Caffeine & Calculations: Unlocking Growth

Aanchal Verma

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Process Mining and Descriptive Analysis

The order fulfilment process and observed 3 major variants:

- Order by Phone
- Order at the Counter
- Delivery or Pickup Options

The Process begins with **Order Preparation** followed by **Route Planning**, **Customer Payment**, **Dispatched for delivery** or **Picked-up** at the store.

Bottlenecks

- **Route Planning Delays:** The 'Route Planning Phase' has a significant delay, which ends up in delivery process inefficiencies.
- **Process Deviation:** Whenever orders are redirected, it shows that process is not operating at its optimal level.

Recommendations

- **Improve Delivery Routing:** Apply enhanced route planning strategies to cut down on delays.
- **Optimize Process Automation:** By managing the handoffs, dispatch and preparation phases, the workflow may accelerate and rerouting may be reduced.

Average Processing Time

280.72

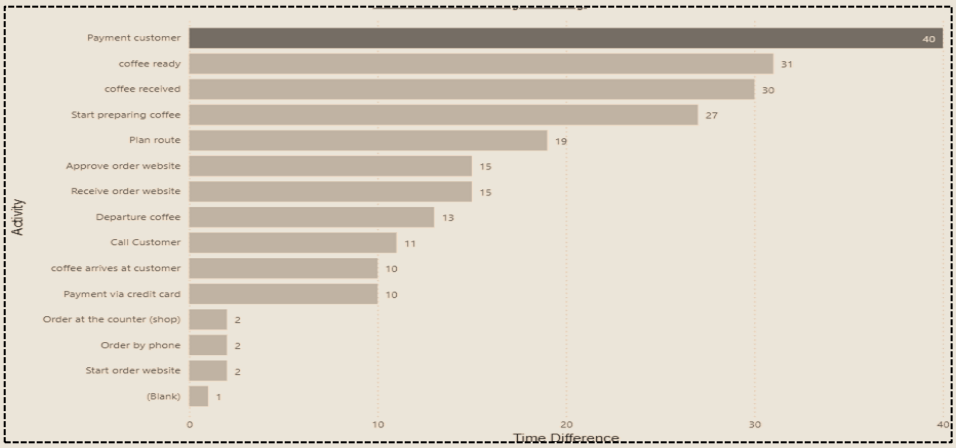
Total Orders

13.58K

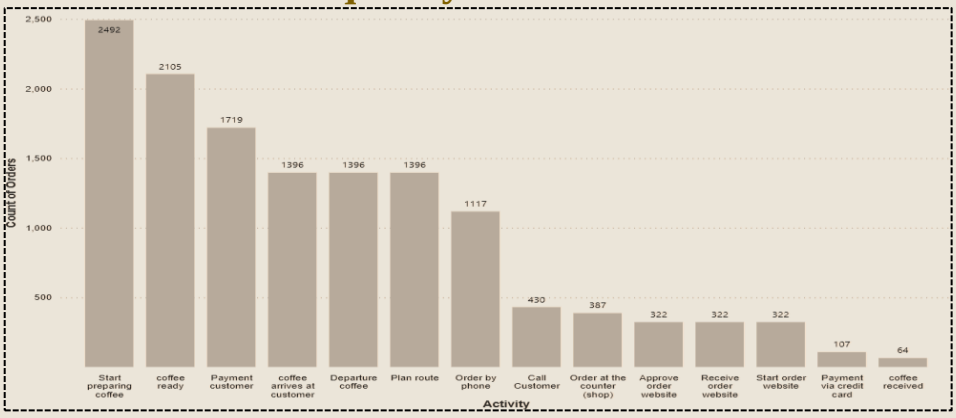
Unique Activities

15

Time Difference by Activities



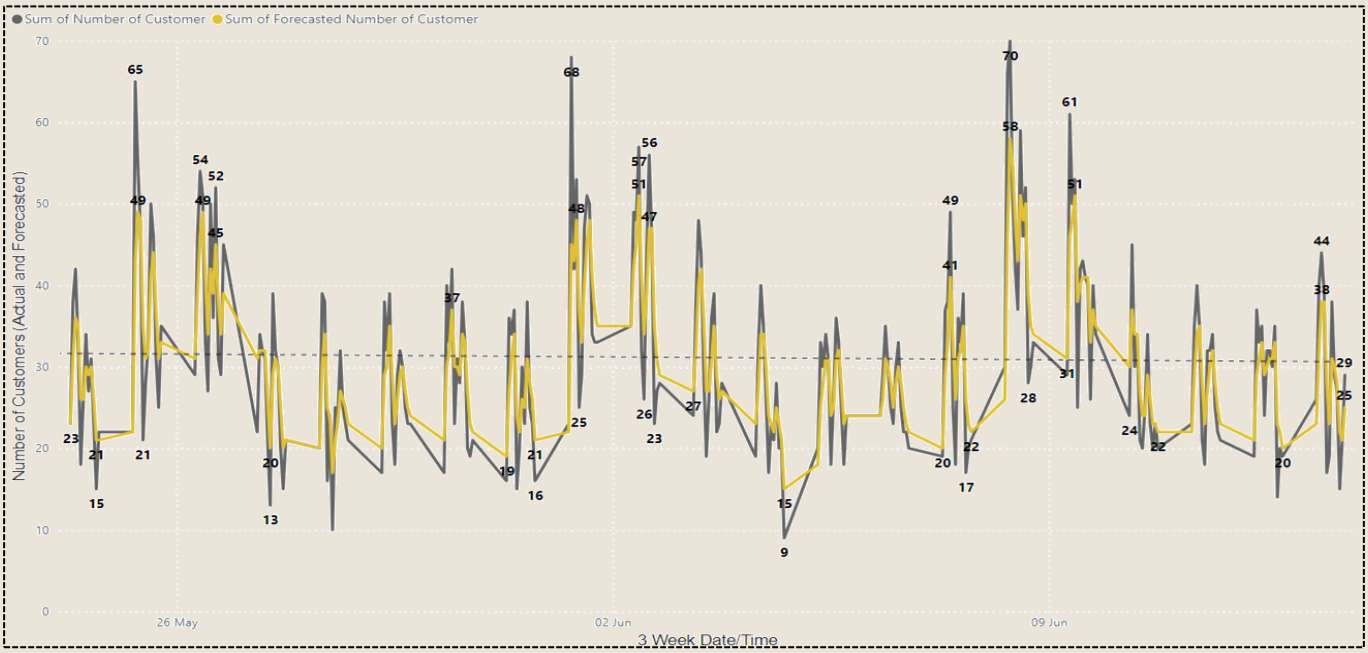
Frequency of Activities



ACTIVITY_EN	Activities per Case
Approve order website	322
Call Customer	430
