DishCraft™
Simplifying Meals, Elevating Lives
by AutoBasket Inc.

123 Yorkland Boulevard
North York, ON M2J 1S5
Toronto, Canada

Demand Forecast Report

14/06/2024

This report presents the demand forecasting analysis for a retail dataset, including vendor data, purchase history, and product demand data. The data was cleaned and preprocessed to handle missing values and duplicates. Exploratory Data Analysis (EDA) was performed to identify patterns, correlations, and anomalies. A machine learning model was developed to predict future demand, and the results are presented in this report.

Vendor Data Info:

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 4 columns):
 #   Column              Non-Null Count  Dtype 
---  ------              --------------  ----- 
 0   vendor_name         100 non-null    object
 1   location            100 non-null    object
 2   ingredient_supplied  100 non-null    object
 3   category            100 non-null    object
dtypes: object(4)
memory usage: 3.3+ KB
```

Purchase History Data Info:

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 50100 entries, 0 to 50099
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype         
---  ------        --------------  -----         
 0   vendor_name   50100 non-null  object        
 1   ingredient    50100 non-null  object        
 2   category      50100 non-null  object        
 3   quantity      50000 non-null  float64       
 4   purchase_date  50100 non-null  datetime64[ns]
dtypes: datetime64[ns](1), float64(1), object(3)
memory usage: 1.9+ MB
```

Product Demand Data Info:

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 730 entries, 0 to 729
Data columns (total 9 columns):
 #   Column                Non-Null Count  Dtype         
---  ------                --------------  -----         
 0   timestamp             730 non-null    datetime64[ns]
 1   product_id            730 non-null    object        
 2   demand                730 non-null    int64         
 3   price                 730 non-null    float64       
 4   promotion             730 non-null    int64         
 5   temperature           730 non-null    float64       
 6   economic_indicator    730 non-null    float64       
 7   social_media_sentiment  730 non-null    float64       
 8   previous_demand       730 non-null    int64         
dtypes: datetime64[ns](1), float64(4), int64(3), object(1)
memory usage: 51.5+ KB
```

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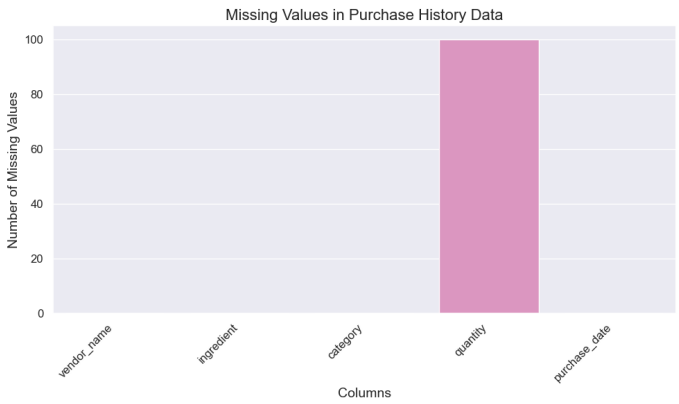
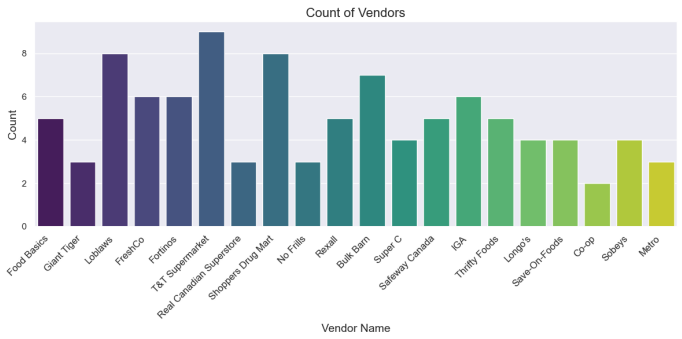
Exploratory Data Analysis (EDA)

Exploratory Data Analysis (EDA) was conducted to understand the data better. The following visualizations provide insights into the distribution of variables, relationships between features, and trends over time.

