



unORG

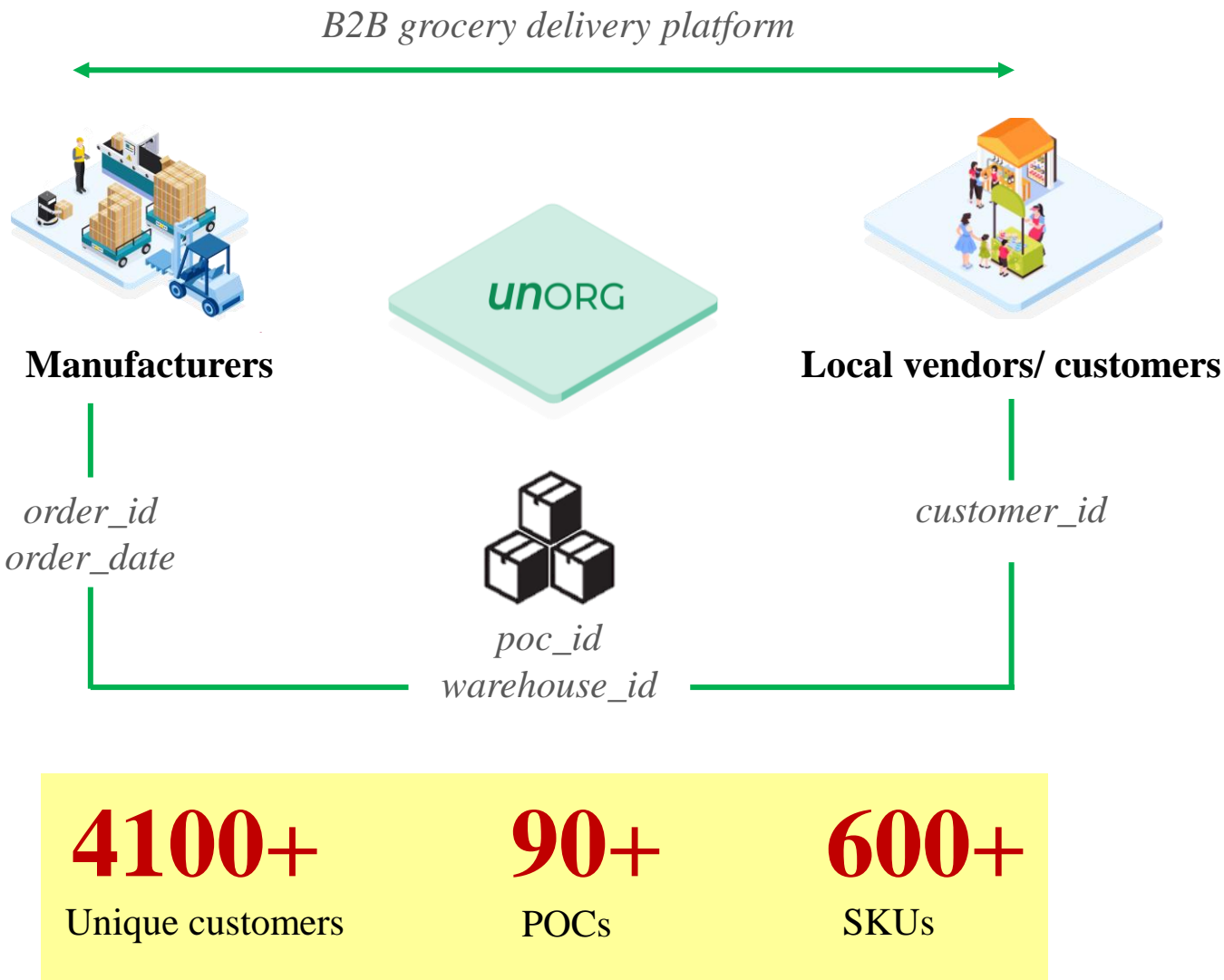
Supply Chain + Data Science

Team Hyperion

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B2B grocery supply chains by order prediction, SKU demand forecast and planned inventory model for UNORG



Deliverables

1

Daily Order Prediction

	D1	D2	D3	D14
 <i>c_id: 1837</i>	0.28	0.14	0.80	0.21



2

SKU Forecast

			14-day aggregated quantity forecast
 <i>c_id: 1837</i>	 <i>SKU_id</i>	 <i>order_date</i>	40

3

Inventory Planning

<i>Periodic review date*</i>				
 <i>warehouse_id</i>	 <i>SKU_id</i>	 <i>Current_inventory</i>	 <i>Target inventory</i>	<i>Quantity</i> 25

EDA

Engineered 20+ features across the dataset

order.csv & item_order.csv

- Total_order

:The total number of orders placed by the customer across the observed time period.
- Average Order Gap Days

The average no. of days between two consecutive orders placed by the customer.
- ⋮
- Total_order

The total number of orders placed by the customer indicates their overall purchase activity.
- Order Consistency Score

measures how regularly and predictably a customer places orders over time.

