

Executive Summary

Project Overview

Our project focuses on addressing food waste in US restaurants by leveraging automated back-of-house operations. This study involves analyzing sales data to identify patterns, predict future sales, and provide actionable insights to optimize inventory management, reduce waste, and improve operational efficiency.

Key Findings

1. Sales Analysis by Category:

- The analysis categorized sales into various food and beverage groups, such as Pasta Dishes, Breakfast & Brunch, Cocktails, etc.
- A detailed examination of total sales by category revealed significant insights into which categories contributed the most to overall revenue. For example, categories like 'Pasta Dishes' and 'Main Courses' showed substantial sales volumes.
- Visualization through a pie chart highlighted that a few categories accounted for a large percentage of the total sales, indicating potential areas for focused waste reduction strategies.

2. Predictive Modelling of Sales:

- Time series analysis and ARIMA modelling were employed to predict daily and hourly sales.
- The Augmented Dickey-Fuller (ADF) test confirmed the stationarity of the sales data, which is crucial for accurate time series forecasting.
- Forecasting models demonstrated a reasonable prediction accuracy, enabling better planning for inventory and staff management.

3. Weekly Sales Forecasting:

- Specific food items, particularly popular dishes like ‘Pappardelle al Sugo di Carne’ and ‘Tortelli di Zucca,’ were analyzed for weekly sales predictions.
- The forecasting models, validated through comparison of actual and predicted sales, showed a minor relative error, indicating robust prediction capabilities.
- Visual comparisons between actual and predicted values via bar charts helped in understanding the performance of the forecasting models.

4. Operational Implications:

- The predictive insights derived from the models can significantly help in inventory management, ensuring that restaurants order the right quantities, thus minimizing both shortages and excesses.
- Automation through can be tailored to focus on high-sales categories, optimizing preparation and storage processes to reduce waste.
- Enhanced forecasting allows for better staffing schedules, reducing labor costs during low-demand periods and ensuring adequate coverage during peak times.

Conclusion and Recommendations

The project underscores the importance of data-driven decision-making in reducing food waste and improving restaurant operations. By integrating sales data analysis with advanced forecasting models, restaurants can achieve greater efficiency, reduce costs, and contribute to sustainability efforts.

Recommendations:

1. Implement the predictive models into the restaurant’s inventory management system for real-time updates and order adjustments.

2. Focus waste reduction initiatives on high-sales categories identified through the sales analysis.
3. Regularly update the forecasting models with new sales data to maintain accuracy and reliability.

This strategic approach promises to enhance overall operational efficiency, reduce food waste, and increase profitability for US restaurants.