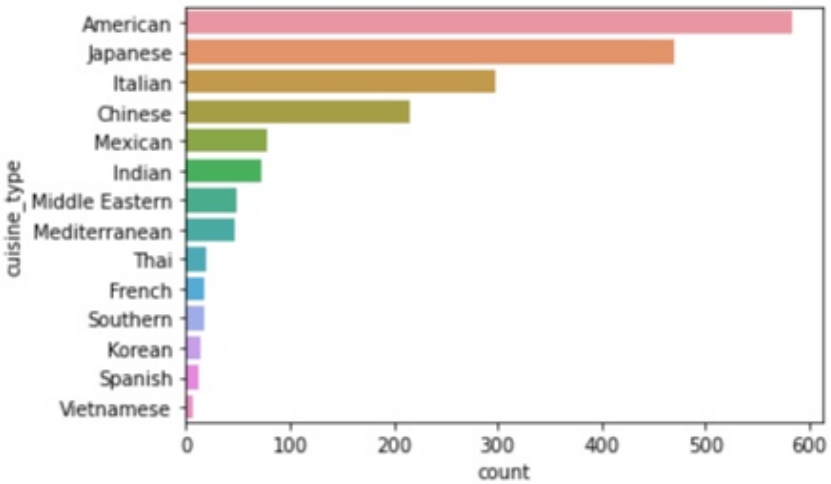
Top 10 Restaurants with Greatest No. Of Orders



- The top ten restaurants include Shake Shack, the Meatball Shop, Blue Ribbon Sushi, Blue Ribbon Fried Chicken, Part, RedFarm Broadway, RedFarm Hudson, TAO, Han Dynasty, and Blue Ribbon Sushi Bar & Grill were frequented the most by FoodHub customers.

- Shake Shack, the Meatball Shop, Blue Ribbon Sushi, Blue Ribbon Fried Chicken, and Parm are the top five restaurants with the greatest number of orders, and account for 33.4% of all orders.

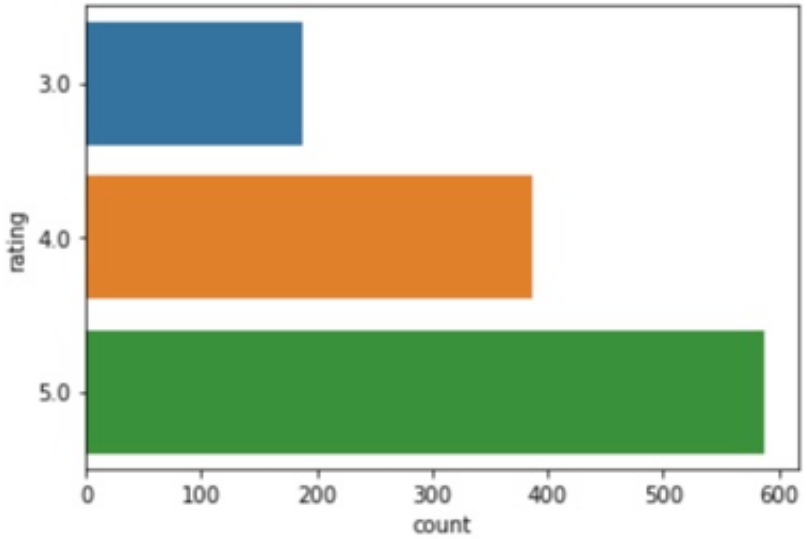
No. Of orders per Cuisine



- The distribution of cost of the order indicates that, on average, this sample of orders cost 16.50 dollars with a standard deviation of $7.48.
- The minimum money spent on an order was $4.47, and the most expensive order was $35.41. The cost therefore had a range of $30.94.
- The middle 50% of orders (IQR) cost between $12.08 and $22.29.
- The median cost of an order is less than the mean, indicating that the costs are left-skewed, and there are more orders cost that cost less than $16.50 than orders that cost more than $16.50.