Major problems faced:

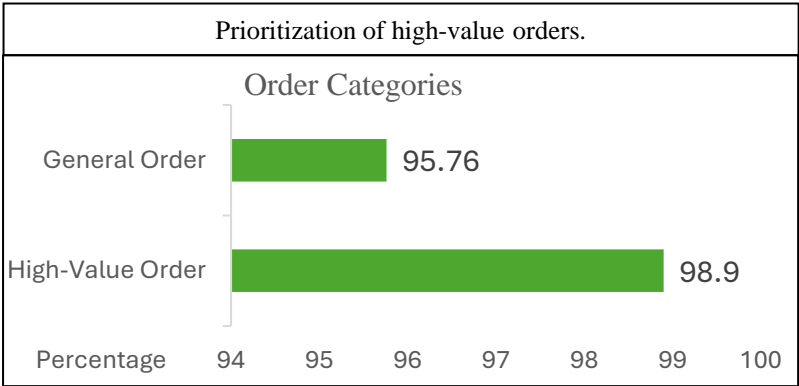
- 1

Same customers with multiple IDs:
89 customers appeared with multiple IDs.

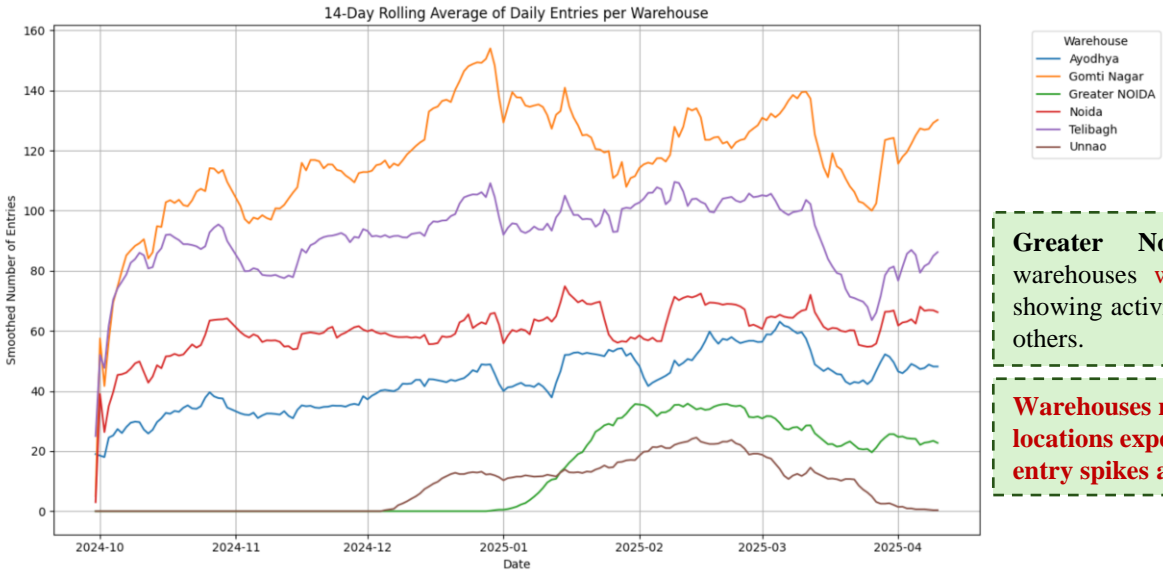
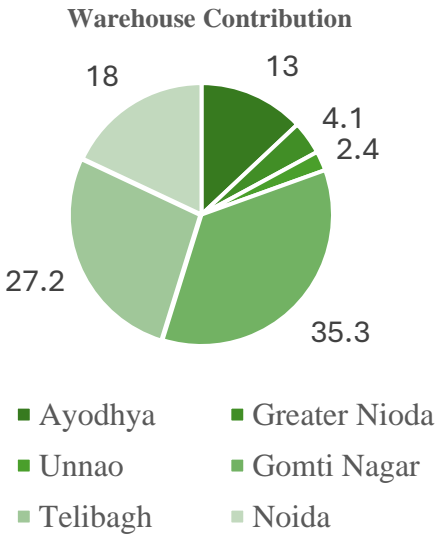
Generate a **primary ID** by replacing each customer ID with the one having the most orders.
- 2

Same POC with multiple IDs:
2 POCs appeared with multiple IDs.

Generate a primary POC ID by replacing each POC ID with the one having the most orders.