coffee arrives at customer	1396
coffee ready	2105
coffee received	64
Departure coffee	1396
Order at the counter (shop)	387
Order by phone	1117
Payment customer	1719
Payment via credit card	107
Plan route	1396
Receive order website	322
Start order website	322
Start preparing coffee	2492

Predictive Analysis

Customer Order: Actual vs Forecasted

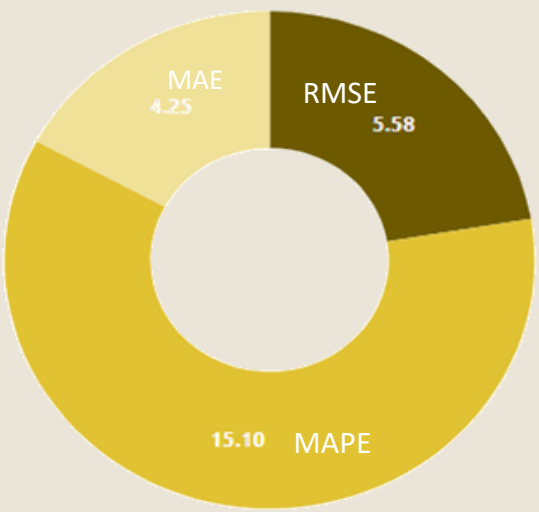


The forecast accurately predicts the highs and lows in customer demand in analysed time by closely aligning to the actual order trends.

Highest volume of customer is in June on weekends between morning 8 to 10.

Lowest Volume of customers are usually either at the time of closing or at the time of opening.

Error Statistics



MAE: The average number of customer orders per hour is 4.25 orders which is less than what was predicted. This implies that the model is reliable as it has low inaccuracy

RMSE: Though there are some more substantial differences between actual and forecasted values, the RMSE value of 5.58 indicates that they are not very noticeable.

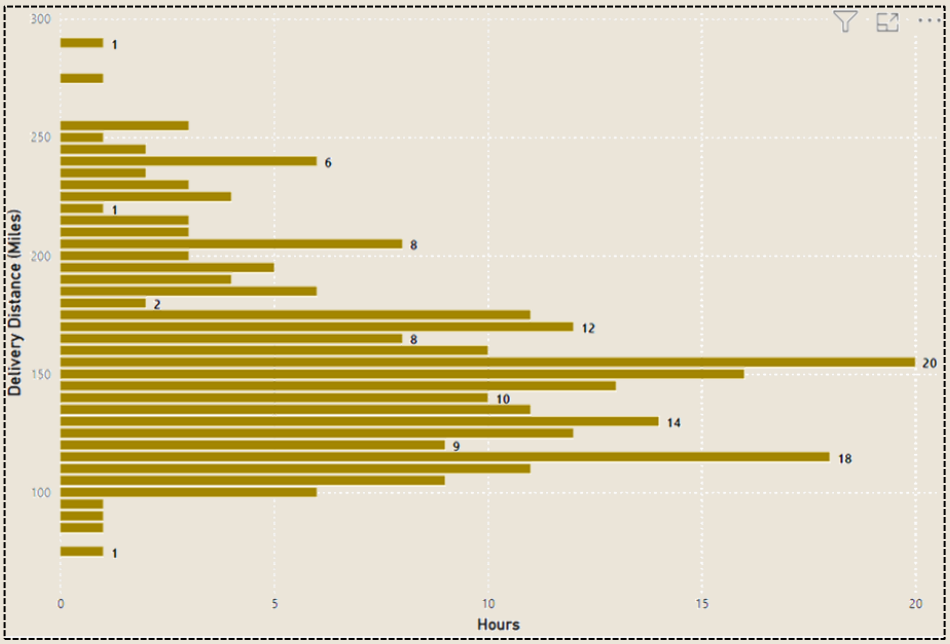
MAPE: The prediction typically differs from the actual orders by 15.1%. This falls within a workable range for operational planning, even though it is just beyond the optimal range, which is normally below 10% for business forecasting.

