

Walmart Sales



Factors influencing sales of larger
retailer

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Project Overview: This presentation seeks to provide actionable insights for improving sales strategies, optimizing operations, and better understanding consumer behavior under varying conditions. This presentation involves analyzing a dataset, extracting insights, and presenting findings with the Python Jupyter Notebook coding and visualization Tool.

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- ❖ Final conclusion



INTRODUCTION

Walmart Sales

The Walmart Sales dataset provides a detailed look into weekly sales data collected from various Walmart stores across regions. This dataset includes essential variables like:

- Store
- Date
- Weekly Sales
- Holiday Flag
- Temperature
- Fuel Price
- CPI (Consumer Price Index)
- Unemployment



PROBLEM STATEMENT

The purpose of this analysis is to explore Walmart's weekly sales data and identify trends, patterns, and factors influencing sales performance for the following:

1. Holiday Impact: How do holidays affect weekly sales? Do they lead to significant increases or fluctuations?
2. Seasonality: Are there seasonal trends in sales influenced by temperature or time of year?
3. Economic Factors: What role do external economic indicators like fuel prices, CPI, and unemployment play in sales performance?
4. Store-Level Analysis: How do sales vary across different Walmart stores? Are there standout performers or locations requiring strategic focus?

DATASET DESCRIPTION

The Walmart Sales dataset contains weekly sales data collected from Walmart stores. It captures various attributes that provide insights into sales performance, consumer behavior, and external factors affecting retail sales. Here's a breakdown of its key components:

- Store: Unique identifier for each Walmart store in the dataset.
- Weekly Sales: Total revenue generated for each store in a given week.
- Holiday Flag: Binary indicator of whether the week includes a major holiday.
- Temperature: Average temperature during the week, which may influence shopping patterns.
- Consumer Price Index (CPI): An economic indicator reflecting inflation and purchasing power.
- Unemployment: Weekly unemployment rate, impacting consumer behavior and sales.

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

2] Generated code may be subject to a license | DataScientist1000/DataScienceProjects
#Import all the Libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

3] #Load the dataset
data = pd.read_csv("Walmart_Sales.csv")

4] #Data Inspection
# .head(), .info(), .shape()

] Start coding or generate with AI.

5] data.head(10)
```

| | Store | Date | Weekly_Sales | Holiday_Flag | Temperature | Fuel_Price | CPI | Unemployment |
|---|-------|------------|--------------|--------------|-------------|------------|------------|--------------|
| 0 | 1 | 5/2/2010 | 1643690.90 | 0 | 42.31 | 2.572 | 211.096358 | 8.106 |
| 1 | 1 | 12/2/2010 | 1641957.44 | 1 | 38.51 | 2.548 | 211.242170 | 8.106 |
| 2 | 1 | 19-02-2010 | 1611968.17 | 0 | 39.93 | 2.514 | 211.289143 | 8.106 |
| 3 | 1 | 26-02-2010 | 1409727.59 | 0 | 46.63 | 2.561 | 211.319643 | 8.106 |
| 4 | 1 | 5/3/2010 | 1554806.68 | 0 | 46.50 | 2.625 | 211.350143 | 8.106 |
| 5 | 1 | 12/3/2010 | 1439541.59 | 0 | 57.79 | 2.667 | 211.380643 | 8.106 |
| 6 | 1 | 19-03-2010 | 1472515.79 | 0 | 54.58 | 2.720 | 211.215635 | 8.106 |
| 7 | 1 | 26-03-2010 | 1404429.92 | 0 | 51.45 | 2.732 | 211.018042 | 8.106 |
| 8 | 1 | 2/4/2010 | 1504068.28 | 0 | 62.27 | 2.710 | 210.820450 | 7.808 |

DATA ANALYSIS (PART 1)

Walmart data analysis refers to the process of analyzing Walmart's sales and business-related data to uncover trends, patterns, and insights that can drive strategic decision-making. By studying this data, businesses can understand the factors influencing Walmart's performance, customer behavior, and market dynamics. Here are the primary goals and components of Walmart data analysis:

Goals of Walmart Data Analysis:

- Understand Sales Trends
- Evaluate Store Performance
- Customer Behavior
- Optimize Inventory and Operations
- Forecasting

Columns Name:
Index(['Store', 'Date', 'Weekly_Sales', 'Holiday_Flag', 'Temperature',
 'Fuel_Price', 'CPI', 'Unemployment'],
 dtype='object')

Data Type:

| Store | int64 |
|--------------|---------|
| Date | object |
| Weekly_Sales | float64 |
| Holiday_Flag | int64 |
| Temperature | float64 |
| Fuel_Price | float64 |
| CPI | float64 |
| Unemployment | float64 |
| dtype: | object |

Print the statistical Parameters
data.describe()

| | Store | Weekly_Sales | Holiday_Flag | Temperature | Fuel_Price | CPI | Unemployment |
|-------|-------------|--------------|--------------|-------------|-------------|-------------|--------------|
| count | 6435.000000 | 6.435000e+03 | 6435.000000 | 6435.000000 | 6435.000000 | 6435.000000 | 6435.000000 |
| mean | 23.000000 | 1.046965e+06 | 0.069930 | 60.663782 | 3.358607 | 171.578394 | 7.999151 |
| std | 12.988182 | 5.643666e+05 | 0.255049 | 18.444933 | 0.459020 | 39.356712 | 1.875885 |
| min | 1.000000 | 2.099862e+05 | 0.000000 | -2.060000 | 2.472000 | 126.064000 | 3.879000 |
| 25% | 12.000000 | 5.533501e+05 | 0.000000 | 47.460000 | 2.933000 | 131.735000 | 6.891000 |
| 50% | 23.000000 | 9.607460e+05 | 0.000000 | 62.670000 | 3.445000 | 182.616521 | 7.874000 |
| 75% | 34.000000 | 1.420159e+06 | 0.000000 | 74.940000 | 3.735000 | 212.743293 | 8.622000 |
| max | 45.000000 | 3.818686e+06 | 1.000000 | 100.140000 | 4.468000 | 227.232807 | 14.313000 |

DATA ANALYSIS (PART 2)

This type of analysis can help Walmart and similar businesses improve their marketing strategies, pricing models, and resource allocation while catering to customer needs more effectively.

Key Components of Walmart Data Analysis:

- Descriptive Analysis
- Exploratory Data Analysis (EDA)
- Predictive Modeling
- Visualization