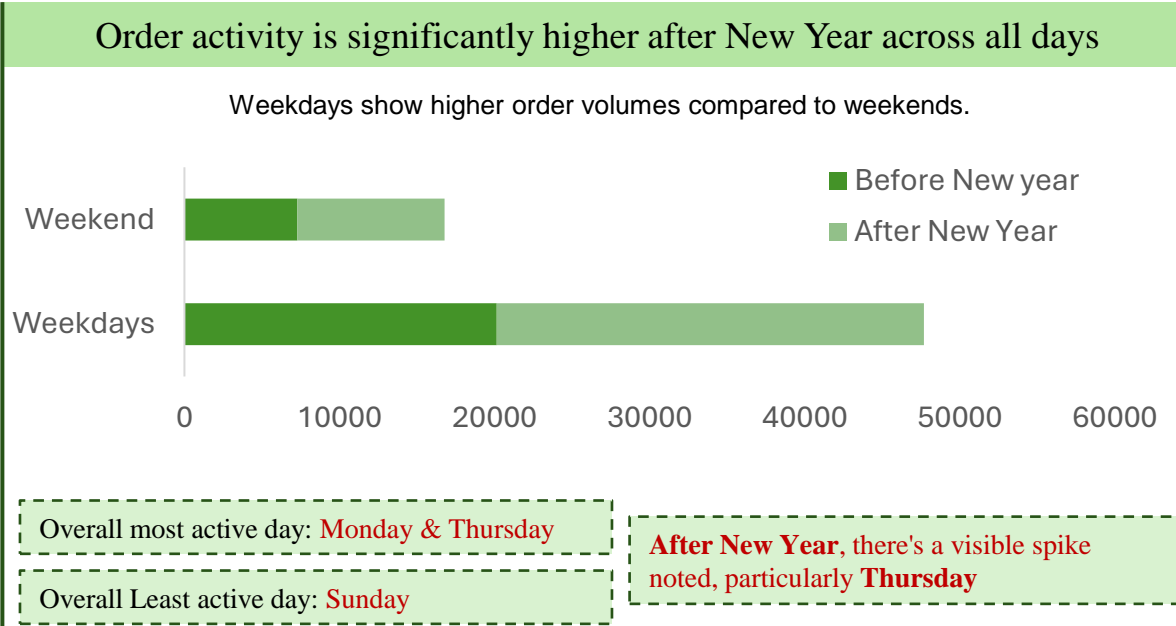


High-value orders show exceptional fulfillment (98.9%), while general orders also perform well (95.76%), indicating possible **prioritization of high-value orders.**



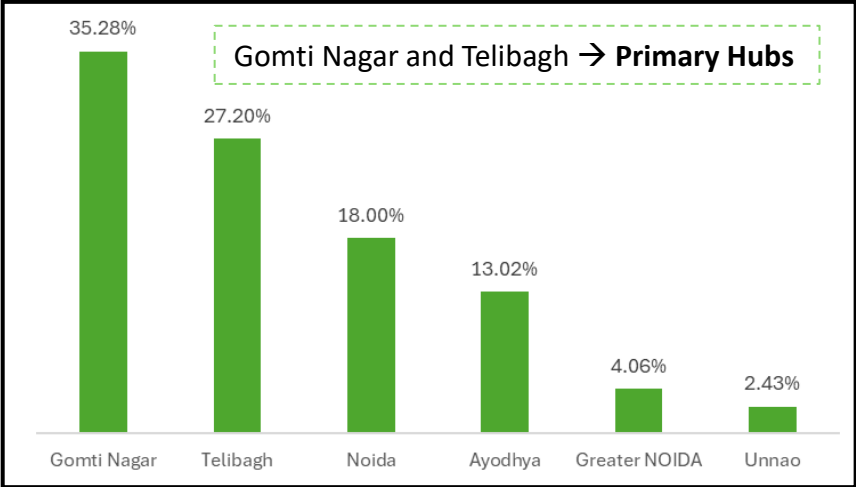
Greater Noida and Unnao warehouses **were launched later**, showing activity starting well after others.

Warehouses near religious locations experienced noticeable entry spikes after the New Year.

