KALBE Nutritionals

Rakamin Academy

From Data to Action: Time Series Forecasting and Clustering for Effective Market Campaigns

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"Iqbal is a junior data scientist with a robust background in exploratory data analysis, preprocessing, modeling, visualization, and providing actionable insights. He possesses extensive experience in handling diverse data types, particularly in the Fintech and E-Commerce industries. His expertise is evident through successful completion of numerous supervised and unsupervised learning projects, which demonstrate his ability to extract valuable information from data, develop accurate models, and effectively communicate findings. With a proven track record in multiple facets of data science, Iqbal serves as a highly valuable asset to any team or organization seeking expertise in data-driven decision making and problem-solving. "

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PROJECT BACKGROUND

Company Background

"In the era of digital advancements, Kalbe Nutritionals strives to assert its market leadership through astute data-driven strategies within the food and supplement industry. Recognizing the pivotal role of data, the company endeavors to thoroughly analyze market trends, thereby augmenting its overall business performance."

The Main Issue/Problem?

- Business Strategy Optimization
- Identification of New Opportunities

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Workflow

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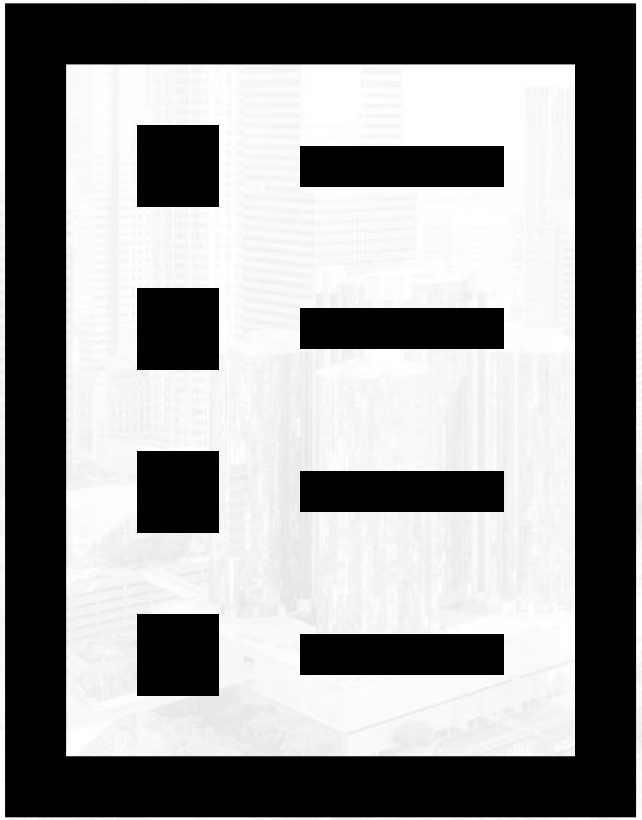


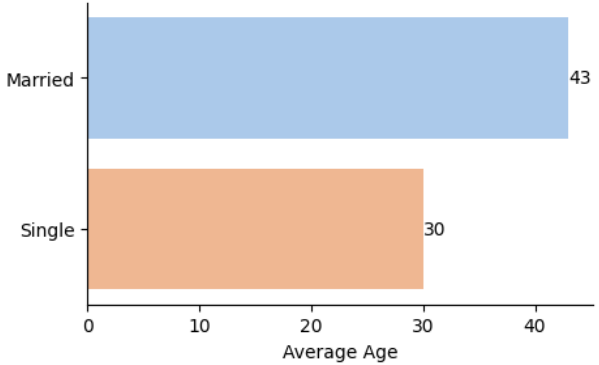
1. Exploratory Data Analysis
2. Time Series Forecasting Model
3. Clustering Model
4. Conclusion

