



**A STUDY ON SALES PREDICTION OF SELECTED LAPTOPS AT RELIANCE DIGITAL,
ANANTAPUR**

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JNTUA SCHOOL OF MANAGEMENT STUDIES ANANTAPUR (India) Research Guide.

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ABSTRACT

Using advanced Python techniques, this study explores into retail management, focusing on predicting sales for specific laptop models. By analyzing historical sales data, the research aims to identify key variables impacting sales growth and highlights the significance of laptop selection, emphasizing DELL and HP models. The study employs intelligent prediction algorithms to generate accurate sales forecasts and enhances its findings through impactful data visualization, presenting charts and graphs for clarity.

Key words: Analyzing Sales Data, Linear Regression Model, Predictive Modeling, Predictive analytics, python, sales prediction.

INTRODUCTION

Sales prediction is the process of estimating future sales by predicting the amount of product or services an individual salesperson, a sales team, or a company is likely to sell in a fixed time period i.e. week, month, quarter, or year.

It is determining present-day or future sales using data like past sales, seasonality, festivals, economic conditions, etc.

DEFINATION:

Sales prediction is to estimate how much of a product or service will be sold during a given period, which can help businesses optimize their inventory, production, and marketing efforts to maximize profits and minimize costs.

NEED OF THE STUDY

The Need of the study is to Sales Prediction of the Selected laptops At Reliance Digital, Anantapur.

SCOPE OF THE STUDY

The study covers the Sales Prediction of Selected Laptops in Reliance digital, Anantapur.

Laptops Brand:

- HP
- DELL
- LENOVA

OBJECTIVES OF THE STUDY:

- To analyze the sales of Selected Laptops in Reliance Digital, Anantapur.
- To determine the most effecting factors for purchasing of the Laptops in Reliance Digital, Anantapur.
- To Sales Prediction of Selected Laptops in Reliance Digital, Anantapur.



RESEARCH METHODOLOGY

The Secondary Data From Reliance Digital, Anantapur.

Secondary Data:

The Secondary data was collected from reliance digital, Annual reports, Websites, Journals, Articles, etc..

Websites : <http://www.reliancedigital.in>

TOOLS AND TECHNIQUES:

Tools:

Python

Techniques:

Regression Analysis

Tables

Graphs

LIMITATIONS OF THE STUDY

- The study is limited to Sales Prediction of Selected Laptops at Reliance Digital, Anantapur.
- The study is limited to two years of data i.e. 2021-2023 at Reliance Digital, Anantapur.

DATA ANALYSIS AND INTERPRETATION:

Import the data

```
import pandas as pd
df=pd.read_excel('sales data.xlsx')
```

Interpretation:

Here imports the Pandas library and then uses the read_excel function to read the sales data from an Excel file. The sales data is then stored in a Pandas DataFrame.

Loading data

```
[ ] df.head()
```

	Month	sales	sales.1	sales.2
0	NaT	dell	Hp	lenova
1	2021-01-01	53	55	45
2	2021-02-01	36	40	33
3	2021-03-01	33	37	36
4	2021-04-01	40	46	29

```
[ ] df.tail()
```

	Month	sales	sales.1	sales.2
26	2023-02-01	43	46	42
27	2023-03-01	45	44	40
28	2023-04-01	46	47	39
29	2023-05-01	50	49	43
30	2023-06-01	54	50	47

Interpretation:

Here imports the Pandas library and then uses the head() and tail() functions to Show the first and last few rows of the sales data.



