E commerce sales analysis

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Course Outline

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Abstract

In the digital era, e-commerce has become a cornerstone of retail, revolutionizing how products are bought and sold. Understanding the intricacies of e-commerce sales dynamics is paramount for businesses to thrive in this competitive landscape. It presents a comprehensive analysis of e-commerce sales, delving into key factors influencing consumer behavior, market trends, and strategies for maximizing revenue. Leveraging advanced analytics techniques, including machine learning algorithms and data visualization, this study explores patterns in sales data to uncover valuable insights.

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Problem Statement

The primary challenges of e-commerce sales analysis include managing large volumes of complex data, ensuring data quality and integration, addressing real-time analysis requirements, attributing sales across multiple channels, maintaining customer privacy and security, interpreting insights for actionable strategies, and ensuring scalability of analytical infrastructure.

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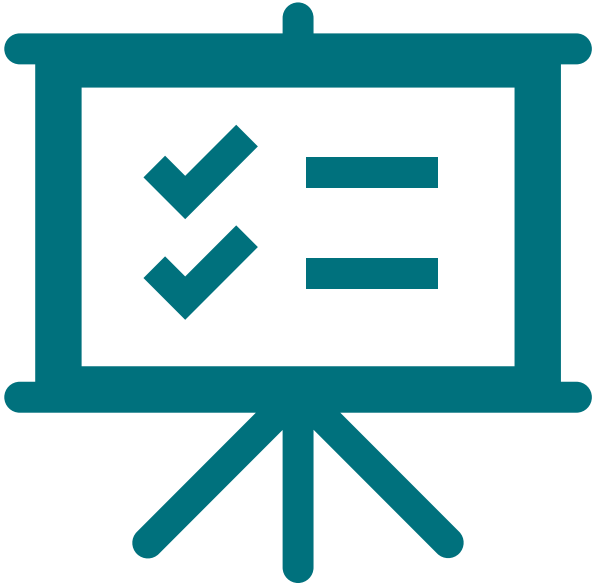
Aim and Objective

Aim: The aim of e-commerce sales analysis is to leverage sales data to optimize strategies, enhance revenue generation, and improve overall performance in the online marketplace.



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Objectives

Personalized Recommendations: Utilizing AI and ML algorithms to analyze customer behavior and preferences, providing personalized product recommendations to enhance the shopping experience and increase sales.

Customer Segmentation and Targeting: Using ML algorithms to segment customers based on various attributes such as demographics, purchase history, and browsing behavior, enabling targeted marketing campaigns and personalized messaging to different customer segments.

Fraud Detection and Prevention: Implementing AI-powered fraud detection systems to identify suspicious transactions, fraudulent activities, and unauthorized access attempts, enhancing security measures and protecting against financial losses.

Chatbots and Virtual Assistants: Integrating AI-powered chatbots and virtual assistants to provide personalized customer support, answer queries, and assist with product recommendations, improving customer engagement and satisfaction.

Predictive Analytics: Employing predictive modeling techniques to forecast future sales trends, demand patterns, and customer behavior, enabling businesses to proactively adjust strategies and inventory levels.

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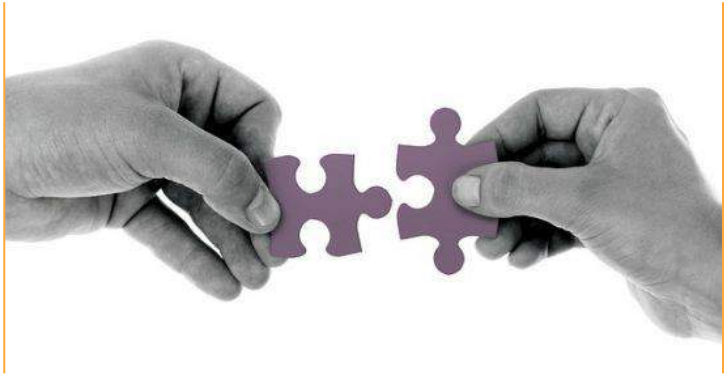
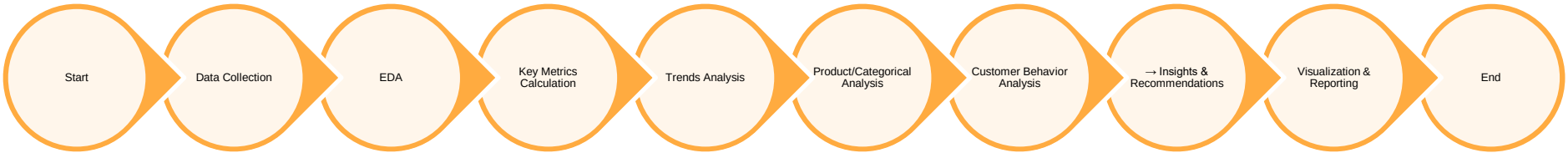
Proposed Solution