Implications

- Operational Efficiency- Better inventory control and staffing are made possible by the prediction.
- Resource Allocation- Reducing courier expenses and optimising delivery routes are two benefits of accurate demand forecasting.
- Demand Buffer- A minimal resource buffer should be kept in place during peak times, according to a 15.1% error margin.
- Cost Saving- A minimal resource buffer should be kept in place during peak times, according to a 15.1% error margin.

Prescriptive Analytics

Total Delivery Distance per Hour

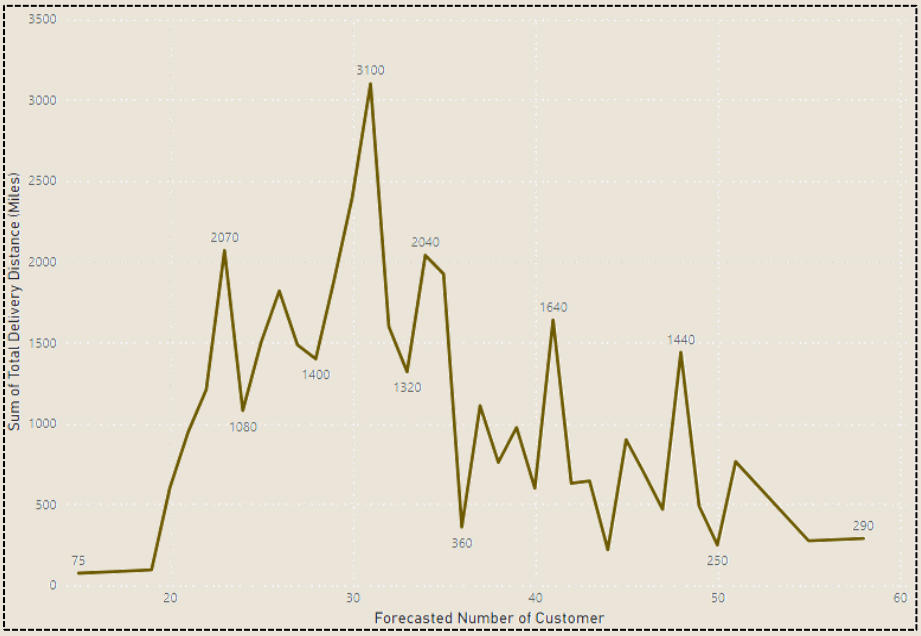


- There is a tremendous demand as seen by the peak delivery lengths of up to 20 miles, which happens between 12 and 5 PM.
- Early morning and late evenings are when the smallest distances, around 1-2 miles are observed.

Insights: More couriers should be assigned during peak hours and fewer during less busy time.

Total Delivery Distance by Forecasted Customers

- At 30 customers, the delivery distance reaches its maximum of 3100 miles.
- 2040 miles (35 customer) and 2070 miles (25 customers) are additional peaks.
- Distances dramatically decreased after 40 customers.



More couriers are needed for around 30 customers, with fewer needed as forecasted customers increase beyond 40

Insights:By adjusting the number of couriers throughout the day to meet demand, dynamic staffing lowers costs and speeds up deliveries during peak hours. To increase operational efficiency, concentrate resources throughout the middle of the day.

- **Peak demand hours**: Between 12 and 5 PM, the longest delivery distance was recorded, requiring the use of additional couriers.
- **Optimal Courier Allocation**: The best way to allocate couriers is to use up to 10 of them during peak hours and 5 to 6 during off-peak hours, depending on delivery distances.
- **Cost Efficiency**: The store can cut down on wasteful expenses at times of low demand, especially in the early morning and late at night, by allocating couriers as efficiently as possible.

Summary and Overview

In order to maximize the operations of a coffee shop which is expanding, we analyzed a number of analytics approaches in this project, including descriptive, predictive, and prescriptive methods. The knowledge acquired from every stage of the analysis offers specific suggestions to boost productivity, cut expenses, and improve customer happiness.

Optimize route planning to decrease off delays and bottlenecks.

Resource management and staffing is guided by accurate forecasts.

Reduce expenses by optimising courier schedules and allocating on the basis of demand.

MAE
4.25

RMSE
5.58

MAPE
15.1%

- Implement automated route planning to cut delays by 15%.
- Adopt dynamic staffing to reduce delivery costs by 20%.

KPI

Reduced average order fulfillment time to 250-260 minutes.

Courier cost reduction of €200-400 per day.

Reduced delivery time by 10-15 min during peak hours.