EXPLORATORY DATA ANALYSIS

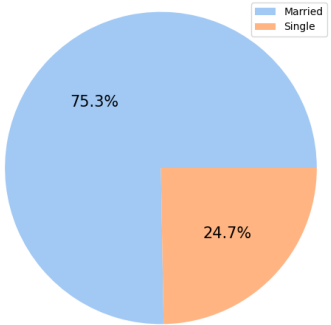
Exploratory Data Analysis

Total Customer
447

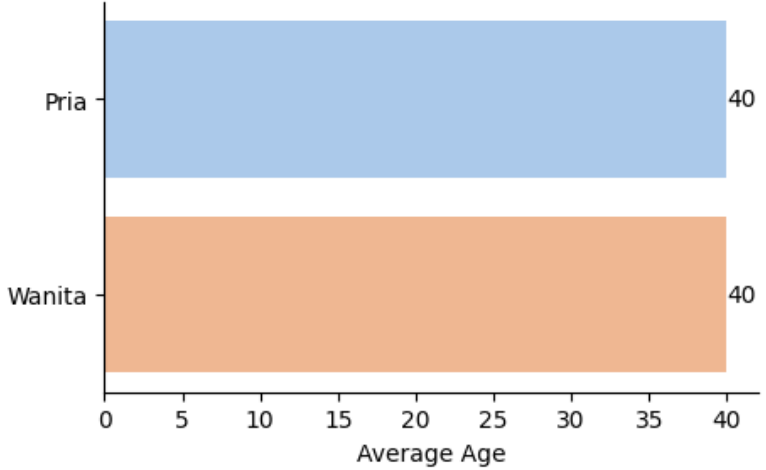
The Average Age of Customer Based On Their Marital Status