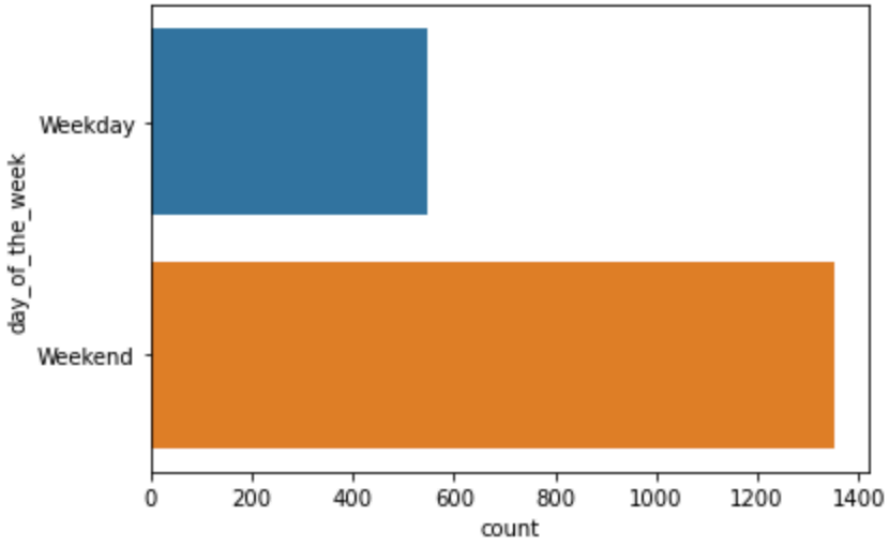
Exploratory Data Analysis (EDA): Univariate Analysis

No. Of Orders by Rating



- 39% of orders did not include ratings.
- For the remaining 61% of orders received ratings between 3 and 5 stars.
- No order received 1 or 2 stars
    - 588 orders received 5 stars
    - 386 orders received 4 stars
    - 188 orders received 3 stars

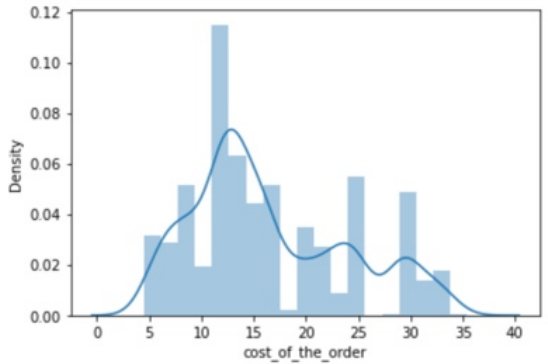
No. Of Orders, Weekdays and Weekends



- Most orders are placed on weekends.
- Of this sample, 1351 orders (or 71% of total orders) were placed on the weekend.

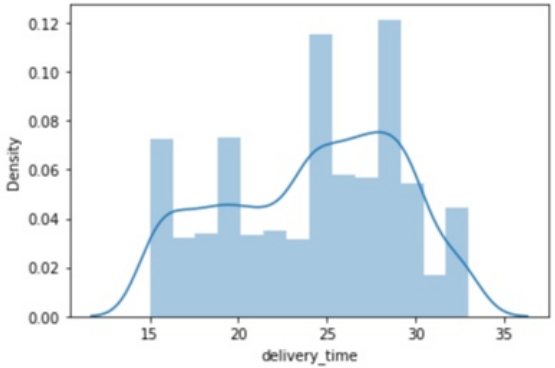
Exploratory Data Analysis (EDA): Univariate Analysis

Distribution of Order Costs (dollars)



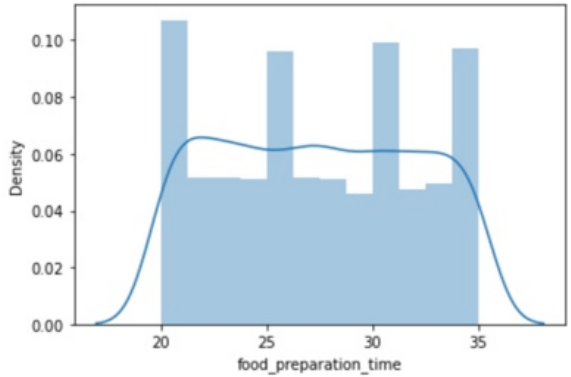
- The distribution of cost of the order indicates that, on average, this sample of orders cost 16.50 dollars with a standard deviation of $7.48.
- The minimum money spent on an order was $4.47, and the most expensive order was $35.41. The cost therefore had a range of $30.94.
- The middle 50% of orders (IQR) cost between $12.08 and $22.29.
- The median cost of an order is less than the mean, indicating that the costs are left-skewed, and there are more orders cost that cost less than $16.50 than orders that cost more than $16.50.