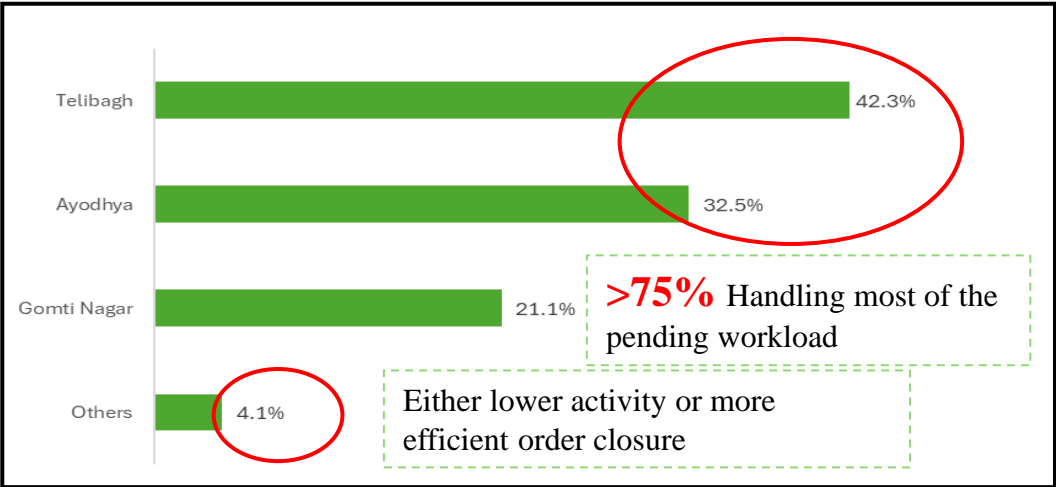


Gomti Nagar and Telibagh are the primary hubs for UnORG, strong weekday activity, and a notable post–New Year volume spike, highlighted operational efficiency and fulfillment trends across locations

Order Distribution by Warehouse



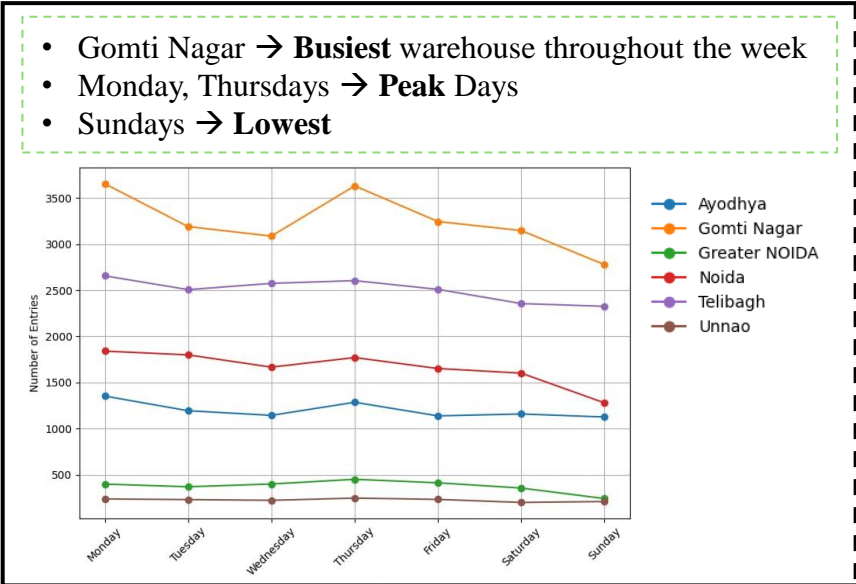
Distribution of OPEN Orders by Warehouse



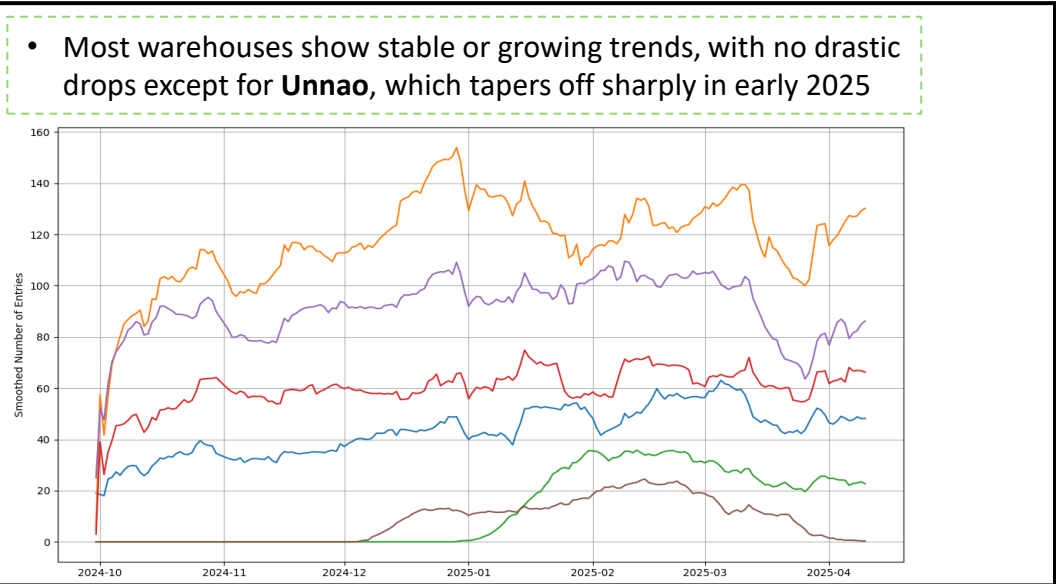
General Observations

- Most open orders are from the Most Recent Date (10th April), sharp drop off for previous days (<1% before 8th April) → **System actively processing orders**
- High-value orders show exceptional fulfillment (98.9%), while general orders also perform well (95.76%), indicating possible **prioritization of high-value orders**