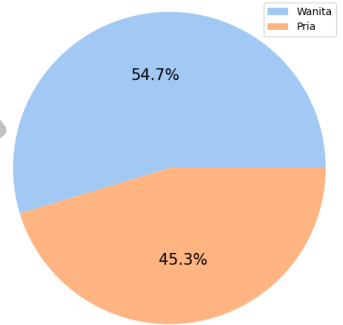
Segmentation Customer



The Average Age of Customer Based On Their Gender



Segmentation Customer

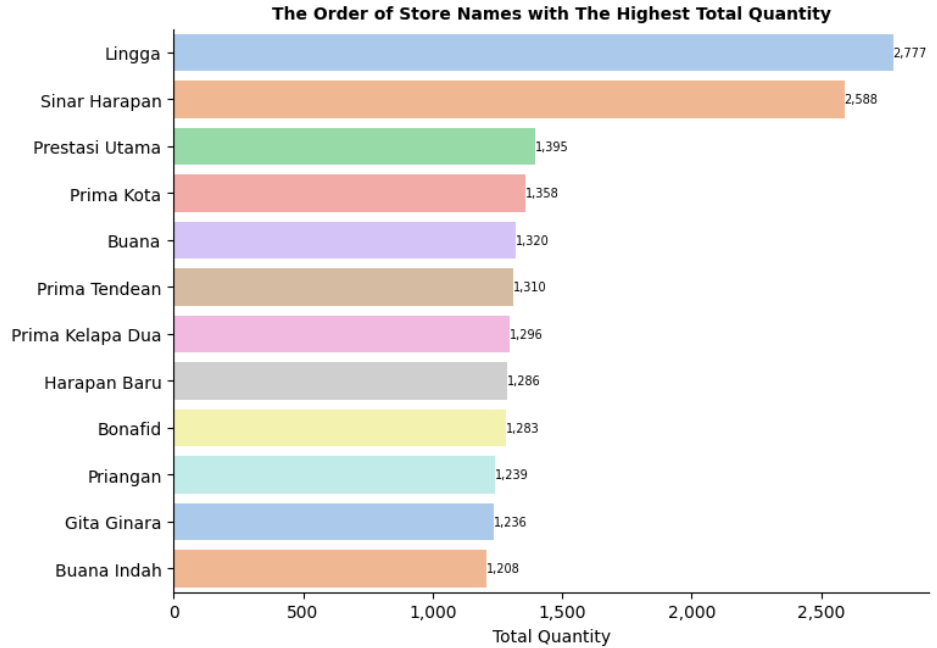


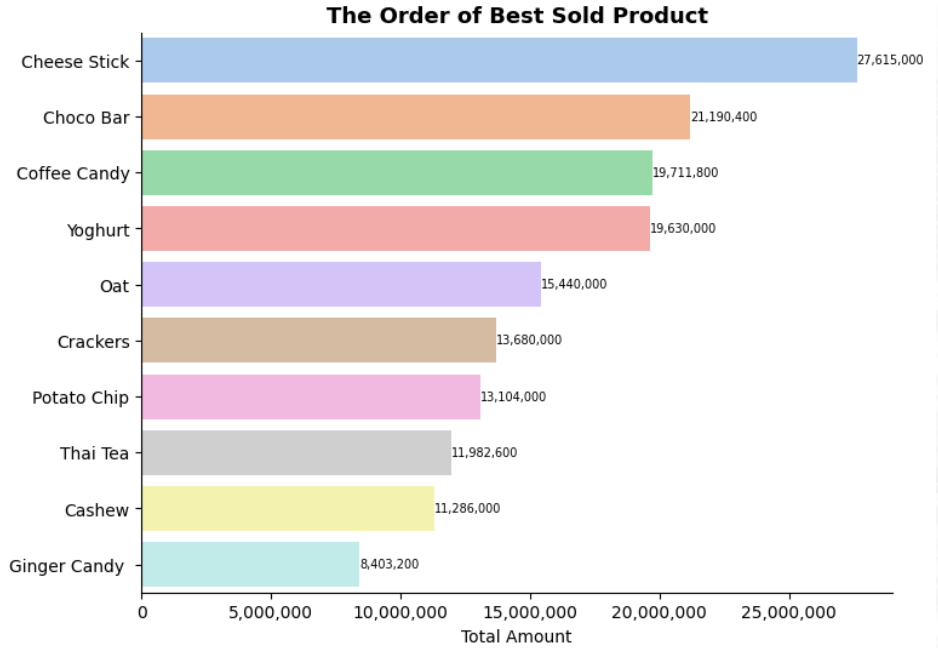
Exploratory Data Analysis

Total Transaction
5020

Best Store : Lingga

Best Product : Cheese Stick





TIME SERIES FORECASTING MODEL

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TIME SERIES FORECASTING MODEL

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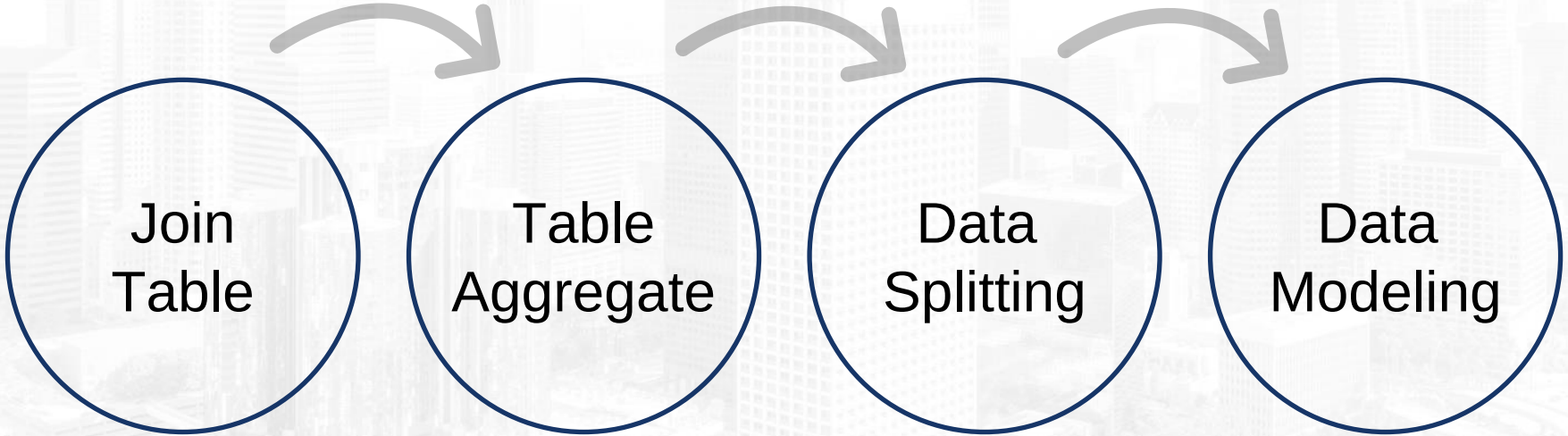


1. Case Study - Transaction
2. Case Study - Customer
3. Case Study - Product
4. Case Study - Store

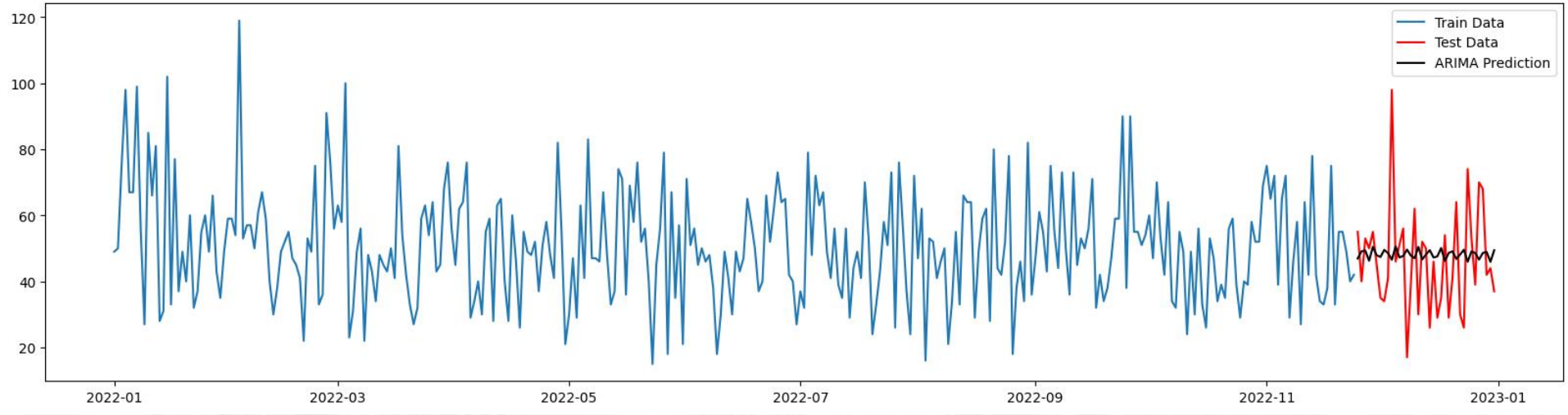
Aggregate Feature ‘Date’ with ‘Qty’ : SUM

