

PRODUCT SALES ANALYSIS

ABSTRACT

- ❖ The "Product Sales Analysis" machine learning project aims to develop a predictive model that can analyze and forecast product sales based on historical data.
- ❖ This project utilizes a dataset containing information about product attributes, sales channels, pricing, and time-related factors.

OBJECTIVES

- ❖ Product sales analysis typically has several objectives, including:
Performance Evaluation, Identifying Trends, Customer Insights, Inventory Management, Competitive Analysis, Profitability Analysis, Marketing Effectiveness, Forecasting, Geographic Analysis, Product Lifecycle Management, Customer Retention, Identifying Growth Opportunities, Cost Reduction, Quality Improvement, Compliance and Reporting
- ❖ By achieving these goals we would know about the sales, profit of the products.

Data Source

Dataset Link: <https://www.kaggle.com/datasets/ksabishek/product-sales-data>

1		Date	Q-P1	Q-P2	Q-P3	Q-P4	S-P1	S-P2	S-P3	S-P4
2	0	13/6/2010	5422	3725	576	907	17187.74	23616.5	3121.92	6466.91
3	1	14/6/2010	7047	779	3578	1574	22338.99	4938.86	19392.76	11222.62
4	2	15/6/2010	1572	2082	595	1145	4983.24	13199.88	3224.9	8163.85
5	3	16/6/2010	5657	2399	3140	1672	17932.69	15209.66	17018.8	11921.36
6	4	17/6/2010	3658	3207	2184	708	11627.56	20332.38	11837.28	5048.04
7	5	18/6/2010	2898	2539	311	1513	9186.66	16097.26	1685.62	10787.69
8	6	19/6/2010	6912	1470	1576	1608	21911.04	9319.8	8541.92	11465.04
9	7	20/6/2010	5209	2550	3415	842	16512.53	16167	18509.3	6003.46
10	8	21/6/2010	6322	852	3646	1377	20040.74	5401.68	19761.32	9818.01
11	9	22/6/2010	6865	414	3902	562	21762.05	2624.76	21148.84	4007.06
12	10	23/6/2010	1287	3955	2710	1804	4079.79	25074.7	14688.2	12862.52
13	11	24/6/2010	2197	1429	2754	1299	6964.49	9059.86	14926.68	9261.87
14	12	25/6/2010	7910	1622	5574	306	25074.7	10283.48	30211.08	2181.78
15	13	26/6/2010	3855	1015	1746	608	12220.35	6435.1	9463.32	4335.04
16	14	27/6/2010	5988	3288	916	1530	18981.96	20845.92	4964.72	10908.9
17	15	28/6/2010	2653	1544	3867	652	8410.01	9788.96	20959.14	4648.76
18	16	29/6/2010	3654	2294	3244	897	11614.88	14543.96	17582.48	6395.61
19	17	30/6/2010	7077	2297	5376	1130	22434.09	14562.98	29137.92	8056.9
20	18	1/7/2010	3509	700	1175	1205	11123.53	4438	6368.5	8591.65
21	19	2/7/2010	3716	3175	651	1263	11779.72	20129.5	3528.42	9005.19
22	20	3/7/2010	7746	2883	671	728	24554.82	18278.22	3636.82	5190.64
23	21	4/7/2010	7006	2833	758	1005	22209.02	17961.22	4108.36	7165.65
24	22	5/7/2010	5223	1923	1583	1877	16556.91	12191.82	8579.86	13383.01
25	23	6/7/2010	4753	3125	2787	583	15067.01	19812.5	15105.54	4156.79
26	24	7/7/2010	3369	752	5913	358	10679.73	4767.68	32048.46	2552.54

DESIGN THINKING

- ❖ Data Preprocessing
- ❖ Exploratory Data Analysis (EDA)
- ❖ Feature Engineering
- ❖ Predictive Modeling
- ❖ Customer Segmentation
- ❖ Anomaly Detection
- ❖ Feature Importance Analysis
- ❖ Data Visualization
- ❖ Evaluation and Reporting
- ❖ Business Recommendations

Data Preprocessing

- ▶ Clean the dataset: Check for missing values and outliers.
- ▶ Convert the 'Date' column to a datetime format for time series analysis.
- ▶ Create new features if needed, such as total sales, profit, or seasonality indicators.

Exploratory Data Analysis (EDA)

- ❖ Visualize the data to understand the trends, seasonality, and correlations.
- ❖ Calculate basic statistics and metrics to gain insights into the dataset.

Feature Engineering

- ❖ Create relevant features that could help predict sales, such as day of the week, month, or any external factors like holidays.

Predictive Modeling:

- ❖ Split the dataset into training and testing sets.
- ❖ Apply various machine learning models for predicting future sales, such as linear regression, decision trees, random forests, or time series models like ARIMA or Prophet.
- ❖ Tune the hyperparameters of the models to achieve the best accuracy.

Customer Segmentation:

- Utilize clustering algorithms (e.g., K-means) to segment customers based on their purchasing behavior.

Anomaly Detection:

- Implement anomaly detection techniques, such as Isolation Forest or One-Class SVM, to identify irregular sales patterns or deviations.

Feature Importance Analysis:

- ▶ Evaluate the importance of each feature in predicting product sales. This can help in understanding which factors have the most significant impact.

Data Visualization:

- ▶ Create visualizations to represent the results of your analysis. This can include sales forecasts, customer segments, and anomaly alerts.

Evaluation and Reporting:

- ▶ Evaluate the performance of the machine learning models using appropriate metrics (e.g., RMSE for regression models).
- ▶ Generate reports or dashboards to present the results and insights to stakeholders.

Business Recommendations:

- ❖ Provide actionable recommendations based on the analysis. For example, suggestions for inventory management, pricing strategies, or targeted marketing campaigns.

CONCLUSION

- ❑ The project aims to help businesses optimize their operations, maximize sales, and improve customer satisfaction. It provides a comprehensive solution for analyzing historical sales data and leveraging machine learning techniques to make informed business decisions.
- ❑ Please note that this is a high-level overview, and the specific implementation details and choice of machine learning models may vary based on the characteristics of your dataset and the goals of your analysis.

THANK
YOU