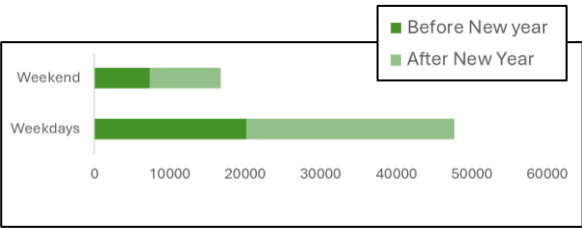
Number of Entries per day for each Warehouse



14-Day Rolling Average of Daily Entries per Warehouse



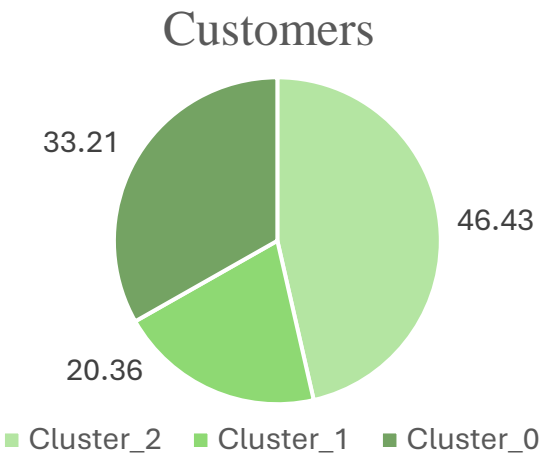
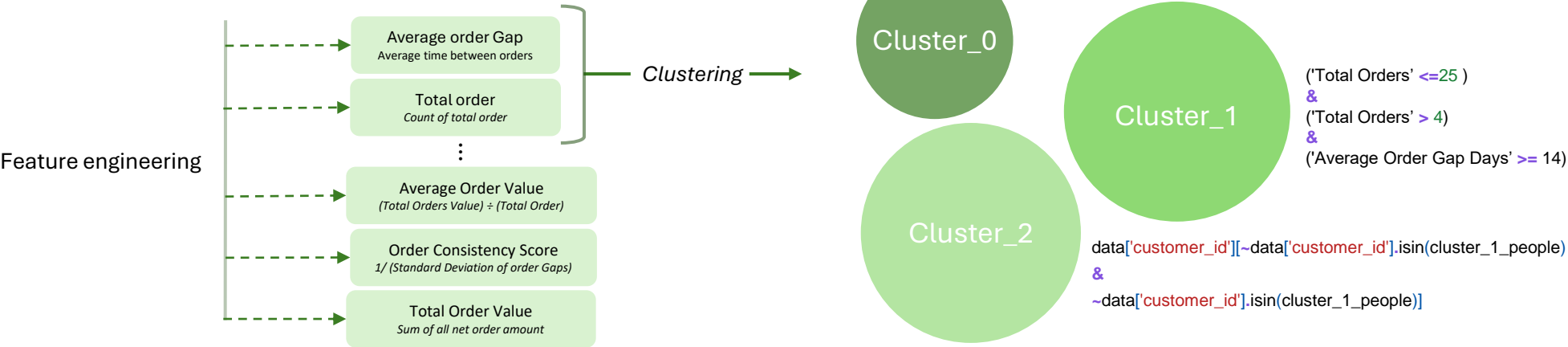
Weekdays show higher order volumes compared to weekends