90% Data Train
10% Data Test

ARIMA Algorithm + Hyperparameter Tuning

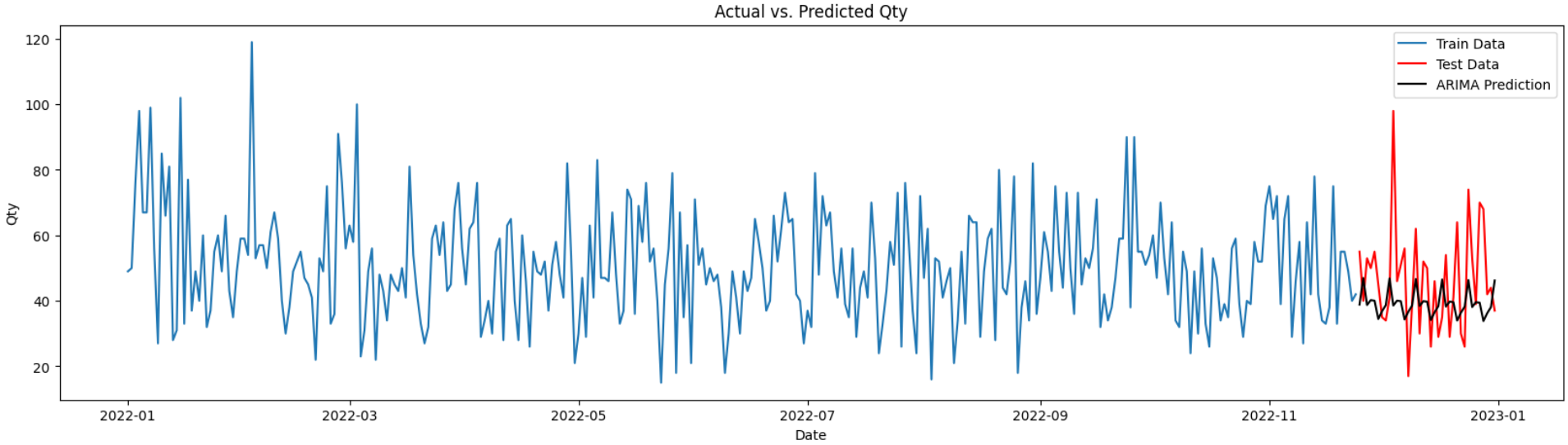
ARIMA MODEL

ARIMA (p,d,q = 1,1,1) :



- RMSE : 16.49
- MAE : 12.92
- R2 : -0.11

After Hyperparameter Tuning :

