Customer Analysis: Customer Segmentation and Product Recommendations for Improved Sales

Research Plan:

1. Research Objective:
    - Analyze customer behavior and preferences to identify distinct segments.
    - Develop personalized product recommendations to improve sales.
2. Research Questions:
    a. Customer Segmentation:
        i. How can we group customers based on their purchasing behavior and preferences?
        ii. Are there distinct segments of customers with similar characteristics and preferences?
        iii. What are the key factors driving customer segmentation?
    b. Product Recommendations:
        i. How can we recommend relevant products to customers based on their segment?
        ii. Which products are frequently purchased together by customers within each segment?
        iii. How can we leverage customer segment information to improve cross-selling and upselling?
3. Hypotheses:
    a. Customer Segmentation:
        1. Hypothesis 1: There are distinct customer segments based on factors such as purchase frequency, purchase amount, and product category preferences.
    b. Product Recommendations:
        2. Hypothesis 2: Personalized product recommendations based on customer segments will lead to increased sales and customer satisfaction.
4. Research Tools:
    - SQL: Extract and analyze relevant data from the database, perform aggregations, and join tables to derive insights.

- Python: Use data visualization libraries (e.g., Matplotlib, Seaborn) to create visualizations and generate insights.
- Statistical Analysis: Utilize train test split to validate hypotheses and measure significance.
- Machine Learning: Apply clustering algorithms (e.g., K-means, hierarchical clustering) for customer segmentation.

5. Research Steps:

    a. Data Preparation:

        1. Extract relevant data from the database tables using SQL queries.
        2. Perform data cleaning, handling missing values, and transforming variables if necessary.

    b. Customer Segmentation:

        3. Apply clustering algorithms to group customers based on their purchasing behavior and preferences.
        4. Evaluate different clustering techniques and determine the optimal number of segments.
        5. Interpret and analyze the characteristics and preferences of each customer segment.

    c. Product Recommendations:

        6. Use association rule mining or collaborative filtering techniques to identify product associations and recommend relevant items to customers.
        7. Assess the effectiveness of personalized product recommendations through statistical analysis and performance metrics.

    d. Visualization and Reporting:

        8. Create visualizations (e.g., charts, graphs) to communicate the findings and insights effectively.
        9. Prepare a comprehensive report outlining the customer segmentation results, product recommendations, and actionable insights for the business.