Null Values:

```
df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 31 entries, 0 to 30
Data columns (total 4 columns):
 #   Column  Non-Null Count  Dtype
---  -
 0   Month   30 non-null    datetime64[ns]
 1   sales   31 non-null    object
 2   sales.1 31 non-null    object
 3   sales.2 31 non-null    object
dtypes: datetime64[ns](1), object(3)
memory usage: 1.1+ KB
```

Analyze code for Sales of Selected laptops:

```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression

# Sample data as a dictionary
data = {
    'Month': ['Jan-21', 'Feb-21', 'Mar-21', 'Apr-21', 'May-21', 'Jun-21', 'Jul-21', 'Aug-21', 'Sep-21', 'Oct-21', 'Nov-21', 'Dec-21', 'Jan-22', 'Feb-22', 'Mar-22',
             'Apr-22', 'May-22', 'Jun-22', 'Jul-22', 'Aug-22', 'Sep-22', 'Oct-22', 'Nov-22', 'Dec-22', 'Jan-23', 'Feb-23', 'Mar-23', 'Apr-23', 'May-23', 'Jun-23'],
    'dell': [53, 36, 33, 40, 42, 50, 39, 43, 50, 56, 38, 49, 38, 43, 40, 37, 44, 47, 39, 40, 57, 60, 43, 50, 55, 43, 45, 46, 50, 54],
    'hp': [55, 40, 37, 46, 43, 50, 44, 49, 56, 60, 45, 49, 56, 41, 39, 40, 43, 52, 45, 48, 57, 60, 39, 52, 50, 46, 44, 47, 49, 50],
    'lenova': [45, 33, 36, 29, 37, 40, 38, 34, 41, 47, 33, 39, 48, 35, 34, 28, 38, 42, 30, 33, 46, 49, 31, 48, 58, 42, 40, 39, 43, 47]
}

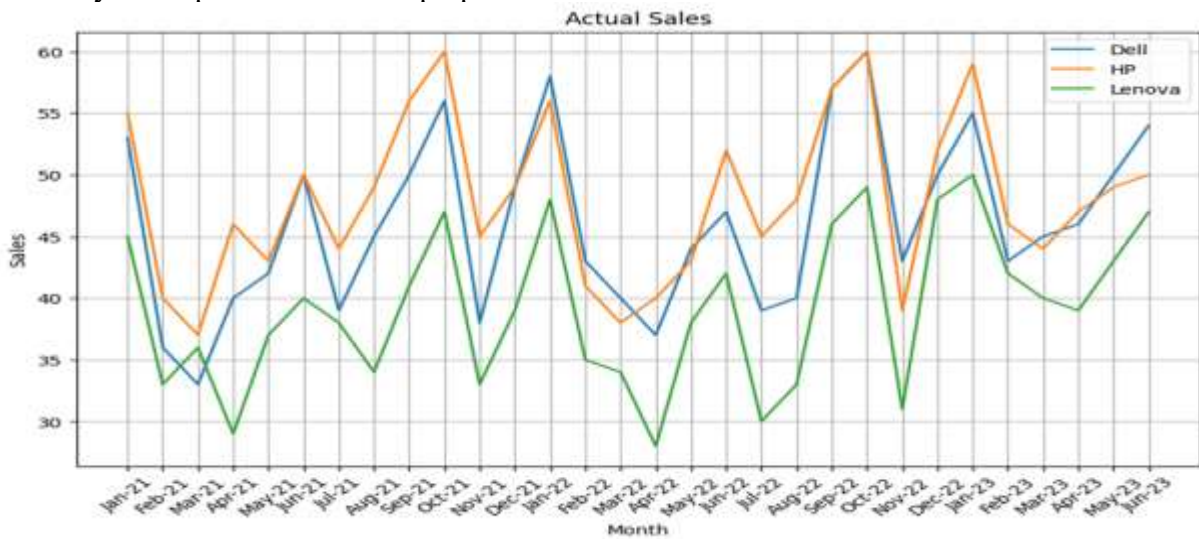
# Create a DataFrame from the data dictionary
df = pd.DataFrame(data)

# Extract features (months) and labels (sales) for each brand
X = df.index.values.reshape(-1, 1)
y_dell = df['dell']
y_hp = df['hp']
y_lenova = df['lenova']

# Perform linear regression for each brand separately
reg_dell = LinearRegression()
reg_hp = LinearRegression()
reg_lenova = LinearRegression()
reg_dell.fit(X, y_dell)
reg_hp.fit(X, y_hp)
reg_lenova.fit(X, y_lenova)

# Plot the actual sales
plt.figure(figsize=(20, 6))
plt.plot(df['Month'], df['dell'], label='Dell')
plt.plot(df['Month'], df['hp'], label='HP')
plt.plot(df['Month'], df['lenova'], label='Lenova')
plt.xlabel('Month')
plt.ylabel('Sales')
plt.title('Actual Sales')
plt.legend()
plt.xticks(rotation=45)
plt.grid(True)
plt.show()
```