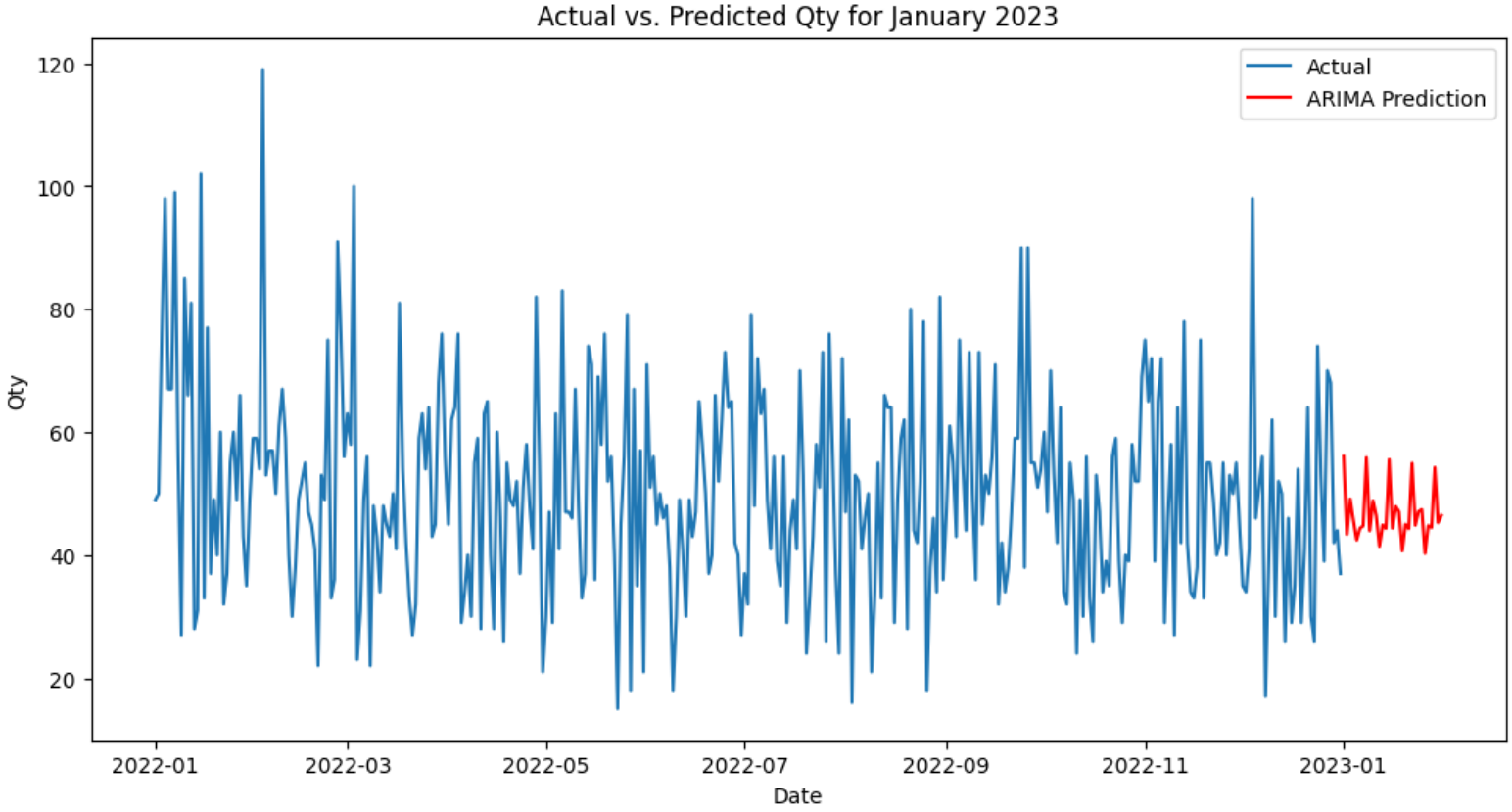


- RMSE : 15.04
- MAE : 11.69
- R2 : 0.074

Setting Parameter

- p : 0 - 5
- d : 0 - 2
- q : 0 - 5
- P : 0 - 1
- D : 0 - 1
- Q : 0 - 1

Prediction (Steps = 31 Days) :



Total Quantity Products Need : 1446

CLUSTERING MODEL

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CLUSTERING MODEL

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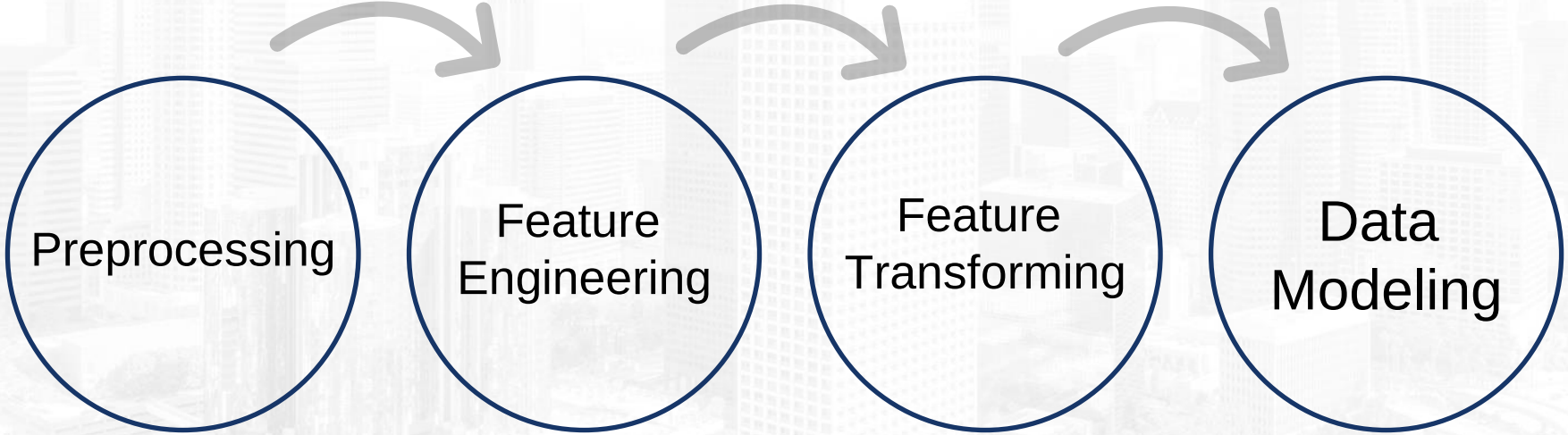