```
9] #Measure of Frequency
print("Frequency and Count: ")

for col in data.columns: # col iteration variable , i, x
    print(f"\nFrequency of {col}'")
    print(data[col].value_counts())
```

Frequency and Count:
'nFrequency of Store'
Store
1 143
2 143
3 143
4 143
5 143
6 143
7 143
8 143
9 143
10 143
11 143
12 143
13 143
14 143
15 143
16 143
17 143
18 143
19 143
20 143
21 143
22 143
23 143
24 143
25 143
26 143
27 143
28 143
29 143
30 143
31 143
32 143
33 143
34 143
Name: count, dtype: int64
'nFrequency of Date'
Date
5/2/2010 45
12/2/2010 45
19-02-2010 45
26-02-2010 45
5/3/2010 45
..
28-09-2012 45
5/10/2012 45
12/10/2012 45
19-10-2012 45
26-10-2012 45
Name: count, Length: 143, dtype: int64
'nFrequency of Weekly_Sales'
Weekly_Sales
760281.43 1
1643690.90 1
1641957.44 1
843361.10 1
773367.71 1
..
1404429.92 1
1472515.79 1
1439541.59 1
1554806.68 1
1409727.59 1
Name: count, Length: 6435, dtype: int64
'nFrequency of Holiday_Flag'
Holiday_Flag
0 5985
1 450
Name: count, dtype: int64
'nFrequency of Temperature'
Temperature
50.43 11
67.87 10
76.03 9
70.07 9
70.28 9
..
33.18 1
30.20 1
31.91 1
30.87 1
43.52 1
Name: count, Length: 3528, dtype: int64
'nFrequency of Fuel_Price'
Fuel_Price
3.636 39
3.616 34
2.771 29
3.891 29
3.594 28
..
3.053 1
3.392 1
3.484 1
3.498 1
3.576 1
Name: count, Length: 892, dtype: int64
'nFrequency of CPI'
CPI
126.520280 11
130.671832 11
130.737873 13
130.710581 11
130.701290 11
..
210.337426 1
210.330968 1
210.180566 1
210.439123 1
210.488700 1
Name: count, Length: 2145, dtype: int64
'nFrequency of Unemployment'
Unemployment
8.099 78
8.163 56
7.852 56
8.200 52
7.931 52
..
5.422 4
..

STORE BY WEEKLY SALES

'nFrequency of Weekly_Sales'

Weekly_Sales

760281.43 1

1643690.90 1

1641957.44 1

843361.10 1

773367.71 1

..

1404429.92 1

1472515.79 1

1439541.59 1

1554806.68 1

1409727.59 1

Name: count, Length: 6435, dtype: int64

The findings from the analysis are crucial for improving inventory management, enhancing marketing strategies, and making data-driven decisions to boost overall performance.

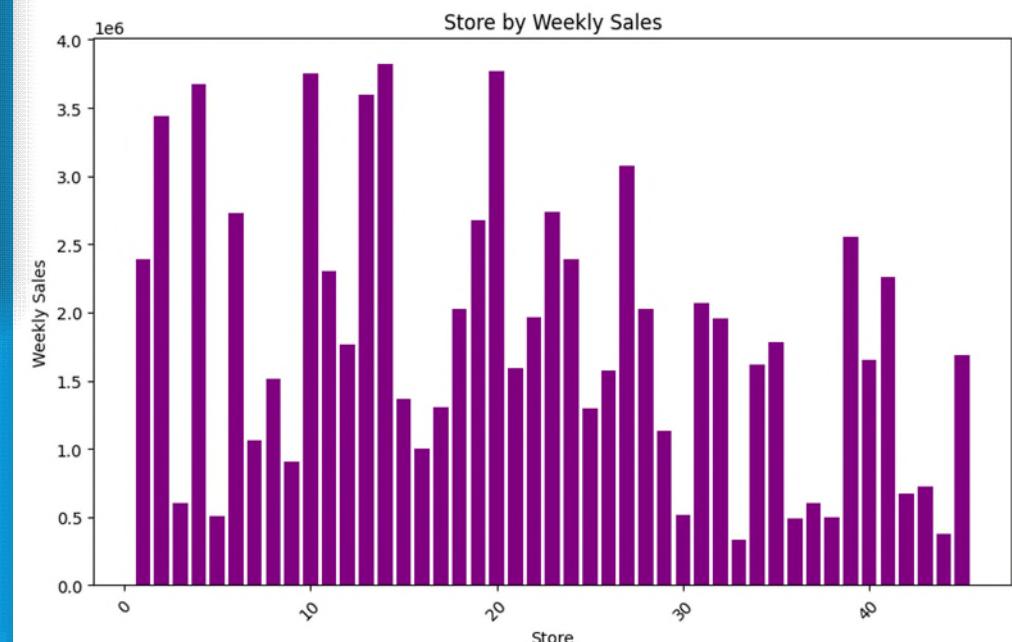
Walmart Weekly Store Sales Analysis focuses on examining sales data from Walmart stores on a weekly basis. The goal is to uncover patterns, trends, and insights to understand factors influencing sales. Through this analysis, Walmart and other retailers can make informed decisions about pricing strategies, stock availability, marketing campaigns, and operational efficiency. The goal is to improve profitability while meeting consumer demand effectively.

The analysis helps in identifying:

- ✓ High-performing and low-performing stores.
- ✓ Sales trends during holidays and non-holiday periods.
- ✓ Seasonal variations and external economic impacts on consumer behavior.

Bar chart

