Domino's Time Series Forecasting

Project Overview

This project involves developing a time series forecasting model to predict the sales of various pizza types from Domino's. The goal is to analyze historical sales data and build models using different techniques such as ARIMA, SARIMA, Prophet, and XGBoost. The best-performing model for each pizza type will be identified, and forecasts for future sales will be generated.

Requirements

- **Python 3.x**
- **Pandas**
- **NumPy**
- **Statsmodels** (for ARIMA/SARIMA)
- **Prophet**
- **XGBoost**
- **Seaborn** (for visualizations)

Installation

1. **Clone the repository:**

   ```
   bash
   Copy code
   git clone https://github.com/YourUsername/dominos-time-series-
   forecasting.git
   cd dominos-time-series-forecasting
   ```

2. **Install the required Python packages:**

   ```
   bash
   Copy code
   pip install pandas numpy statsmodels prophet xgboost seaborn
   ```

Project Structure

```
perl
Copy code
dominos-time-series-forecasting/
│
├── Pizza_sale_new.csv                      # Historical sales data for
various pizzas
├── Pizza_ingredients.csv                   # ingredints of each pizza and
quantity of ingredints
├── dominos_time_series_forecasting.ipynb   # Jupyter notebook for time
series analysis and forecasting

├── dominos_forecasted_pizza_quantities.csv  # Directory for saving
forecast quantity
```

```
├── dominos_final_purchase_order.csv     # Directory for saving purchase
order for the forecasted quantity of pizzas

├── README.md                             # Project documentation
└── Dominos_Time_Series_Forecasting_Report.pdf # Additional documentation
```

Time Series Analysis (`dominos_time_series_forecasting.ipynb`)

This Jupyter notebook contains the steps for data preprocessing, time series analysis, model training, and forecasting.

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Model Training

1. **ARIMA and SARIMA**: Use the `statsmodels` library to train ARIMA and SARIMA models for each pizza type.
2. **Prophet**: Utilize the `Prophet` library for forecasting, suitable for handling seasonality and trends.
3. **XGBoost**: Implement XGBoost for regression modeling based on historical sales data.

Evaluation

- Calculate Mean Absolute Percentage Error (MAPE) to evaluate the performance of each model.
- Select the best-performing model for each pizza based on the lowest MAPE.

Forecasting

After selecting the best model for each pizza type, the notebook will generate forecasts for the next week and save the results.

Usage

1. **Run the notebook:**

   ```
   bash
   Copy code
   jupyter notebook dominos_time_series_forecasting.ipynb
   ```

Results

The results, including forecasted sales quantities and purchase order will be saved in the `dominos_forecasted_pizza_quantities .csv` and `dominos_final_purchase_order.csv`

Acknowledgements

- **Pandas** for data manipulation
- **Statsmodels** for statistical modeling
- **Prophet** for forecasting
- **XGBoost** for advanced regression modeling

Contact

For any questions or feedback, please reach out to your_email@example.com.