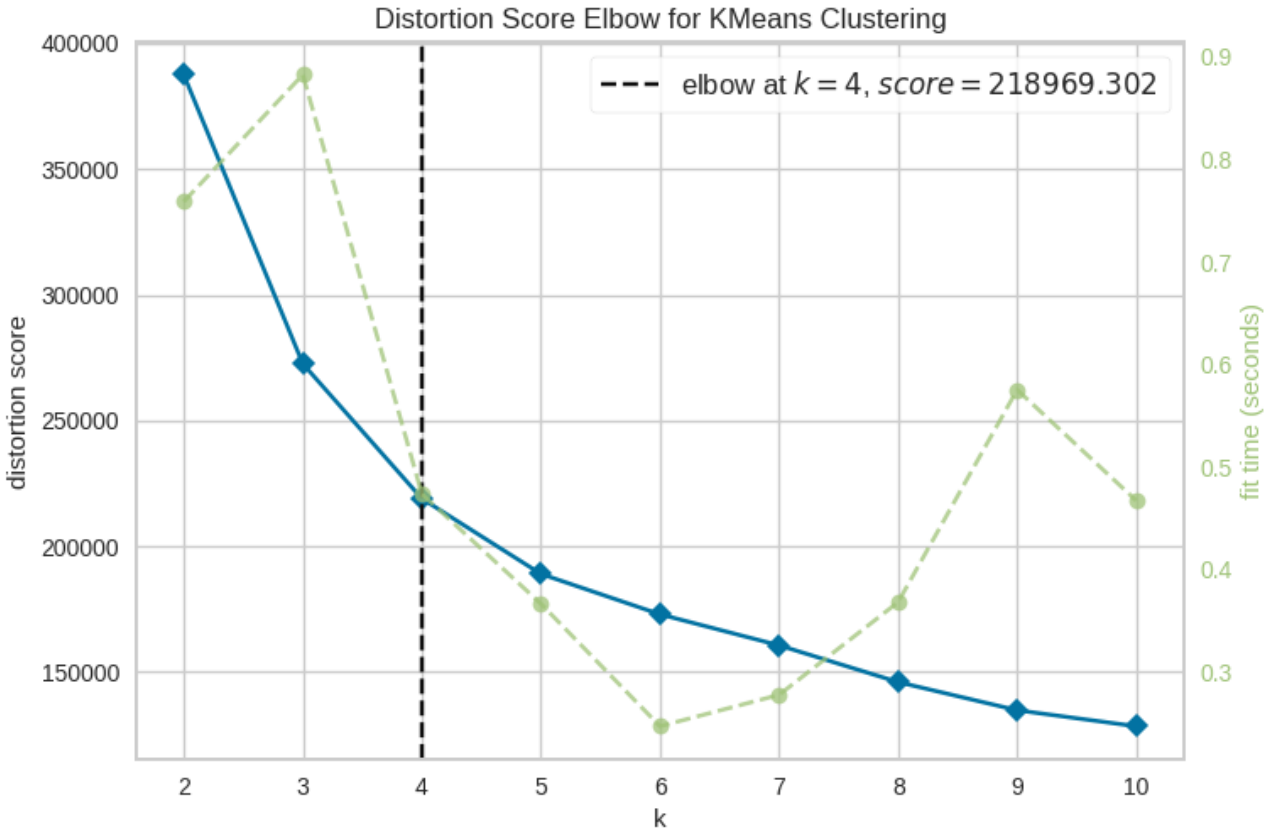
1. Join Table
2. Handle Missing Value
3. Handle Data Duplicate

1. Extract feature ‘month’ from ‘date’
2. Drop feature that not relevant to process learning

1. Standard Scaler
2. Label Encoding

1. K-Means Algorithm
2. Evaluation Metrics :
   - Elbow Method
   - Silhoutte Score

KMEANS MODEL



Elbow Method Evaluation :