```
#Graph Analysis: Bar Chart
plt.figure(figsize=(10, 6))
plt.bar(data['Store'], data['Weekly_Sales'], color = 'purple', label = 'Weekly Sales')
plt.xlabel('Store')
plt.ylabel('Weekly Sales')
plt.title('Store by Weekly Sales')
plt.xticks(rotation=45)
plt.show()
```



DATE DISTRIBUTION OF WEEKLY SALES

Histogram chart

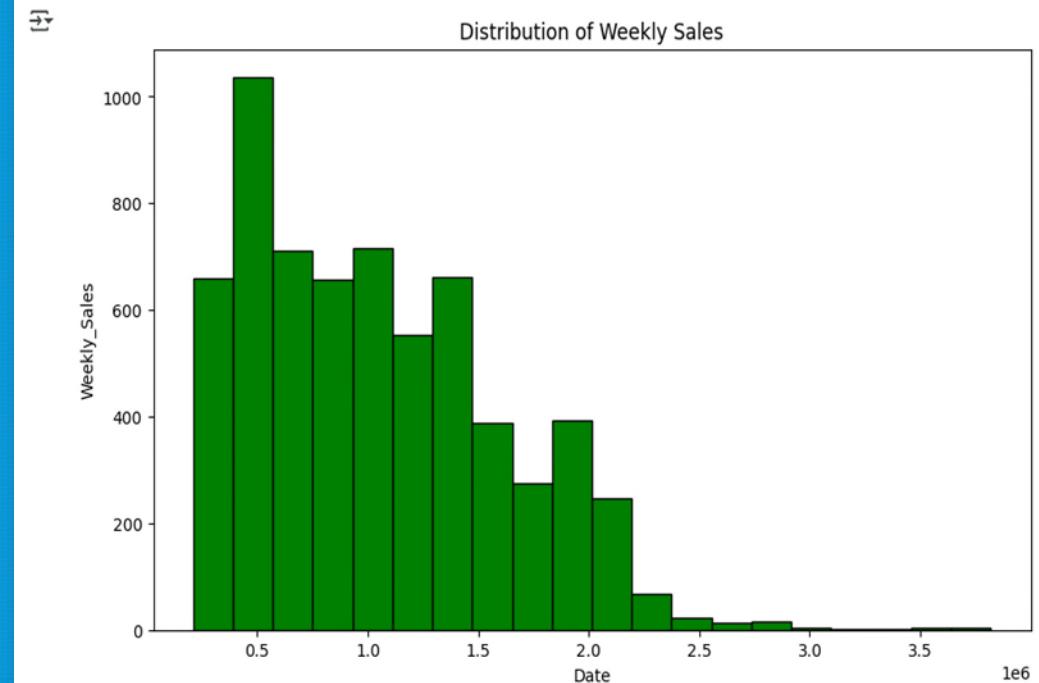
```
'nFrequency of Date'  
Date  
5/2/2010    45  
12/2/2010   45  
19-02-2010  45  
26-02-2010  45  
5/3/2010    45  
..  
28-09-2012  45  
5/10/2012   45  
12/10/2012  45  
19-10-2012  45  
26-10-2012  45  
Name: count, Length: 143, dtype: int64
```

Walmart Weekly Store Sales by Date Analysis focuses on examining sales trends over time. This analysis enables businesses to forecast future trends, optimize inventory, and refine marketing strategies to align with expected demand.

The analysis helps in identifying:

- ✓ Seasonal Trend
- ✓ Holiday Influence
- ✓ Economic Factors Over Time
- ✓ Store Performance Changes

```
[46] #Graph Analysis: Histogram Chart  
plt.figure(figsize=(10, 6))  
plt.hist(data['Weekly_Sales'], bins=20, color='green', edgecolor='black')  
plt.xlabel('Date')  
plt.ylabel('Weekly_Sales')  
plt.title('Distribution of Weekly Sales')  
plt.show()
```



STORE BY HOLIDAY FLAG

```
'nFrequency of Holiday_Flag'  
Holiday_Flag  
0    5985  
1     450  
Name: count, dtype: int64
```

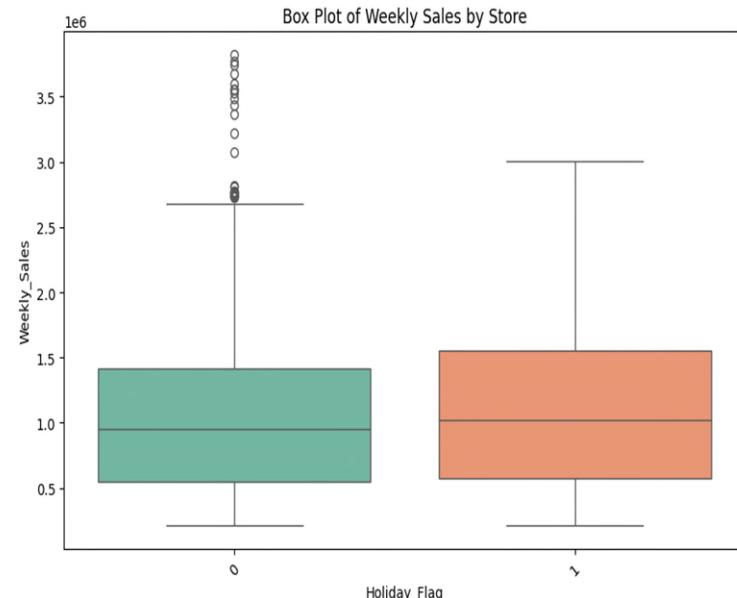
The Walmart Weekly Store Holiday Flag Analysis focuses on examining the impact of holiday weeks. The insights allow businesses to prepare for increased demand during holiday periods and adjust inventory, staffing, and promotional strategies accordingly.

Frequency Observation:

- ✓ Non-Holiday Weeks: 5,985 occurrences, indicating the majority of the dataset consists of regular weeks.
- ✓ Holiday Weeks: 450 occurrences, showing fewer instances of weeks with major holidays.
- ✓ The effect of holidays on weekly sales trends
- ✓ Seasonal variations in customer shopping behavior during holiday and non-holiday weeks.

BOX PLOT CHART