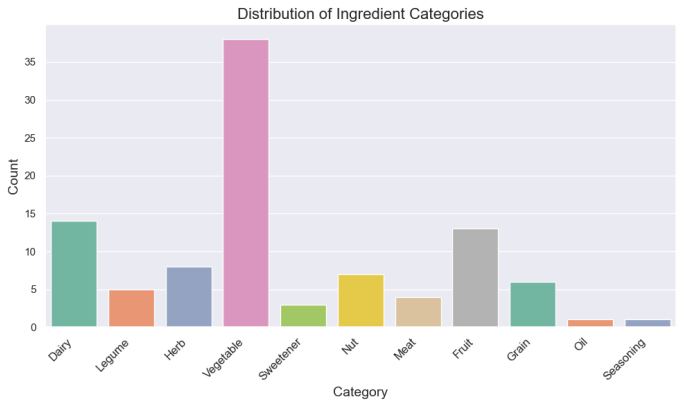
Missing values in purchase history data



Vendor data count plot for vendor names



Vendor data count plot for ingredients & categories



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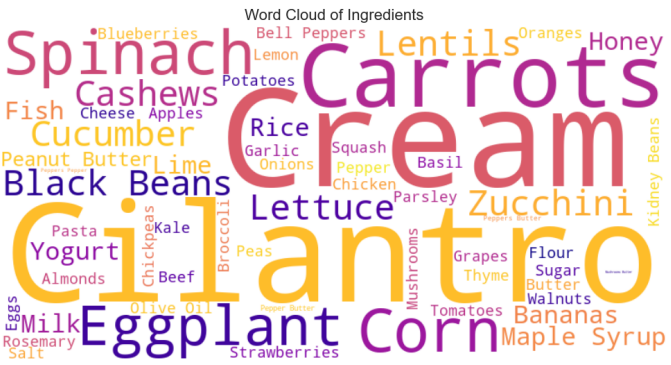
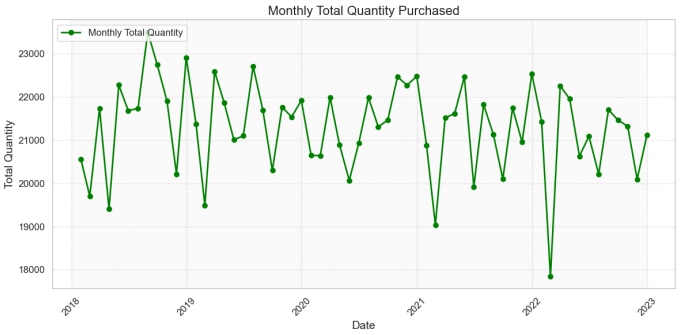
Wordcloud of vendor names

Purchase history ingrediants wordcloud



Purchase history data histogram

Purchase history monthly data



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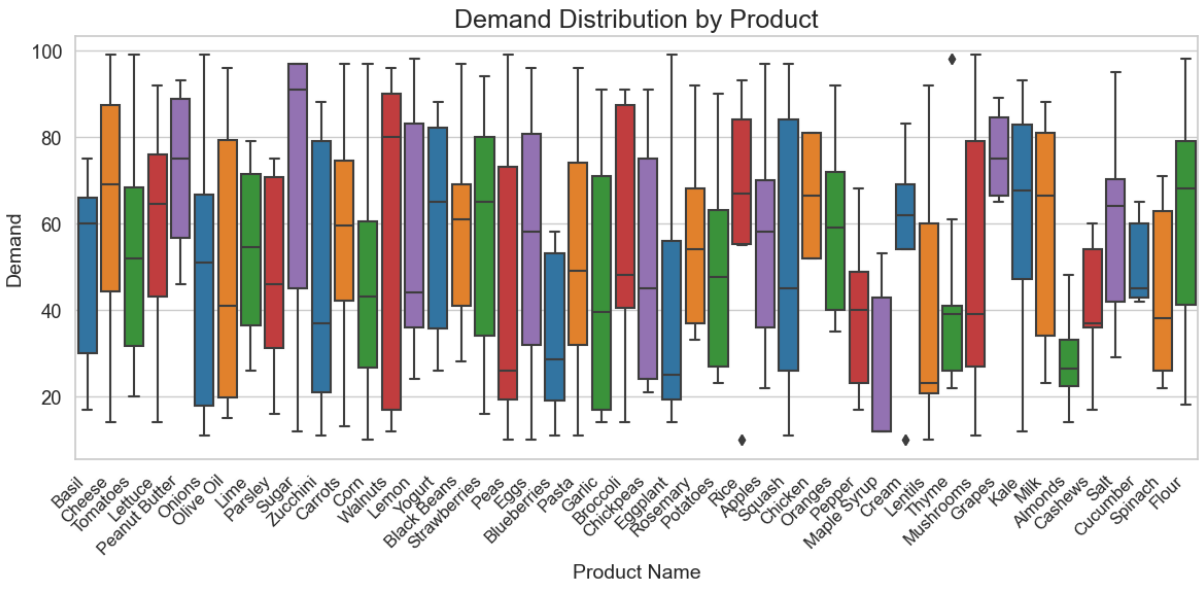
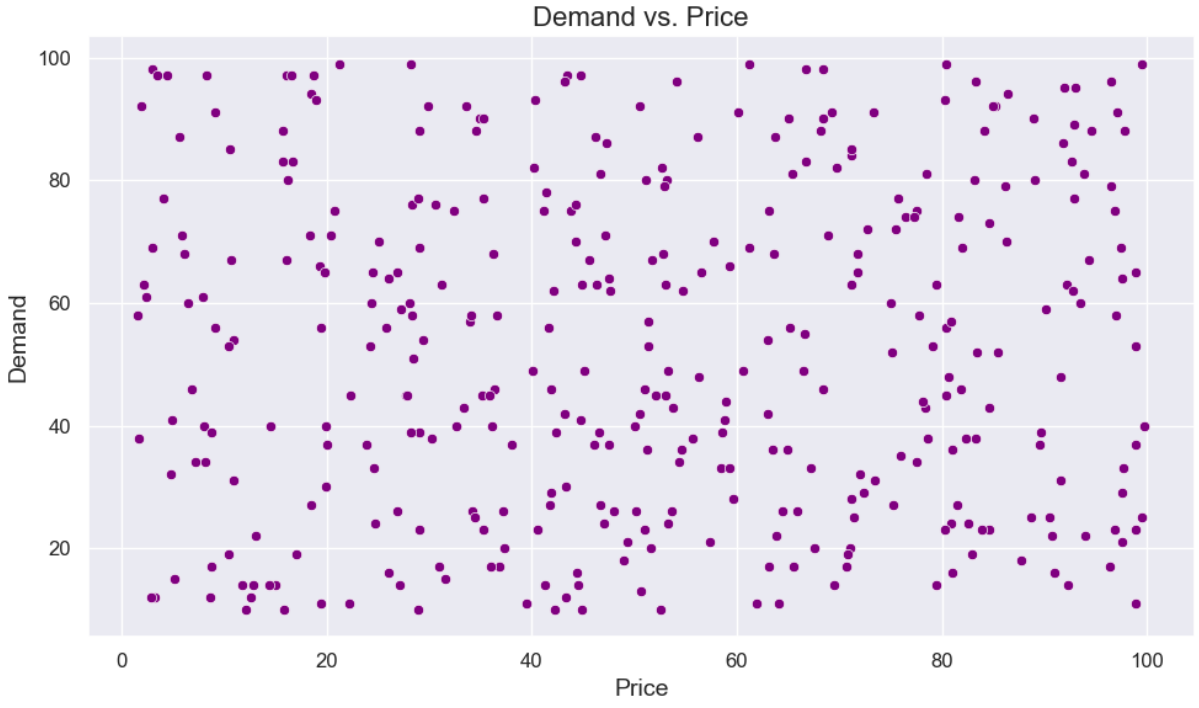
Demand distribution by product



Demand vs Price