1. Best Distortion Score :

   218969.302

2. Total Best Cluster :

   4 Cluster

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KMEANS MODEL

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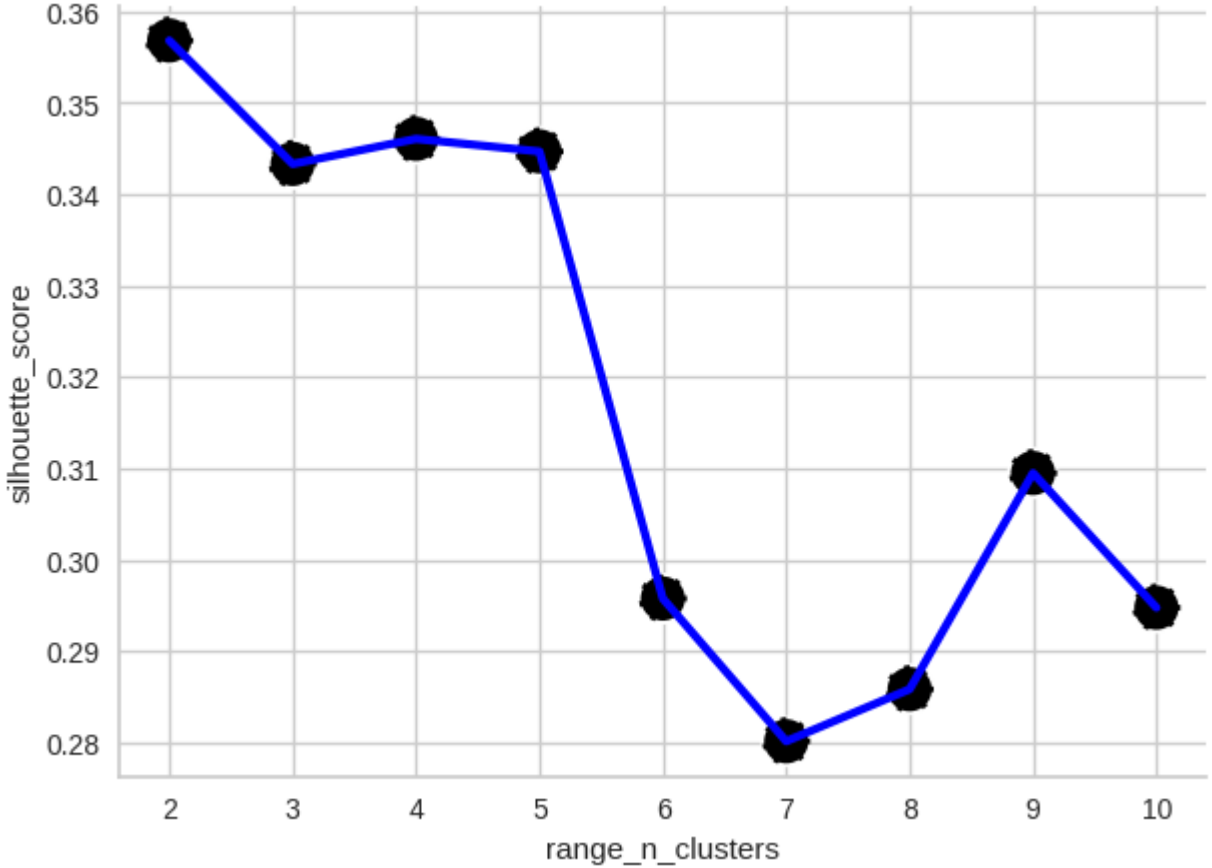

Silhoutte Score Evaluation :

1. Best Silhoutte Score :

   0.36

2. Total Best Cluster :

   2 Cluster

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RFM ANALYSIS

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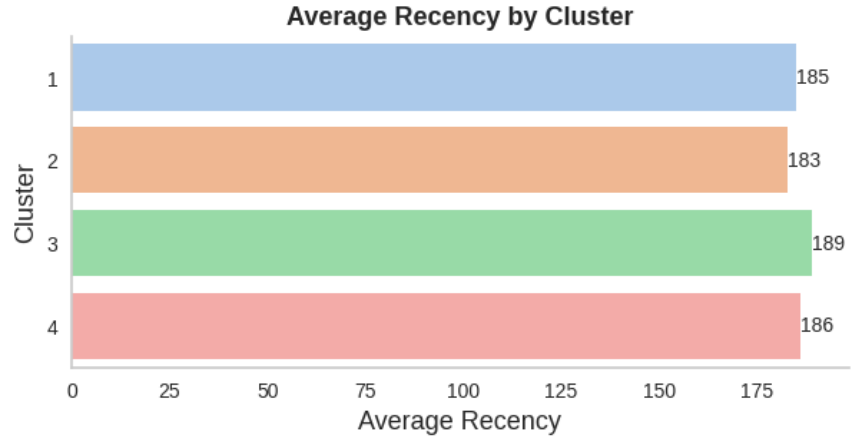