```
[45] #Graph Analysis: Box Plot  
plt.figure(figsize=(10, 6))  
sns.boxplot(x='Holiday_Flag', y='Weekly_Sales', data=data, palette='Set2')  
plt.xlabel('Holiday_Flag')  
plt.ylabel('Weekly_Sales')  
plt.title('Box Plot of Weekly Sales by Store')  
plt.xticks(rotation=45)  
plt.show()  
  
ipython-input-45-d20fddb56c20>:3: FutureWarning:  
Passing 'palette' without assigning 'hue' is deprecated and will be removed in v0.14.0. Assign the 'x' variable to 'hue' and set 'legend=False' for the same effect.  
sns.boxplot(x='Holiday_Flag', y='Weekly_Sales', data=data, palette='Set2')
```



TEMPERATURE

The Temperature Analysis insights allow retailers to tailor their operations and strategies to seasonal demand variations, improving customer satisfaction and profitability.

The Walmart Weekly Store Temperature Analysis examines how temperature variations impact sales patterns. The dataset includes temperature values ranging from approximately 30.26 to 76.67 degrees, with varying frequencies of occurrence. The most frequent temperature is 50.43 degrees, recorded 11 times, while several temperatures appear only once.

- ✓ Seasonal Trends
- ✓ Consumer Behavior
- ✓ Strategic Planning

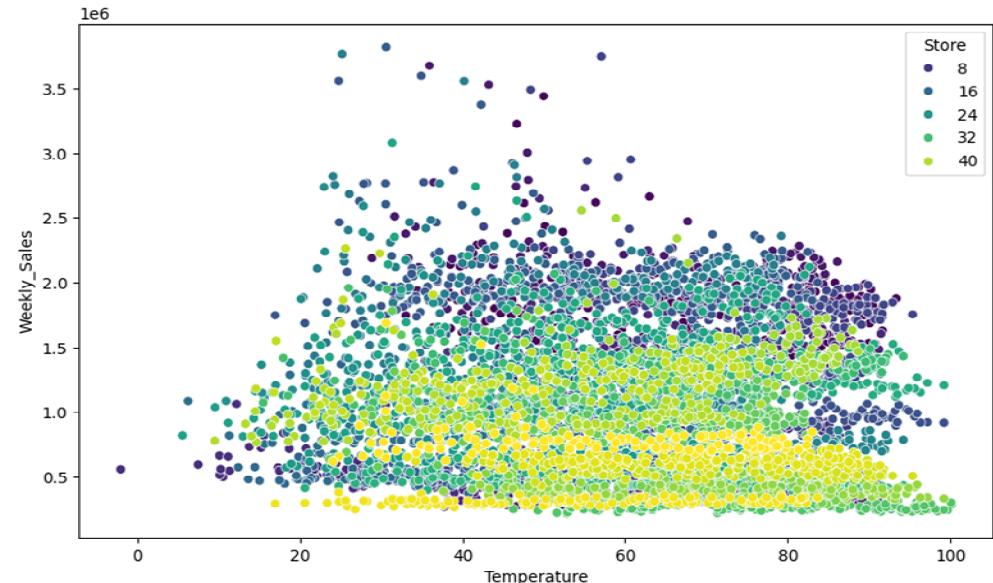
| 'nFrequency of Temperature' | |
|---|-----------|
| Temperature | Frequency |
| 50.43 | 11 |
| 67.87 | 10 |
| 76.03 | 9 |
| 76.67 | 9 |
| 70.28 | 9 |
| .. | |
| 33.18 | 1 |
| 30.26 | 1 |
| 31.91 | 1 |
| 30.87 | 1 |
| 43.52 | 1 |
| Name: count, Length: 3528, dtype: int64 | |

Scatter plot chart

```
[47] #Graph Analysis:Scatter Plot
plt.figure(figsize=(10, 6))
sns.scatterplot(x='Temperature', y='Weekly_Sales', data=data, hue='Store', palette='viridis')
plt.xlabel
```

```
matplotlib.pyplot.xlabel
def xlabel(xlabel: str, fontdict: dict[str, Any] | None=None, labelpad: float | None=None, *, loc: Literal['left', 'center', 'right'] | None=None, **kwargs) -> Text
    Set the label for the x-axis.

