Data Analytics Project Report

Introduction

This report summarizes a set of data analytics tasks carried out using Python to address business scenarios related to sales, marketing, and customer behavior. The tasks involved filtering, grouping, ranking, comparing time periods, and visualizing data. The focus was on transforming raw sales datasets into actionable insights for decision-making teams.

Background

The dataset contained sales transaction records, product information, customer identifiers, and order attributes. Using this data, various analytical problems were solved, ranging from identifying top-selling products to detecting sales declines. Each scenario represented a real-world business requirement, reflecting how data analytics supports marketing strategies, inventory control, and customer engagement.

Learning Objectives

The work was designed to achieve the following objectives: - Strengthen skills in data cleaning, transformation, and filtering. - Apply aggregation and ranking techniques to business datasets. - Implement time-based comparisons to evaluate trends. - Create data visualizations for better insight communication. - Understand domain-specific decision-making in retail and e-commerce contexts.

Activities and Tasks

The tasks completed were: 1. Top 5 Products by Sales (2022, Mobiles & Tablets) - Filtered data by category, year, and valid orders. - Aggregated quantities sold per product and ranked results. - Created a horizontal bar chart to display the top 5 performers. 2. Sales Decline Analysis (Others Category, 2021–2022) - Compared yearly sales data for products in the "Others" category. - Calculated both absolute and percentage changes in quantities sold. - Classified trends as UP, DOWN, or FAIR and identified the 20 largest declines. 3. Customers Who Checked Out but Didn't Pay (2022) - Filtered transactions to find cases with completed checkouts but no payment. - Retrieved unique customer IDs with registration dates for targeted marketing. 4. Weekend vs Weekday Sales (Q4 2022) - Calculated monthly and overall average sales for weekends and weekdays. - Compared figures to evaluate the impact of weekend promotional campaigns. 5. Largest Sales Drop Between Two Periods - Created datasets for two different years. - Measured differences in product sales and identified the top 10 declines. - Visualized results in a bar chart.

Skills and Competencies Developed

Through these tasks, the following competencies were reinforced: - Data manipulation with Python (Pandas filtering, grouping, and merging). - Analytical thinking to convert business questions into measurable metrics. - Ranking and sorting techniques for prioritizing insights. - Time-series analysis for comparing performance across periods. - Visualization skills for clear presentation of results. - Domain knowledge in sales and marketing analytics.

Feedback and Evidence

The outputs included ranked tables, summary statistics, and visual charts. These deliverables provided marketing and warehouse teams with direct answers to their questions. The clarity of results meant that minimal explanation was needed for stakeholders to interpret the findings.

Challenges and Solutions

- Challenge: Handling multiple filters (category, date, order validity) without missing edge cases. Solution: Applied step-by-step filtering in Python and validated intermediate datasets. - Challenge: Ensuring accuracy in percentage change calculations. Solution: Verified results by cross-checking with manual calculations for sample products. - Challenge: Communicating complex findings simply. Solution: Used concise charts and grouped outputs logically.

Outcomes and Impact

The analysis: - Identified high-demand products for festival promotions. - Flagged products with declining sales for inventory adjustments. - Provided a list of customers for re-engagement campaigns. - Quantified the effect of weekend promotions, guiding marketing strategy. - Delivered actionable insights, saving time for decision-makers.

Conclusion

The project demonstrated the role of data analytics in transforming transactional data into practical business intelligence. By applying Python-based filtering, aggregation, and visualization, each scenario was addressed with clarity and precision. The skills and approaches developed here can be scaled to larger datasets and more complex problems, supporting strategic planning in sales and marketing.