Distribution of Delivery Time (min)



- On average, orders take about 27 minutes to prepare, with a standard deviation of 4.63 minutes.
- The minimum time spent preparing an order was 20 minutes, and the maximum time spent was 35 minutes. The range for food preparation time is therefore 15 minutes.
- The middle 50% of time spent preparing food fell between 23 and 31 minutes.
- The median time spent preparing food is 27 minutes, which is close to the mean of 27.63 minutes, indicating that the time spent preparing food is not skewed.

Distribution of Food Prep Time (min)

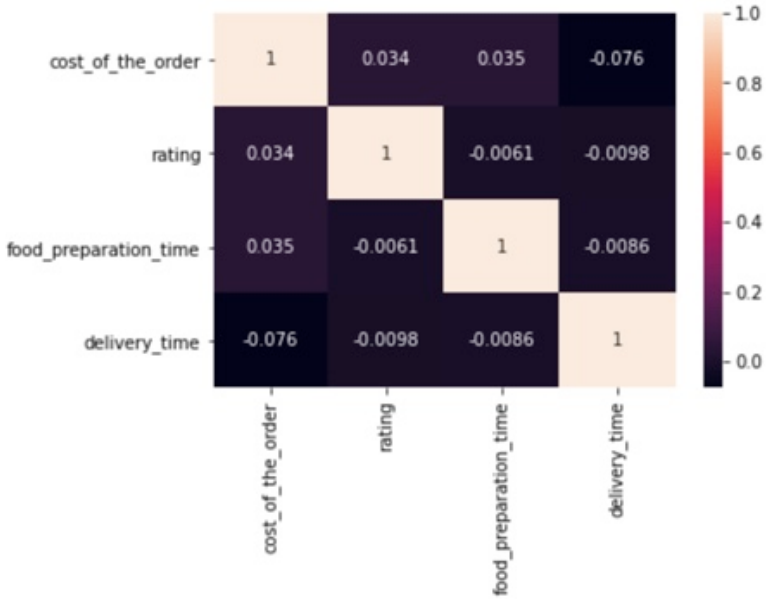


- On average, orders take about 24.16 minutes to deliver, with a standard deviation of 4.97 minutes.
- The minimum time spent delivering an order was 15 minutes, and the maximum time was 33 minutes. The range of delivery times is therefore 18 minutes.
- The median time spent delivering an order is 25 minutes, which is slightly higher than the mean time. The two measures are very close, but the delivery time has a high variability and is slightly right-skewed, indicated that there are slightly more orders that take more time than average (~24 minutes) to arrive than orders that take less time than 24 minutes to arrive.

Exploratory Data Analysis (EDA): Correlation

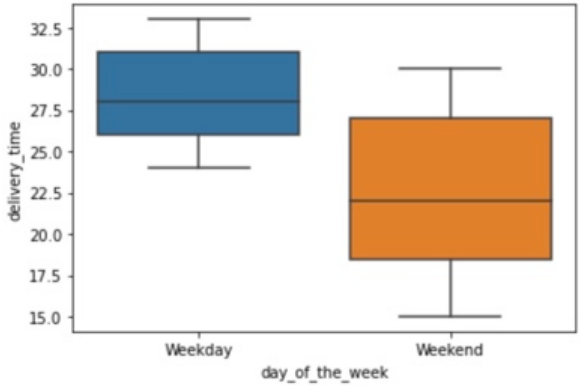
- There are no significant correlations between the following numerical variables: cost of the order, rating, food preparation time, and delivery time.
- However, cost of the order has a slightly positive correlation with both rating and food prep time, indicating:
  - As cost of the order increases, rating may increase slightly.
  - As the time to prepare food increases, the cost of the of the order increases slightly.
- Cost of the order has a slightly negative correlation with delivery time, indicating:
  - As cost of the order increases, the delivery time decreases slightly.