Parameters
-----
xlabel : str
    The label text.
```



FUEL PRICES

The Fuel Price Analysis insights assist Walmart in optimizing operations and addressing economic factors that impact customer purchasing power.

The Walmart Weekly Store Fuel Price Analysis investigates how variations in fuel prices correlate with sales trends. The dataset shows a range of fuel prices, with some prices appearing more frequently than others. For example:

- Fuel prices like \$3.638 occurred 39 times, followed by \$3.630 with 34 occurrences.
- Less common prices, such as \$3.053, appear only once.

This analysis helps in understanding:

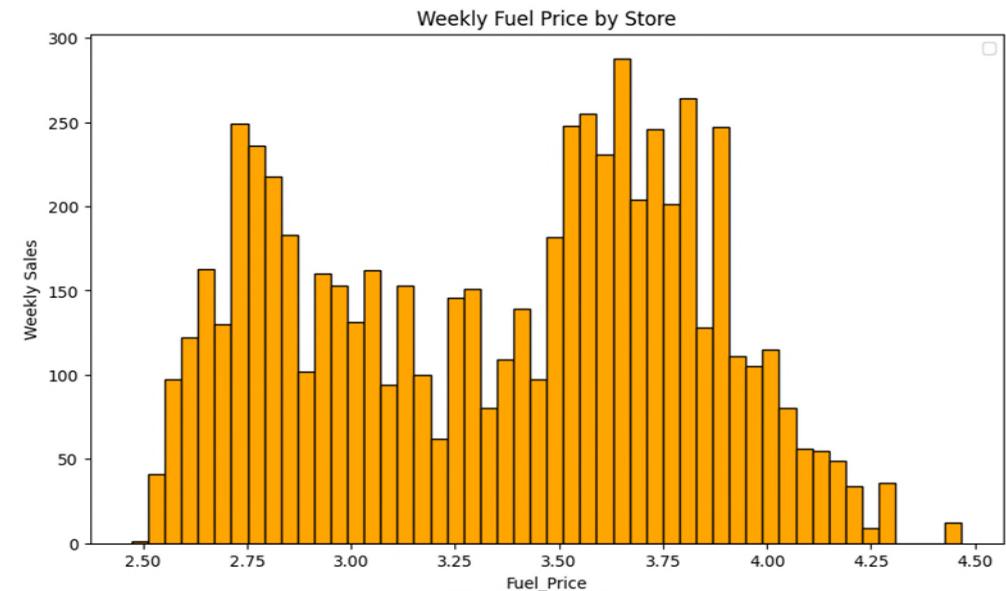
- ✓ Impact on Consumer Behavior
- ✓ Economic Trends
- ✓ Strategic Planning

```
'nFrequency of Fuel_Price'  
Fuel_Price  
3.638    39  
3.630    34  
2.771    29  
3.891    29  
3.594    28  
..  
3.053    1  
3.392    1  
3.404    1  
3.490    1  
3.576    1  
Name: count, Length: 892, dtype: int64
```

Histogram chart

