

# **Dominos - Predictive Purchase Order System**

(Domain:Food Service Industry)

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## INTRODUCTION:

This is a detailed analysis and forecast for a pizza sales dataset that includes data cleaning, exploratory data analysis (EDA), and a prediction model for sales and inventory.

This is to optimize the process of ordering ingredients by predicting future sales and creating a purchase order. By accurately forecasting sales, Dominos can ensure that it has the right amount of ingredients in stock, minimizing waste and preventing stockouts. This project aims to leverage historical sales data and ingredient information to develop a predictive model and generate an efficient purchase order system.

## Business Use Cases:

- **Inventory Management:** Ensuring optimal stock levels to meet future demand without overstocking.
- **Cost Reduction:** Minimizing waste and reducing costs associated with expired or excess inventory.
- **Sales Forecasting:** Accurately predicting sales trends to inform business strategies and promotions.
- **Supply Chain Optimization:** Streamlining the ordering process to align with predicted sales and avoid disruptions.

## Data Set Explanation:

- **Sales Data:** Historical sales records (Date, Pizza Type, Quantity Sold, Price, Category, Ingredients)
- **Ingredient Data:** Ingredient requirements for each pizza type (Pizza Type, Ingredient, Quantity Needed)

## APPROACH:

### 1. Library Imports & Data Loading

The necessary libraries are imported, including statsmodels for time series analysis and sklearn for evaluation metrics.

Both pizza\_sales and pizza\_ingredients data are loaded and merged on pizza\_name\_id.

### 2. Data Cleaning

The order\_date column is standardized by replacing dashes with slashes and converting to datetime format. The order\_time column is also converted to a time format.

Duplicates and NaN values are removed for cleaner analysis.

### 3. Exploratory Data Analysis (EDA)

Daily, weekly, and monthly sales trends are visualized, including sales trends by pizza category.

EDA includes analyzing order patterns by time of day, pizza size, pizza category, and monthly and weekly order distributions.

#### 4. Sales Prediction with ARIMA

Daily sales data is aggregated and split into training and testing sets.

An ARIMA model is trained to forecast sales, evaluated by Mean Absolute Percentage Error (MAPE).

The actual vs. predicted sales are visualized to assess model performance.

#### 5. Purchase Order Generation

Predicted sales over the next 7 days are used to estimate ingredient quantities needed.

Ingredient proportions per pizza are calculated, and a summary is created for purchase order quantities based on forecasted sales.

#### Library and Packages used:

- ! pip install **statsmodels**
- ! pip install **holidays**
- from statsmodels.tsa.arima\_model import **ARIMA**
- import **pandas** as **pd**
- import matplotlib.pyplot as **plt**
- import seaborn as **sns**
- from sklearn.metrics import **mean\_absolute\_percentage\_error**

## RESULT:

- **Accurate Sales Predictions:** A model capable of producing reliable sales forecasts based on historical data trends.
- **Efficient Purchase Orders:** An automatically generated purchase order system tailored to predicted sales volumes, listing precise ingredient quantities needed for the sales forecast period.