1.Data Collection: Gather sales data from various sources.
2.Data Preparation: Clean, handle missing values, and standardize data formats.
3.EDA: Explore data, visualize trends, and analyze distribution.
4.Metrics Calculation: Compute key metrics like revenue, AOV, and conversion rate.
5.Trends Analysis: Identify seasonal patterns and anomalies.
6.Product Analysis: Determine top-selling products and categories.
7.Customer Behavior: Analyze purchasing patterns and segment customers.
8.Insights & Recommendations: Summarize findings and provide actionable recommendations.
9.Visualization & Reporting: Create visualizations and prepare a concise report.
10.Iterative Improvement: Continuously monitor and update analysis based on feedback.



E commerce sales analysis



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Dataset Description:

DATASET NAME : A clear and descriptive name for the dataset is given.
SOURCE : Specify where the data was sourced from. This could be a specific e-commerce platform, a third-party data provider, or a simulated dataset.
TIME PERIOD : Mention the time period covered by the dataset. This could be daily, weekly, monthly, or yearly data.

VARIABLES :

1. **Order Details**: Include information about each order, such as order ID, date/time of purchase, customer ID, and shipping details.
2. **Product Details**: Describe the products sold, including product ID, name, category, description, price, and quantity sold.
3. **Customer Information**: Provide details about the customers, such as customer ID, name, location, email, and any other relevant demographic information.
4. **Sales Metrics**: Include metrics related to sales performance, such as revenue, discounts applied, taxes, shipping costs, and total order value.

5. **Payment Information**: If applicable, include payment details such as payment method used (credit card, PayPal, etc.), transaction ID, and payment status.
6. **Promotions and Discounts**: If promotions or discounts were applied to orders, include details about the type of promotion, discount amount, and any codes used.
7. **Order Status**: Describe the status of each order (e.g., processing, shipped, delivered, canceled).
8. **Customer Behavior**: Include any additional information that may be relevant for analyzing customer behavior, such as website visits, time spent on site, or products viewed.

- **DATA SIZE :** Provide information on the size of the dataset in terms of the number of rows and columns.
- **DATA CLEANING :** If any cleaning or preprocessing has been applied to the dataset (e.g., handling missing values, removing duplicates), describe the steps taken.
- **POTENTIAL APPLICATION :** Discuss potential use cases for the dataset, such as sales forecasting, customer segmentation, or market basket analysis.

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Model Development & Algorithm

Image Preprocessing:

Data Collection: Gather comprehensive data on e-commerce sales transactions, including details such as order IDs, product information, customer demographics, and transaction timestamps.
Data Preprocessing: Cleanse the data by handling missing values, removing duplicates, and encoding categorical variables. Normalize or scale numerical features as needed.
Feature Engineering: Extract relevant features from the dataset that can provide insights into sales patterns, such as time-based features (day of week, time of day), product attributes, customer behavior, and marketing indicators.
Exploratory Data Analysis (EDA): Conduct exploratory analysis to understand the distribution of key variables, identify correlations, and uncover insights that could guide further analysis.

- **Model Development**:
    1. Choose appropriate algorithms based on the analysis goals and characteristics of the data. Common choices include regression models, decision trees, random forests, or neural networks.
    2. Split the dataset into training and testing sets for model evaluation.
- **Model Evaluation**: Evaluate the trained model's performance using appropriate evaluation metrics (e.g., mean absolute error, root mean squared error) on the testing dataset. Compare the model's performance against baseline models or industry benchmarks.
- **Insights Generation**: Interpret the model's predictions and extract actionable insights to inform business decisions. Identify key factors influencing e-commerce sales and explore opportunities for optimization.
- **Iterative Improvement :** Explore additional features, experiment with different algorithms, and update the model as needed to adapt to changing business requirements and market dynamics.

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Year-to-date (YTD) sales, profit, quantity sold, and profit margin

```
YTD Sales = TOTALYTD(SUM('ecommerce_data (1)'[sales_per_order]),Calender[Date])
```

Year over year (YOY) sales, profit, quantity sold, and profit margin

```
Profit color = IF([YoY Profit]>0, "Green","Red")

Profit Icon = var positive_icon = UNICHAR (9650)
              var negative_icon = UNICHAR (9660)
                  var result = IF([YoY Profit]>0,positive_icon,negative_icon)
                  return result
```