```
[1]: #Graph Analysis: Histogram Chart  
plt.figure(figsize=(10,6))  
plt.hist(data['Fuel_Price'], bins= 50, color = 'orange', edgecolor = 'black')  
plt.xlabel('Fuel_Price')  
plt.ylabel('Weekly Sales')  
plt.title('Weekly Fuel Price by Store')  
plt.legend()  
plt.show()
```

→ <ipython-input-101-a3cec6c87609>:7: UserWarning: No artists with labels found to put in legend. Note that artists whose label st



CONSUMER PRICE INDEX (CPI):

The Walmart Weekly Store CPI Analysis examines the frequency distribution of the Consumer Price Index (CPI) in relation to sales performance. CPI measures inflation and purchasing power, impacting consumer spending habits.

- Most Frequent CPI Values: Several CPI values, such as 126.526286, 130.071032, and 130.737871, occur 11 times each, showing consistent economic conditions during certain periods.
- Less Common CPI Values: High CPI values like 210.337426 and 210.488700 appear only once, indicating fluctuations in the economic environment.

Key Insights:

- Higher CPI periods may suggest increased inflation, potentially influencing consumer purchasing behavior.
- Lower CPI values could reflect stable or declining inflation rates, possibly leading to increased spending.

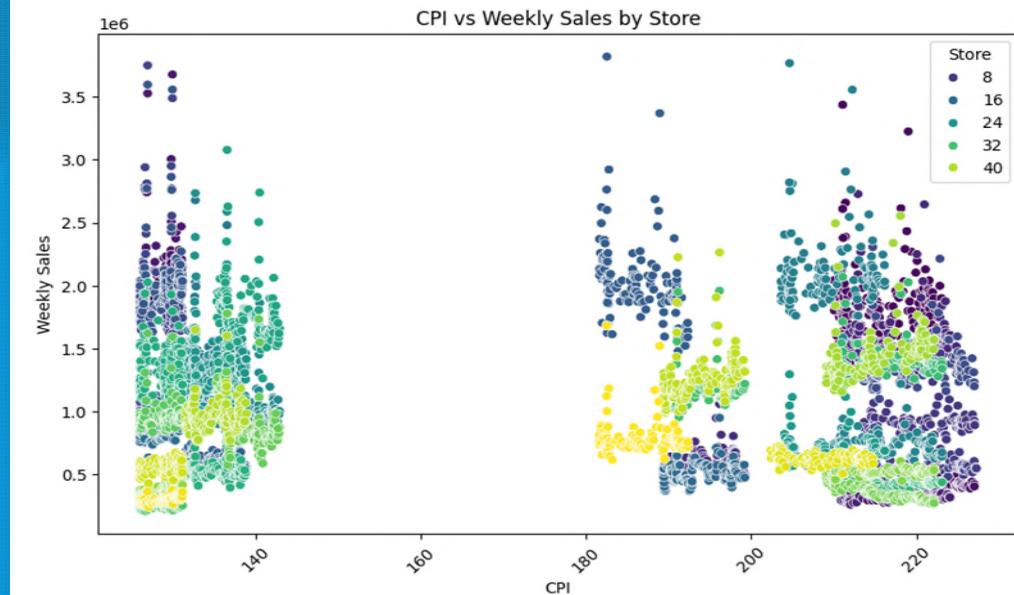
'nFrequency of CPI'