Correlation of Numerical Variables in Dataset

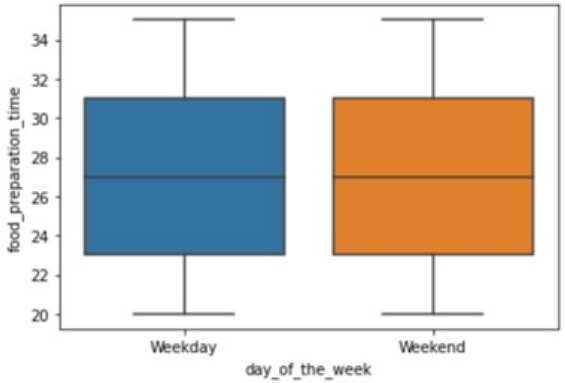


Exploratory Data Analysis (EDA): Multivariate Analysis

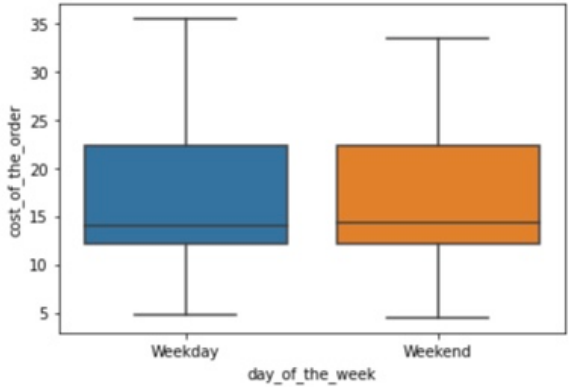
Delivery Times on Weekends & Weekdays



Distribution of Order Costs (dollars)

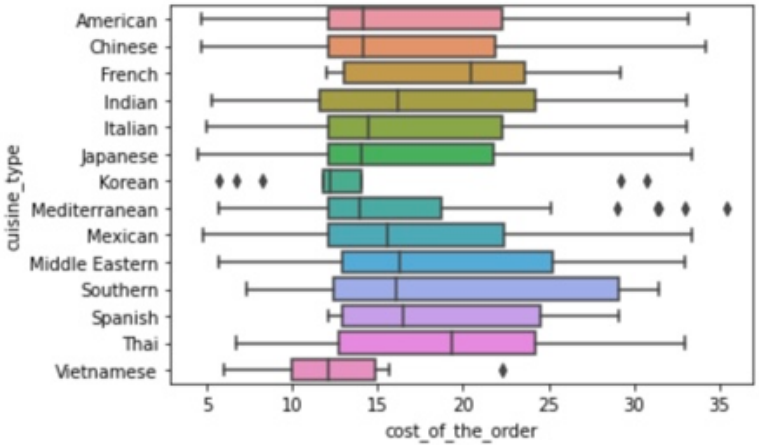


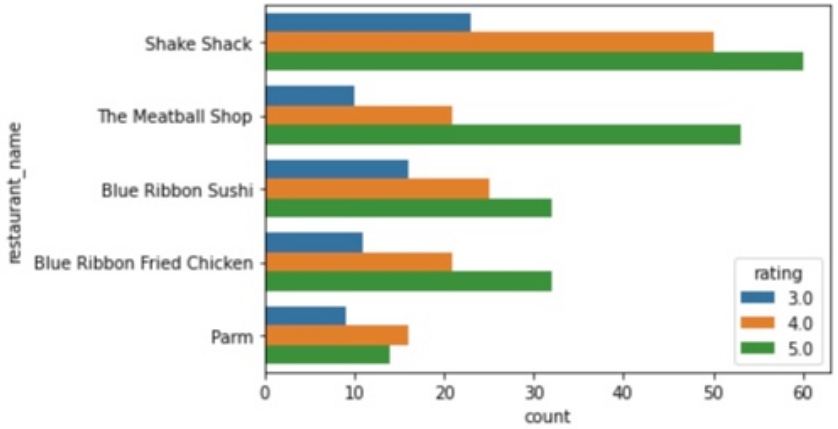
Distribution of Order Costs (dollars)