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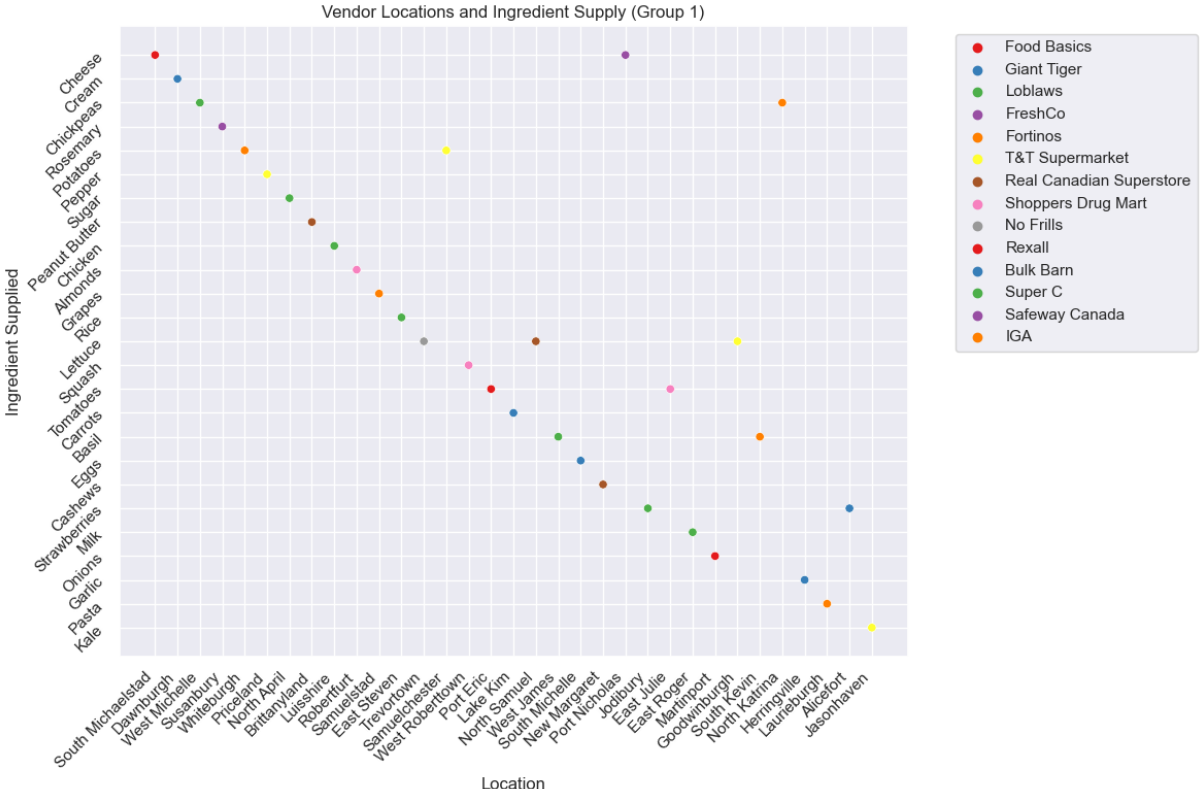
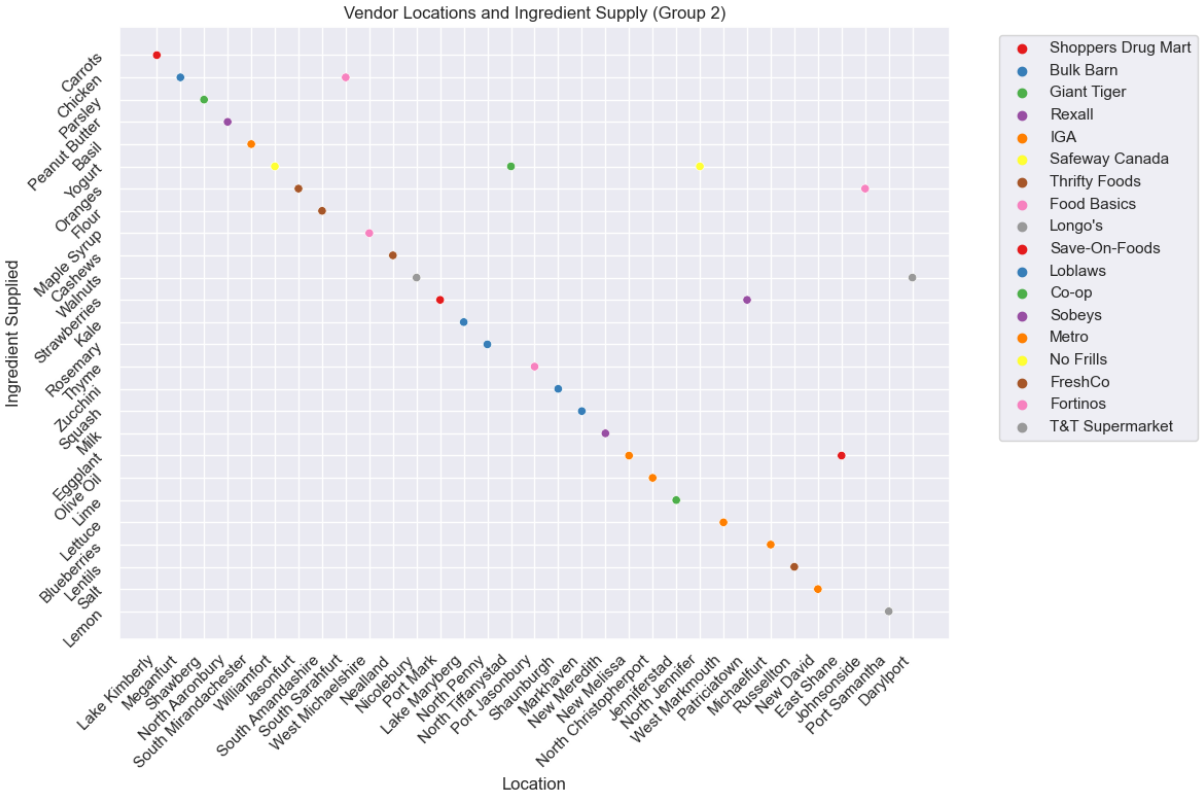
Vendor Locations and Ingredient Supply





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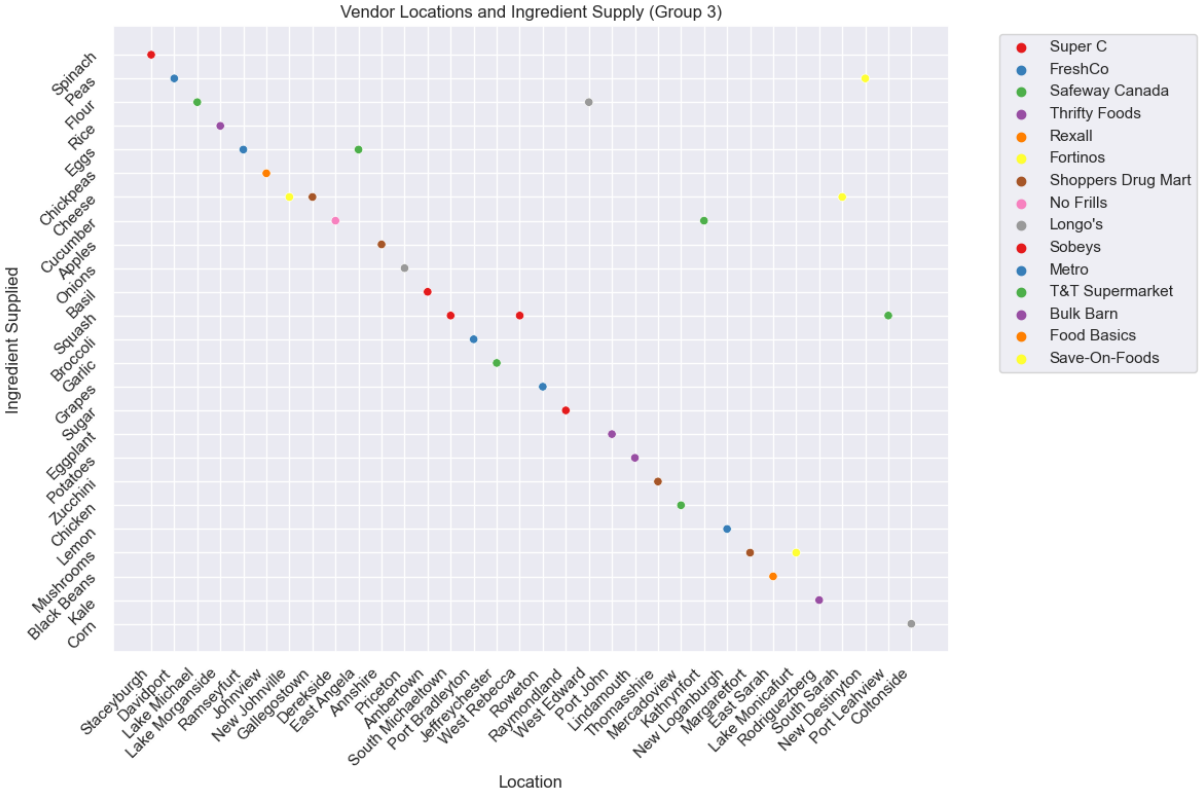
Vendor Locations and Ingredient Supply (contd. . .)



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System Features

This report was generated automatically using a Python-based PDF generation engine. The system efficiently processed and analyzed a retail dataset, including vendor data, purchase history, and product demand data. Key features of the system include: - Automated report generation, ensuring consistency and reliability. - Integration of exploratory data analysis (EDA) techniques to uncover insights from the dataset. - Automated creation of visualizations such as charts and graphs to illustrate trends and patterns in the data. - Utilization of machine learning models for demand forecasting, providing accurate predictions for future demand. The automation of report generation and visualization creation not only saves time and effort but also enhances the reproducibility and scalability of the analysis. This approach enables stakeholders to quickly gain actionable insights from the data, facilitating informed decision-making and optimizing business strategies.

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Conclusion

In conclusion, this report has provided a comprehensive analysis of demand forecasting for a retail dataset. The data cleaning and preprocessing stages ensured that the dataset was ready for analysis, handling missing values and duplicates effectively. Exploratory Data Analysis (EDA) revealed valuable insights into the relationships and trends within the data, guiding the development of a machine learning model. The predictive model demonstrated promising results in forecasting future demand, which can assist stakeholders in making informed decisions to optimize inventory management and meet customer demands effectively.