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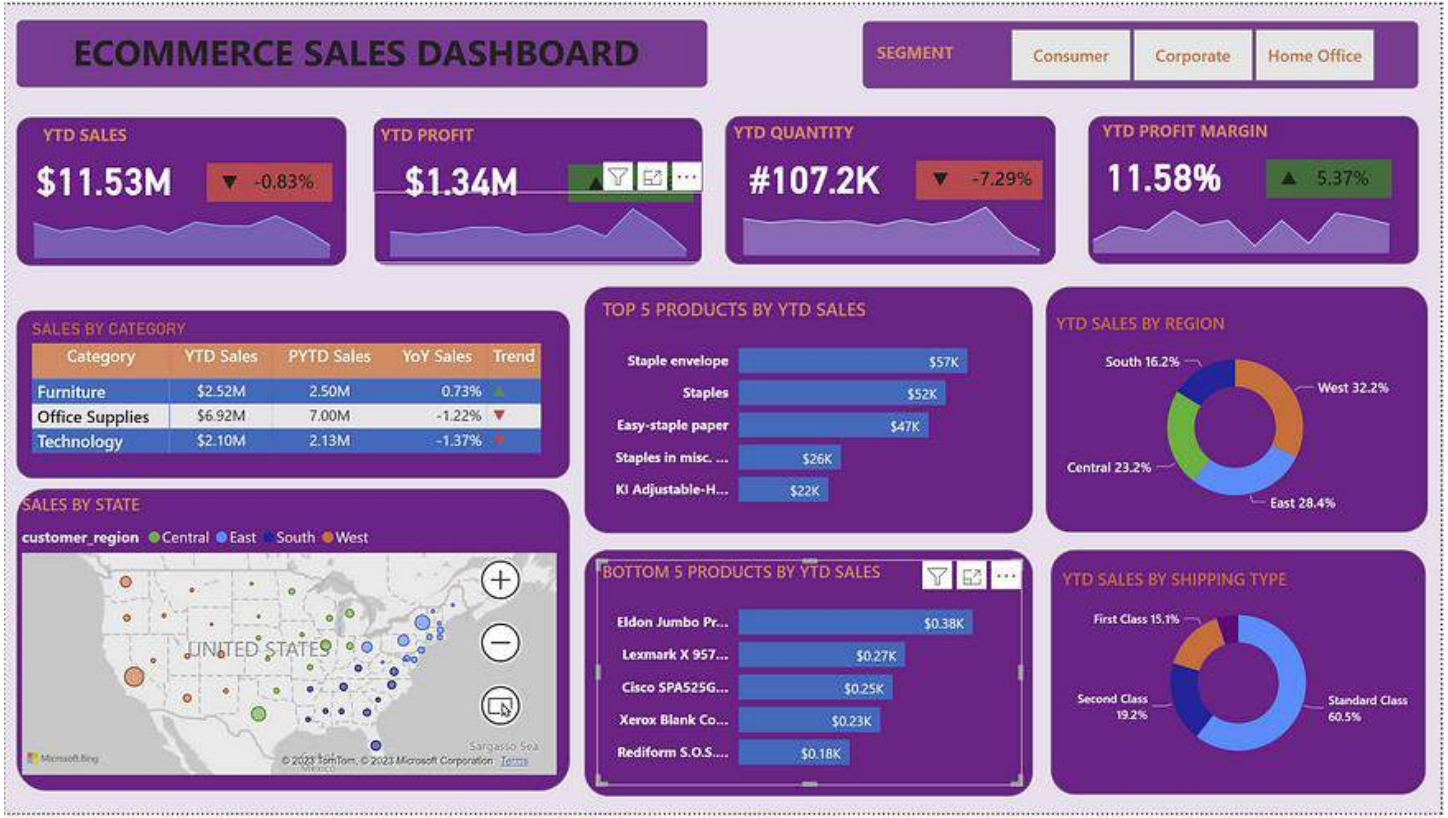
Result



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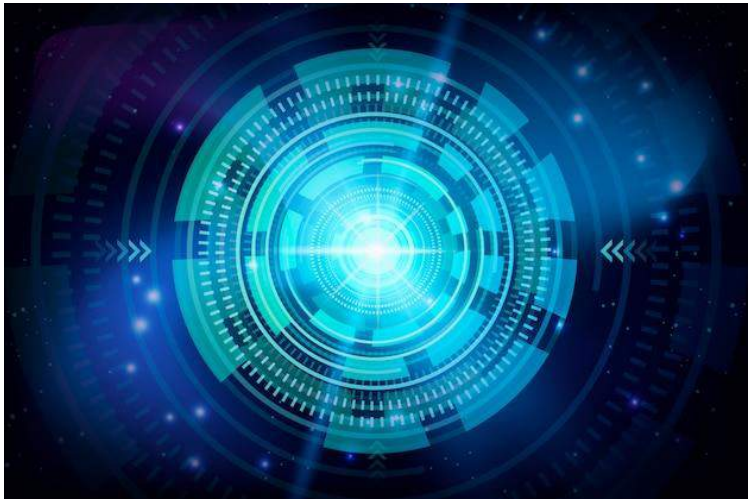
Future Scope

Advanced Predictive Analytics: With the advancement of machine learning and AI technologies, e-commerce sales analysis will move towards more accurate predictive models. These models will forecast sales trends, customer behavior, and market demand with higher precision, enabling businesses to make proactive decisions.

