Project Documentation: Pizza Sales Analysis

1.0 Project Overview

The objective of this project is to perform a comprehensive analysis of pizza sales data to identify sales patterns, customer preferences, and key performance indicators (KPIs).
The analysis focuses on uncovering trends by date, category, and pizza size while determining which products drive the most revenue.
The insights derived from this project will assist in optimizing inventory, enhancing marketing strategies, and improving overall sales performance.

2.0 Technology Stack

Component	Technology / Library	Purpose
Data Analysis	**Python (Pandas, NumPy)**	Data manipulation, cleaning, and aggregation
Visualization	**Matplotlib, Seaborn**	Creating trend and performance visualizations
Environment	**Jupyter Notebook**	Interactive analysis and reporting

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3.0 Task Breakdown by Phase

Phase 1: Data Preparation & Cleaning (Python)

Task 1.1: Import Required Libraries

Objective: Initialize the environment and import necessary packages.
Actions:

- Import `pandas`, `numpy`, `matplotlib.pyplot`, and `seaborn`.
- Set Seaborn's default style for clean visuals.

Task 1.2: Data Import and Inspection

Objective: Load and examine the pizza sales dataset.
Actions:

- Load `pizza_sales.csv` using `pd.read_csv()`.
- Use `.info()`, `.shape`, and `.describe()` to understand data structure.
- Validate essential columns like `order_id`, `pizza_name`, `quantity`, `total_price`, `order_date`, `pizza_category`, and `pizza_size`.

Task 1.3: Data Cleaning & Formatting

Objective: Prepare data for analysis by ensuring consistency and accuracy.
Actions:

- Handle missing or null values.
- Convert `order_date` to datetime format.
- Extract day names and months for trend grouping.
- Standardize categorical text (pizza names, categories, sizes).

Phase 2: Exploratory Data Analysis (EDA)

Task 2.1: KPI Calculation

Objective: Generate key business performance metrics.
Actions:

- Compute:
    - **Total Revenue** = Sum of `total_price`
    - **Total Orders** = Count of unique `order_id`
    - **Total Pizzas Sold** = Sum of `quantity`
    - **Average Order Value (AOV)** = Total Revenue ÷ Total Orders
    - **Average Pizzas per Order** = Total Pizzas Sold ÷ Total Orders

Task 2.2: Daily & Weekly Sales Trends

Objective: Identify temporal sales trends and peak business periods.
Actions:

- Group by `order_date` to visualize revenue trends over time.
- Create day-of-week and monthly summary charts using Seaborn barplots.
- Identify high and low-performing days for operations planning.

Task 2.3: Category & Size Performance

Objective: Understand the contribution of pizza categories and sizes to overall sales.
Actions:

- Group by `pizza_category` and `pizza_size`.
- Create comparative bar charts to show revenue contribution per category and size.
- Identify which pizza size and category drive maximum sales.

Task 2.4: Top-Selling Pizzas

Objective: Identify pizzas contributing most to revenue.
Actions:

- Aggregate by `pizza_name` and sort by total sales.
- Visualize top 10 pizzas by revenue using horizontal bar charts.

Task 2.5: Ingredient Analysis

Objective: Explore ingredient popularity.
Actions:

- Split the `pizza_ingredients` column into individual items using `.str.split(',')`.
- Use `.explode()` and `value_counts()` to identify frequently used ingredients.
- Visualize with bar plots showing top ingredients.

Phase 3: Visualization & Insights

Task 3.1: Correlation & Revenue Patterns

Objective: Analyze how order quantity, pizza size, and category influence total revenue.
Actions:

- Create a correlation heatmap to understand relationships.
- Plot revenue distributions across various dimensions.

Task 3.2: Temporal and Product Insights

Objective: Find operational and marketing insights.
Actions:

- Determine busiest days and time windows for sales.
- Identify product mix optimization opportunities (e.g., offer bundles on popular pizzas).

Task 3.3: Business Recommendations

Objective: Summarize findings into actionable strategies.
Actions:

- Highlight high-performing products, days, and sizes.
- Suggest promotional timings and product focus areas.

4.0 Conclusion

The **Pizza Sales Analysis** project successfully provides a data-driven understanding of the business's sales performance.
By analyzing customer preferences, order behavior, and category performance, it identifies key trends and actionable opportunities for business growth.
This analysis supports decision-making in marketing, pricing strategy, and inventory optimization.

5.0 Result Snapshot

Metric	Value
Total Revenue	$817,860.05
Total Orders	21,350
Total Pizzas Sold	49,574
Average Order Value (AOV)	$38.31
Average Pizzas per Order	2.32
Top 3 Pizzas (by Revenue)	The Thai Chicken Pizza, The Barbecue Chicken Pizza, The California Chicken Pizza
Top Category	Classic
Most Popular Size	Large