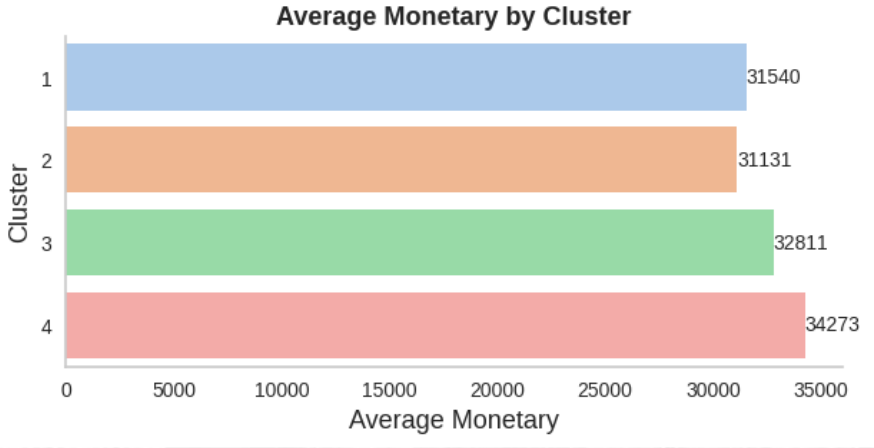

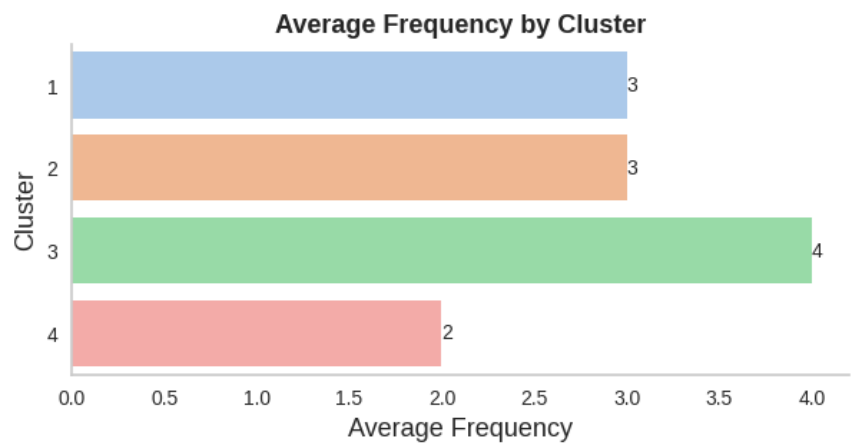

1. Best Average Recency : Cluster 3
2. Best Average Frequency : Cluster 3
3. Best Average Monetary : Cluster 4

CONCLUSION

CONCLUSION

Based on customer segmentation from EDA, the following insights are observed:

- When viewed based on Marital Status, 75% of customers are already married with an average age of 43 years.
- When viewed based on Gender, there is not a significant difference between male and female customers, with an average age of around 40 years.

Based on Arima Model:

- R2 = 0.074
- MAE = 11.69
- Prediction Product Qty = 1446

Based on KMeans Model:

- Best Cluster = 4 Clusters
- Best Average Recency = Cluster 3
- Best Average Frequency = Cluster 3
- Best Average Monetary = Cluster 4

BUSINESS RECOMMENDATION

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Business Recommendation

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1. Target Married Customers:

   As 75% of customers are already married, it may be beneficial to tailor marketing campaigns and product offerings to target this specific segment.

2. Gender-Neutral Marketing:

   Since there is not a significant difference between male and female customers in terms of average age, adopting a gender-neutral marketing approach could be advantageous.

3. Product Quantity Prediction:

   Utilize the ARIMA model's product quantity prediction to optimize inventory management and production planning.

Business Recommendation

4. Customer Segmentation Strategy:
   Consider implementing the KMeans model's customer segmentation strategy with 4 clusters.

5. Customer Retargeting:
   Leverage the KMeans model's insights on the best-performing clusters to optimize retargeting campaigns.

6. Data-Driven Decision Making:
   Emphasize the importance of data-driven decision making across the organization.

7. Customer Experience Enhancement:
   Gather feedback and insights from customers to improve the overall customer experience.

THANK YOU

Click icon for the code :  Click icon for dashboard :  Click icon for video :