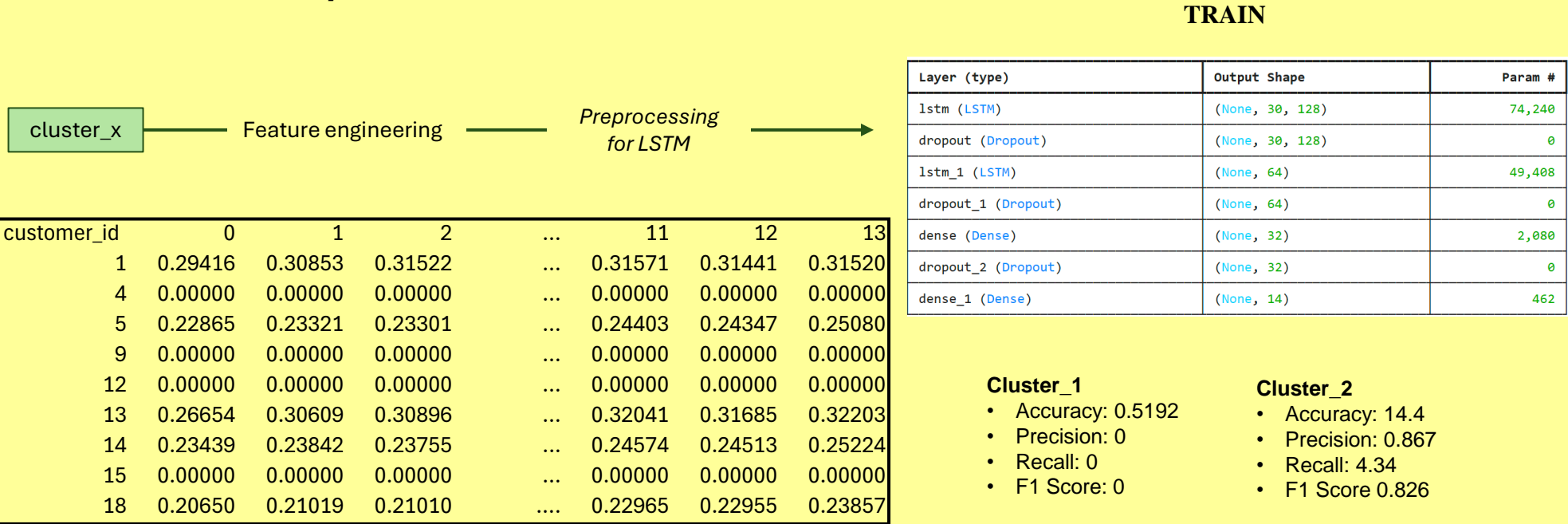
After New Year, there's a visible spike noted, particularly Thursday

PS1 – LSTM based Daily Order Prediction Model

Order.csv dataset



LSTM model Implementation



VALIDATION

- Cluster_1
- Accuracy: 51.50
 - Precision: 0
 - Recall: 0
 - F1 Score: 0
- Cluster_2
- Accuracy: 14.03
 - Precision: 83.53
 - Recall: 4.25
 - F1 Score: 8.09

TEST

- Cluster_1
- Accuracy: 0.5185
 - Precision 0
 - Recall: 0
 - F1 Score: 0
- Cluster_2: Perfect
- Accuracy: 82.13
 - Precision: 84.048
 - Recall: 51.91
 - F1 Score: 48.85
- Cluster_2
- Accuracy: 14.24
 - Precision: 86.08
 - Recall: 4.35
 - F1 Score: 8.27

Gomti Nagar and Telibagh are the primary hubs for UnORG, strong weekday activity, and a notable post–New Year volume spike, highlighted operational efficiency and fulfillment trends across locations

Features engineering



VALIDATION

- Cluster_1: Perfect

 - Accuracy: 51.50
 - Precision: 0
 - Recall: 0
 - F1 Score: 0
- Cluster_2: Perfect

 - Accuracy: 14.03
 - Precision: 83.53
 - Recall: 4.25
 - F1 Score: 8.09

TEST

- Cluster_1: Perfect

 - Accuracy: 51.93
 - Precision0
 - Recall: 0.0
 - F1 Score: 0.0
- Cluster_1

 - Accuracy: 95.86
 - Precision 47.95
 - Recall: 50.0
 - F1 Score: 48.95
- Cluster_2: Perfect

 - Accuracy: 14.24
 - Precision: 86.08
 - Recall: 4.35
 - F1 Score: 8.27
- Cluster_2:

 - Accuracy: 82.13
 - Precision: 84.048
 - Recall: 51.91
 - F1 Score: 48.85

- Cluster_1: Perfect

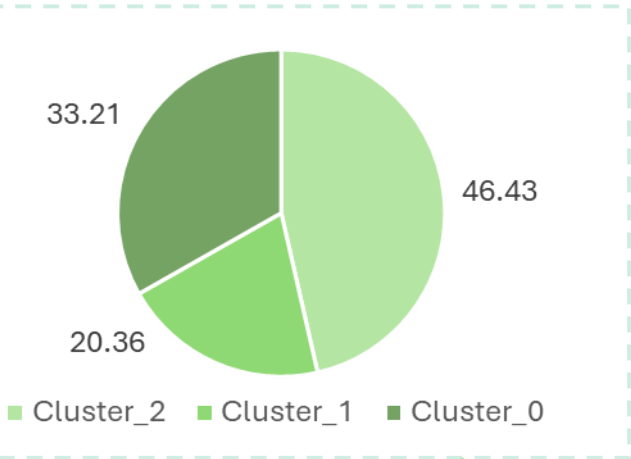
 - Accuracy: 51.93
 - Precision: 7.14
 - Recall: 0.01
 - F1 Score: 0.02
- Cluster_2: Perfect