Emerging Technologies Integration: Integration of emerging technologies such as block chain, augmented reality (AR), and virtual reality (VR) will open up new avenues for e-commerce sales analysis. These technologies will enable innovative approaches to product visualization, supply chain transparency, and customer engagement.



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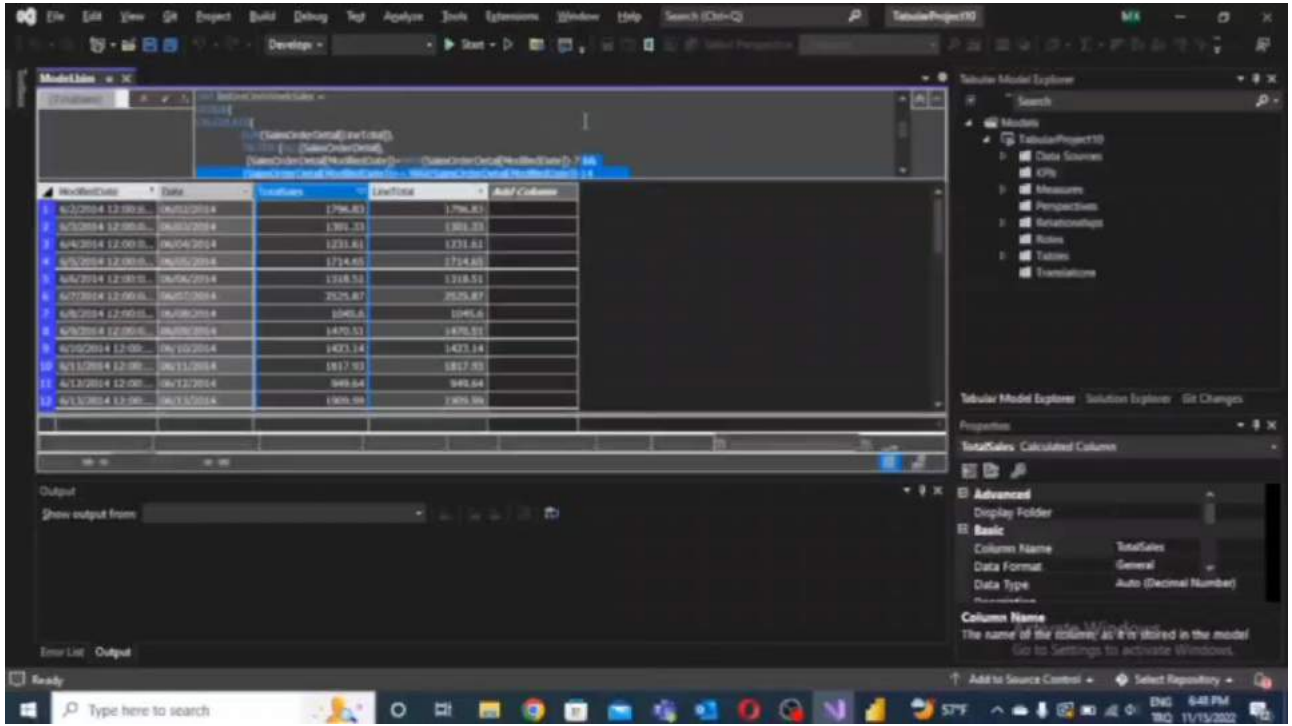
Video of the Project



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Conclusion

In conclusion, the e-commerce sales analysis project has provided valuable insights into understanding and optimizing sales performance in the digital marketplace. Through comprehensive data collection, preprocessing, and analysis, we have gained a deeper understanding of customer behavior, product trends, and market dynamics.

We can able to find,

Identification of top-selling products and categories, enabling targeted marketing strategies and inventory management.

Analysis of customer demographics and purchase patterns, facilitating personalized marketing campaigns and customer segmentation.

Exploration of sales trends over time, allowing for forecasting and proactive decision-making to capitalize on market opportunities.

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Reference

https://github.com/DharshanKumarCoder/ecommerce_analysis.git
https://www.researchgate.net/publication/290786852_Sales_Analysis_of_E-Commerce_Websites_using_Data_Mining_Techniques
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Thank you!