| | |
|------------|----|
| CPI | |
| 126.526286 | 11 |
| 130.071032 | 11 |
| 130.737871 | 11 |
| 130.719581 | 11 |
| 130.701290 | 11 |
| .. | |
| 210.337426 | 1 |
| 210.339968 | 1 |
| 210.389546 | 1 |
| 210.439123 | 1 |
| 210.488700 | 1 |

Name: count, Length: 2145, dtype: int64

Scatter plot chart

```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='CPI', y='Weekly_Sales', data=data, hue='Store', palette='viridis')
plt.xlabel('CPI')
plt.ylabel('Weekly Sales')
plt.title('CPI vs Weekly Sales by Store')
plt.xticks(rotation=45)
plt.show()
```



UNEMPLOYMENT

This analysis helps determine how unemployment trends might correlate with weekly store sales. For example:

- ✓ Higher unemployment may lower consumer spending, affecting sales.
- ✓ Variability in unemployment rates could highlight regional economic differences impacting store performance.

The Walmart Weekly Store Unemployment Analysis focuses on examining unemployment rates and their frequency across the dataset. Here's a summary of the key findings:

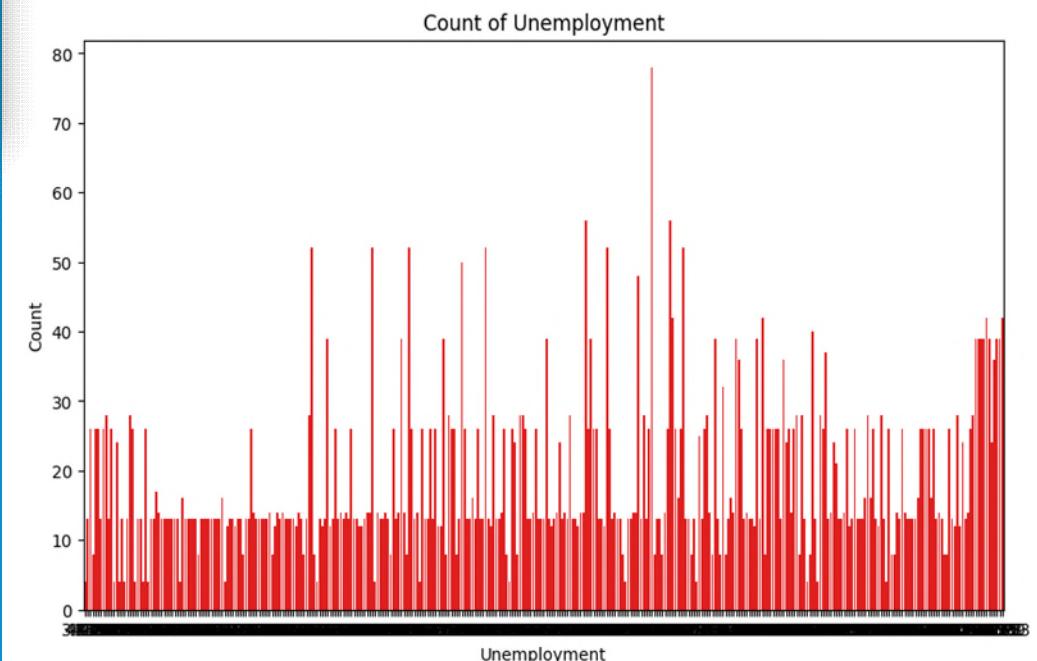
Most Frequent Rates:

- ✓ An unemployment rate of 8.099 occurred 78 times, making it the most common rate in the dataset.
- ✓ Rates such as 8.163 and 7.852 also appeared frequently, with 56 occurrences each.