 - Accuracy: 14.4
 - Precision: 0.867
 - Recall: 4.34
 - F1 Score 0.826

Layer (type)	Output Shape	Param #
lstm (LSTM)	(None, 30, 128)	74,240
dropout (Dropout)	(None, 30, 128)	0
lstm_1 (LSTM)	(None, 64)	49,408
dropout_1 (Dropout)	(None, 64)	0
dense (Dense)	(None, 32)	2,080
dropout_2 (Dropout)	(None, 32)	0
dense_1 (Dense)	(None, 14)	462

LSTM Model

% customers



Feature engineering

LGBM-predicted demand quantities for each customer-SKU-date combination in the 14-day forecast window (11th - 24th April)

Orders.csv

order_id

customer_id

order_date

.....

poc_id

warehouse_id

Items.csv

order_id

quantity

.....

order_item_id

Merged per customer per SKU basis

Engineered 10+ features to capture Time trends, Calendar features, and discounts

- lag_1_day

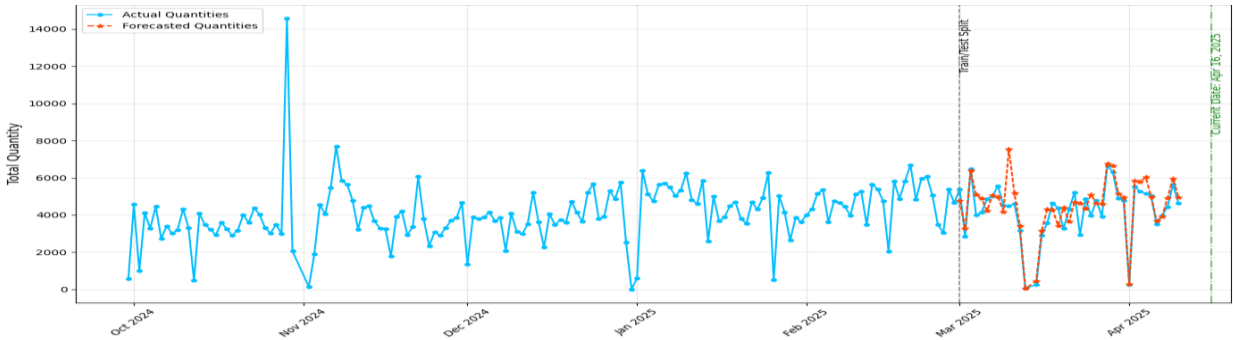
SKUs purchased in the prev. order
- rolling_mean_7d

Avg. qty across 7 most recent orders
- discount_percentage

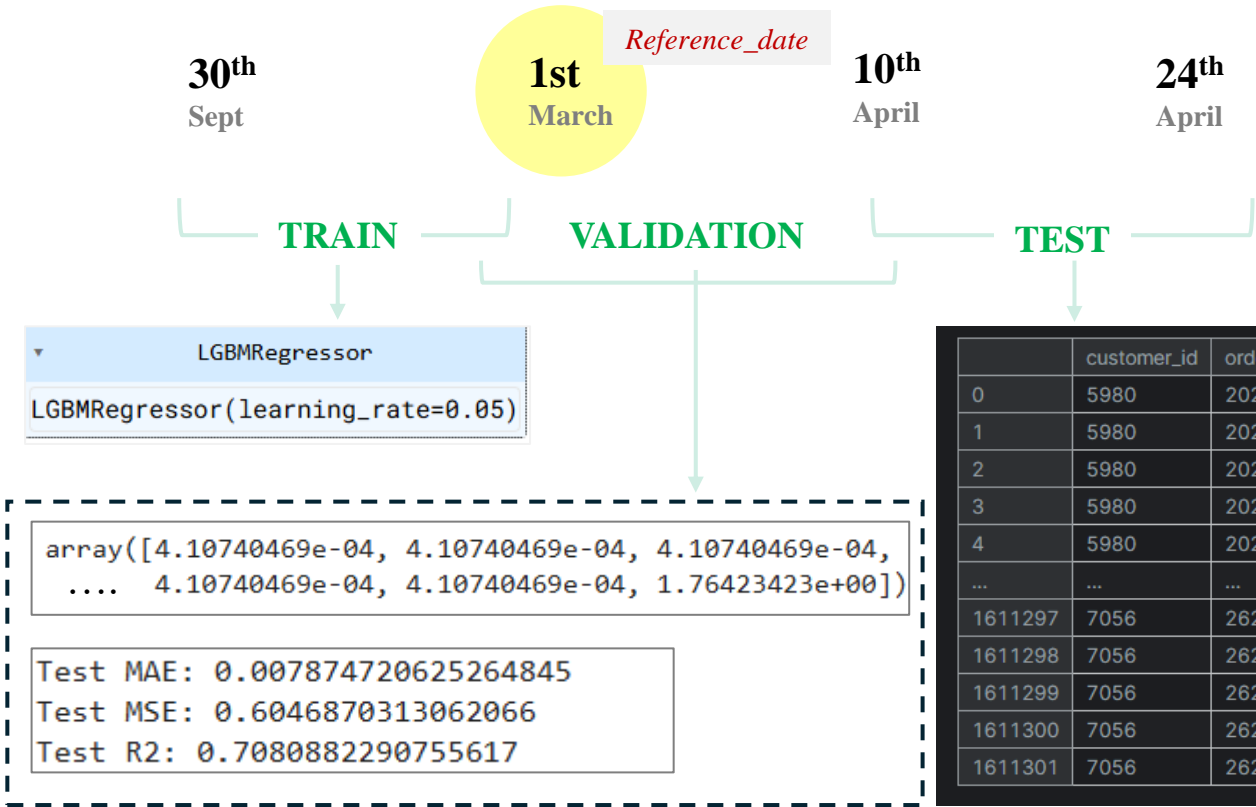
Discount amount/ price per unit
- is_holiday