Analyze Graph for Selected laptops:



Interpretation:

- From the above graph sales of DELL laptops were sold highest in the month of oct-2022 and the sales count is 60 and the lowest sales in the month of Mar-2021 and the sales count is 33 and Average sales count is 46.
- From the above graph sales of HP laptops were sold highest in the month of oct-2022 and the sales count is 60 and the Lowest sales in the month of Mar-2021 and the sales count is 37 and Average sale count is 48.
- From the above graph sales of LENOVA laptops were sold highest in the month of jan-2023 and the sales count is 51 and the Lowest sales in the month of Apr-2021 and the sales count is 30 and Average sales count is 39.

Sales prediction code for selected laptops :

```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression

# Sample data as a dictionary
data = {
    'Month': ['Jan-21', 'Feb-21', 'Mar-21', 'Apr-21', 'May-21', 'Jun-21', 'Jul-21', 'Aug-21', 'Sep-21', 'Oct-21', 'Nov-21', 'Dec-21', 'Jan-22', 'Feb-22', 'Mar-22',
             'Apr-22', 'May-22', 'Jun-22', 'Jul-22', 'Aug-22', 'Sep-22', 'Oct-22', 'Nov-22', 'Dec-22', 'Jan-23', 'Feb-23', 'Mar-23', 'Apr-23', 'May-23', 'Jun-23'],
    'dell': [53, 36, 33, 40, 42, 50, 39, 45, 50, 56, 38, 49, 58, 43, 40, 37, 44, 47, 39, 40, 57, 60, 43, 50, 55, 43, 45, 46, 50, 54],
    'hp': [55, 40, 37, 46, 43, 50, 44, 49, 56, 60, 45, 49, 56, 41, 38, 40, 43, 52, 45, 48, 57, 60, 39, 52, 59, 46, 44, 47, 49, 50],
    'lenova': [45, 33, 30, 29, 37, 40, 38, 34, 41, 47, 33, 39, 48, 35, 34, 28, 38, 42, 30, 33, 46, 49, 31, 48, 50, 42, 40, 39, 43, 47]
}

# Create a DataFrame from the data dictionary
df = pd.DataFrame(data)

# Extract features (months) and labels (sales) for each brand
X = df.index.values.reshape(-1, 1)
y_dell = df['dell']
y_hp = df['hp']
y_lenova = df['lenova']

# Perform linear regression for each brand separately
reg_dell = LinearRegression()
reg_hp = LinearRegression()
reg_lenova = LinearRegression()
reg_dell.fit(X, y_dell)
reg_hp.fit(X, y_hp)
reg_lenova.fit(X, y_lenova)
```



```
# Make predictions for the next 6 months (Jan-23 to Jun-23) and beyond (Jul-23 to Dec-23)
next_months = len(df) + 6
X_future = list(range(len(df), next_months))
X_future = pd.DataFrame(X_future)

pred_dell = reg_dell.predict(X_future)
pred_hp = reg_hp.predict(X_future)