```
'nFrequency of Unemployment'  
Unemployment  
8.099    78  
8.163    56  
7.852    56  
8.200    52  
7.931    52  
..  
5.422    4  
3.879    4  
5.329    4  
8.665    4  
5.217    4  
Name: count, Length: 349, dtype: int64
```

Bar Chart

```
#Graph Analysis: Bar Chart  
plt.figure(figsize=(10, 6))  
sns.countplot(x='Unemployment', data=data, color='red')  
plt.xlabel('Unemployment')  
plt.ylabel('Count')  
plt.title('Count of Unemployment')  
plt.show()
```



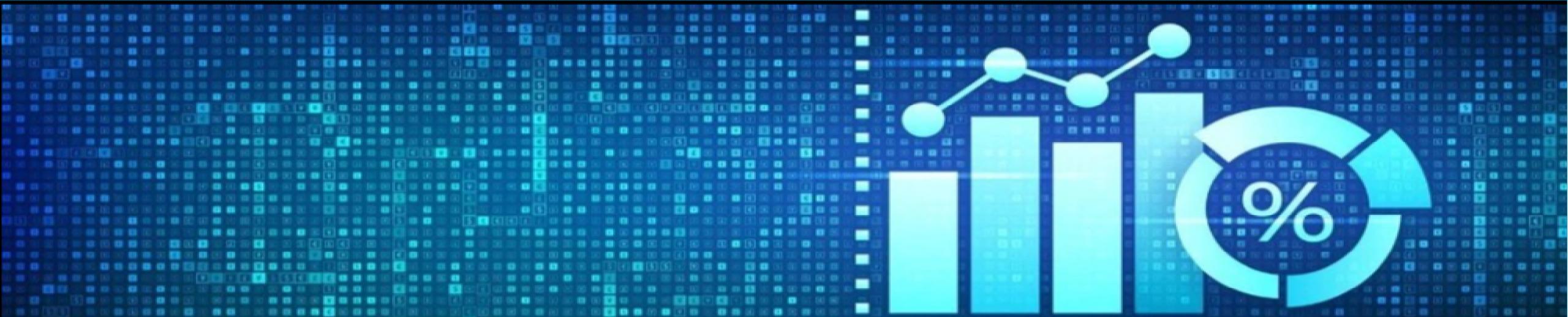
CONCLUSION

The Walmart Sales Analysis provided valuable insights into weekly store performance, sales trends, and external factors influencing consumer behavior. By evaluating variables such as holiday impacts, fuel prices, unemployment rates, CPI fluctuations, and temperature variations, we uncovered patterns that affect sales outcomes.

These insights provide actionable recommendations for optimizing inventory management, refining pricing strategies, and aligning marketing efforts with consumer behavior. Understanding these trends allows Walmart and similar retailers to make data-driven decisions that enhance profitability and customer satisfaction.

- Holiday Influence
- Seasonal Effects
- Economic Impact
- Store Performance





Data Analytic Intern at Oeson Learning and Internship

Data Analyst Expertise:

- Data Analytics
- Business Intelligence
- Advanced Excel
- SQL
- Tableau
- Python
- Power BI

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