day_of_week

.....

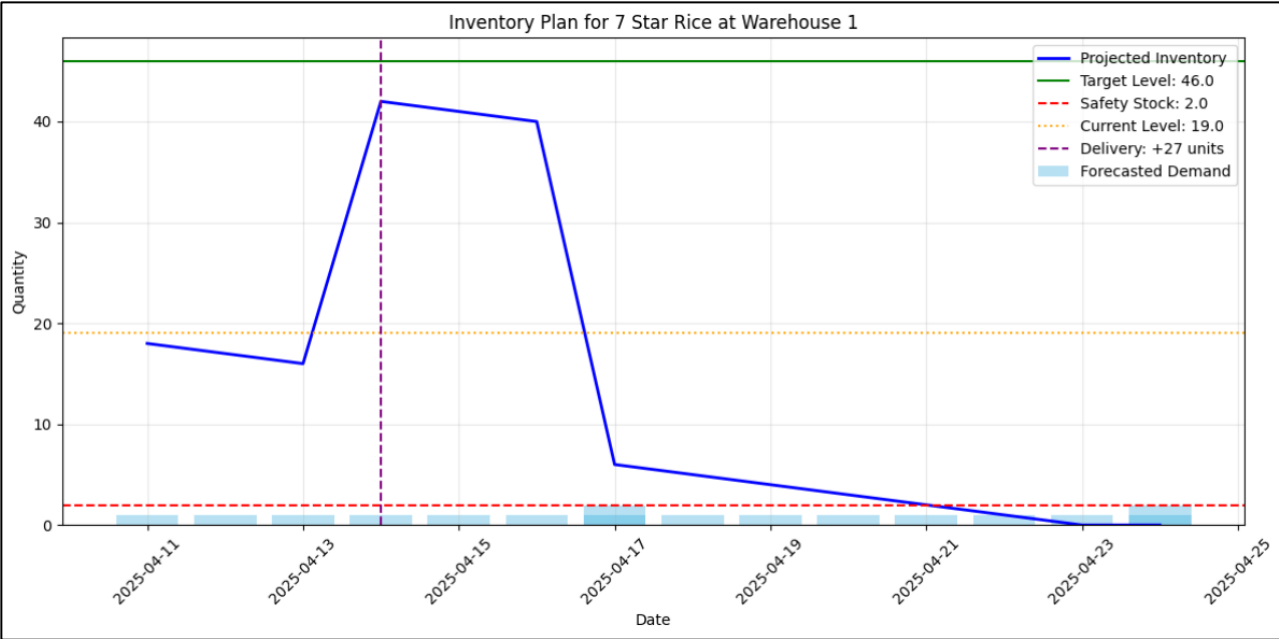


Daily Order Quantities



PS3 – Inventory Model

Implemented a Periodic Review (P-System) for each customer-product-warehouse combination



7 days
Review Interval

3 days
Lead Time

Running periodic review on 2025-04-11

Orders to place on 2025-04-11:

	warehouse_id	item_name	current_inventory \
0	1	7 Star Rice	19.0
1	1	ASHOK BIRYANI MASALA (50 GM)	2.0
2	1	ASHOK KALI MIRCH POWDER (100g)	4.0
3	1	ASHOK SONTI MASALA (100gm)	2.0
4	1	Adani Mota Besan	30.0
..
986	6	Tata Salt Pkt(1Kg)	32.0
987	6	Tibaar Rice	6.0
988	6	Tuta Basmati Rice	1.0
989	6	Urad Sabut Dal	14.0
990	6	Vibhor Soya Pouch(1L)	117.0

	target_inventory	order_quantity
0	46.0	27
1	3.0	1
2	7.0	3
3	4.0	2
4	105.0	75
..
986	53.0	21
987	15.0	9
988	5.0	4
989	21.0	7
990	173.0	56

[991 rows x 5 columns]

Next review scheduled for: 2025-04-18

Thankyou