pred_lenova = reg_lenova.predict(X_future)

# Generate dates for the predictions for the next 6 months (Jan-23 to Jun-23)
date_range = pd.date_range(start='2023-07-01', periods=6, freq='M')

# Generate dates for the predictions beyond the next 6 months (Jul-23 to Dec-23)
future_date_range = pd.date_range(start='2023-07-01', end='2023-12-31', freq='M')

# Combine the actual and predicted sales into a single DataFrame
combined_df = pd.DataFrame({
    'Month': df['Month'].tolist() + date_range.strftime('%b-%y').tolist(),
    'Actual Dell': df['dell'].tolist() + [None] * len(date_range),
    'Actual HP': df['hp'].tolist() + [None] * len(date_range),
    'Actual lenovo': df['lenovo'].tolist() + [None] * len(date_range),
    'Predicted Dell': [None] * len(df) + pred_dell.tolist(),
    'Predicted HP': [None] * len(df) + pred_hp.tolist(),
    'Predicted Lenovo': [None] * len(df) + pred_lenova.tolist(),
})

# Generate a DataFrame with the predicted sales for the future months
predictions_future = pd.DataFrame({
    'Month': future_date_range.strftime('%b-%y').tolist(),
    'Predicted Dell': pred_dell.tolist(),
    'Predicted HP': pred_hp.tolist(),
    'Predicted Lenovo': pred_lenova.tolist(),
})

# Display the predicted sales for the future months
print("Predicted Sales for Future Months (July 2023 to December 2023):")
print(predictions_future)

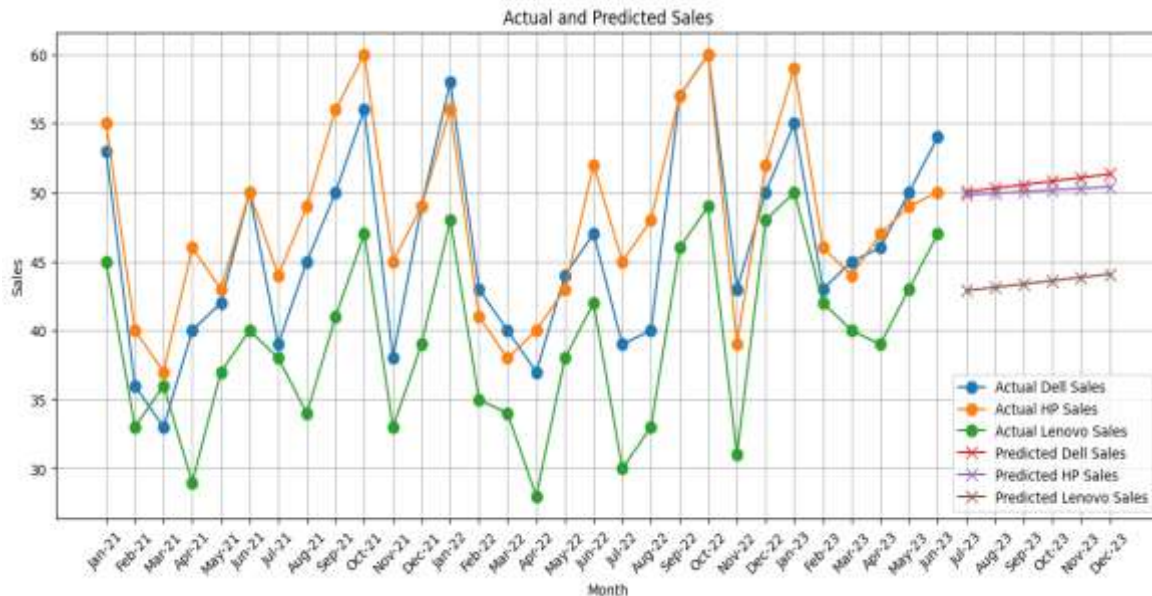
# Plot the combined actual and predicted sales for all companies
plt.figure(figsize=(15, 6))
plt.plot(combined_df['Month'], combined_df['Actual Dell'], 'o-', label='Actual Dell Sales', markersize=8)
plt.plot(combined_df['Month'], combined_df['Actual HP'], 'o-', label='Actual HP Sales', markersize=8)
plt.plot(combined_df['Month'], combined_df['Actual Lenovo'], 'o-', label='Actual Lenovo Sales', markersize=8)

plt.plot(combined_df['Month'], combined_df['Predicted Dell'], 'x-', label='Predicted Dell Sales', markersize=8)
plt.plot(combined_df['Month'], combined_df['Predicted HP'], 'x-', label='Predicted HP Sales', markersize=8)
plt.plot(combined_df['Month'], combined_df['Predicted Lenovo'], 'x-', label='Predicted Lenovo Sales', markersize=8)

plt.xlabel('Month')
plt.ylabel('Sales')
plt.title('Actual and Predicted Sales')
plt.legend()
plt.xticks(rotation=45)
plt.grid(True)
plt.show()
```