- The spread of delivery times on weekdays is much smaller than the spread of delivery times of weekends. This could be due to the greater number of orders on Weekends, which could lead to a greater variability than the smaller number of orders placed on Weekdays.
- The greater variability in delivery times on weekends could also be due to more predictable traffic patterns on weekdays. For example, rush hour probably occurs around the same time on Monday-Friday when people are working, allowing the FoodHub app's mapping tools to predict the fastest route with greater accuracy due to greater consistency. Traffic patterns could be much more variable on the weekends depending on events happening around the city.
- Weekdays also tend to have longer delivery times than weekends, perhaps due to people ordering food during lunch and dinner rush hours.
    - Weekend mean=28 minutes vs. 22 minutes on the weekend
    - The minimum, maximum, and median of weekday delivery times is higher than the same measures for the weekend.
- Food preparation time is not different from weekdays to weekends.
- The average cost of orders placed on weekdays is similar the the average cost of weekend orders, although the maximum cost for weekday orders is slightly higher than the weekend.

Exploratory Data Analysis (EDA): Multivariate Analysis





Business Insights and Recommendations

Restaurant Popularity:
The top five restaurants with the most orders (Shake Shack, the Meatball Shop, Blue Ribbon Sushi, Blue Ribbon Fried Chicken, and Parm) account for 33.4% of all 1898 orders in the sample data. Offering promotional advertisements for these restaurants on the FoodHub app has the potential to drive demand for the restaurants and therefore revenue for FoodHub. Shake Shack has the highest number of 4 and 5 star ratings.

- The Meatball Shop also has over 50 5-star ratings.
- Blue Ribbon Sushi and Blue Ribbon Fried Chicken have a mix of 3, 4, and 5 star reviews, although total reviews are fewer than Shake Shack and the Meatball Shop.
- Parm has fewer total number of reviews than the other four Top 5 restaurants, and has a slightly greater number of 4 star than 5 star reviews. - 736 orders, or 39% of all orders, were not rated.
- Only neutral (3 star) and positive (4 and 5 star) reviews are given. 50.6% of reviews given were 5-star reviews, 33.2% were 4-star reviews, and 16.1% were 3 star reviews. Customers with negative FoodHub experiences may not bother to rate the experience, or the values were left out.
- In order to gain a better understanding of negative customer experiences, and to gain a holistic view of customer experiences with FoodHub for each restaurant, FoodHub should incentivize customers to leave honest reviews.

Cuisine Preferences:
American, Japanese, and Italian food were most popular on both weekends and weekdays.

- To generate customer demand, FoodHub may want to offer promotions for customers who buy American, Japanese, and Italian food. FoodHub could also consider adding more American, Japanese, and Italian restaurants to their app.
- Most cuisines tended to cost between 5 dollars and 35 dollars; however, Korean and Vietnamese food orders tended to be lower and less variable in price than other cuisines.

Order Costs: All orders cost between 4.47 dollars and 35.41 dollars. The average cost of an order is 16.50 dollars, but due to the right skew of the right-skewed distribution of costs, most orders cost more than the average.

Day of the Week: While the day of the week (weekday vs. weekend) doesn't seem to impact the cost of the order (both weekdays and weekends had a similar order cost distributions), or food preparation times, delivery times tend to be higher on weekdays (28 minutes on average) than on weekends (22 minutes on average). However, delivery times vary more during the weekend.

- The average delivery time for all orders is 24 minutes, but due to the left skew of the data, most orders took more than 24 minutes to deliver.
- In order to improve customer delivery times, FoodHub could recruit more delivery people during weekday rush hour, or optimize traffic routing on their app to avoid areas with heavy traffic on weekdays.

Preparation Time:
Preparation times vary greatly, with most orders taking between 20-21 minutes, 25-26 minutes, 30-31 minutes, and 33-34 minutes to prepare.

- The average time to prepare and order is 27 minutes.
- In order to shorten the times customers have to wait for food to be prepared, FoodHub could consider incentivizing restaurants that take a longer time to prepare food to prioritize FoodHub orders over other orders. They could achieve this through a promotional offering to the restaurants, or consider writing this condition of prioritization into existing contracts with the restaurants.

greatlearning
Power Ahead

Happy Learning !