Sales Prediction graph for selected laptops :



Prediction Values:

Predicted Sales for Future Months (July 2023 to December 2023):

Month	Predicted Dell	Predicted HP	Predicted Lenovo
0 Jul-23	50.045977	49.820690	42.887356
1 Aug-23	50.302707	49.938154	43.127401
2 Sep-23	50.559436	50.055617	43.367445
3 Oct-23	50.816166	50.173081	43.607490
4 Nov-23	51.072896	50.290545	43.847534
5 Dec-23	51.329626	50.408009	44.087579

Interpretation:

- From the above graph predicted sales of Dell laptops decreases, 50 units was sold in month of Jul-2023 and 54 units was sold in the month of Dec-2023.
- From the above graph predicted sales of HP laptops increase gradually over the next 6 months, 52 units was sold in month of June-2023 and 54 units was sold in the month of Dec-2023.
- From the above graph Predicted sales of LENOVA laptops decreases, 42 units was sold in month of Jul-2023 and 44 units was sold in the month of Dec-2023.

Findings:

- The sales of DELL laptops were sold highest in the month of oct-2022 and the sales count is 60 and the lowest sales in the month of Mar-2021 and the sales count is 33 and Average sales count is 46.
- The sales of HP laptops were sold highest in the month of oct-2022 and the sales count is 60 and the Lowest sales in the month of Mar-2021 and the sales count is 37 and Average sale count is 48.
- The sales of Lenova laptops were sold highest in the month of jan-2023 and the sales count is 51 and the Lowest sales in the month of Apr-2021 and the sales count is 30 and Average sales count is 39.
- The sales of the Laptops were Highest in the months of oct and Jan due to the festival season where more offered.
- The sales of the HP Laptops gradually increasing Because they provide more offers to customers.
- The predicted sales of Dell laptops decreases, 50 units was sold in month of Jul-2023 and 54 units was sold in the month of Dec-2023.



- The predicted sales of HP laptops increase gradually over the next 6 months, 52 units was sold in month of June-2023 and 54 units was sold in the month of Dec-2023.
- The Predicted sales of Lenova laptops decreases, 42 units was sold in month of Jul-2023 and 44 units was sold in the month of Dec-2023.

Conclusion:

Sales Prediction is crucial for company to make informed decisions, demand fluctuations, and it can also help to identify periods of high and low demand of sales That can be used to manage inventory levels.

Based on this analysis, forecasting sales are growing continuously and in an upward direction.

Suggestions:

- It is suggested that the sales of the Dell and HP Laptops sales are high so Maintain inventory of those brands will helpful for the sales.
- On the regular days Lenova laptop sales was more compared to festival season, in the festival season Dell and HP sales was high, so to get more sales providing offers may increase.
- Customers are Looking for a budget-friendly laptop, so offer a variety of models with different features, so they can find one that fits their needs.
- Sales of the Laptops was based on the features of the laptops like brand, memory, storage, color, model etc., so that maintain the all brands and models will increase the sales.
- Sales of the laptops was decreased in the month of march, in order to increase the sales you should provide offers, discounts.

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