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Traffic Light Control System

REPORT

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INTRODUCTION

This report provides an analysis of a dataset containing traffic metrics for a website over five consecutive days in January 2024. The key metrics in this dataset include:

- **PageViews: The total number of page views on the website each day.**
- **UniqueVisitors: The total number of unique visitors to the website each day.**
- **BounceRate: The percentage of visitors who leave the website after viewing only one page.**

The goal of this analysis is to understand the trends in website traffic over time and visualize these trends using various graphs. By doing so, we can derive meaningful insights about how traffic behavior changes on a daily basis.

Methodology

The analysis was performed using the following methodology:

2.1 Data Collection

The dataset is provided as a table with the following columns:

- **Date: The date of the data entry.**
- **PageViews: The total number of page views recorded on that date.**
- **UniqueVisitors: The number of unique visitors recorded on that date.**
- **BounceRate: The bounce rate, which measures the percentage of visitors who leave the site after viewing a single page.**

2.2 Data Preprocessing

1. **Convert Dates: The Date column was converted into a proper datetime format to facilitate time-series analysis.**
2. **Data Structuring: The data was structured into a Pandas DataFrame for easy manipulation and plotting.**

2.3 Data Visualization

To understand the relationship between the metrics, line plots were created to visualize:

- **PageViews over time.**
- **Unique Visitors over time.**
- **BounceRate over time.**

2.4 Tools Used

The analysis was conducted using Python with the following libraries:

- **Pandas: For data manipulation.**
- **Matplotlib and Seaborn: For data visualization.**

3. Code

Here is the Python code used to process the data and generate the visualizations.

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

# Creating the dataframe
df = pd.read_csv('/content/traffic_data.csv')

# Convert data to a DataFrame
df = pd.DataFrame(data)


# Set the plot style
sns.set(style="whitegrid")
```

```
# Create subplots for PageViews, UniqueVisitors, and BounceRate
fig, ax = plt.subplots(3, 1, figsize=(10, 10))

# Plot PageViews
ax[0].plot(df['Date'], df['PageViews'], marker='o', color='b', label='PageViews')
ax[0].set_title('PageViews Over Time')
ax[0].set_xlabel('Date')
ax[0].set_ylabel('PageViews')
ax[0].legend()

# Plot UniqueVisitors
ax[1].plot(df['Date'], df['UniqueVisitors'], marker='o', color='g', label='Unique Visitors')
ax[1].set_title('Unique Visitors Over Time')
ax[1].set_xlabel('Date')
ax[1].set_ylabel('Unique Visitors')
ax[1].legend()
```

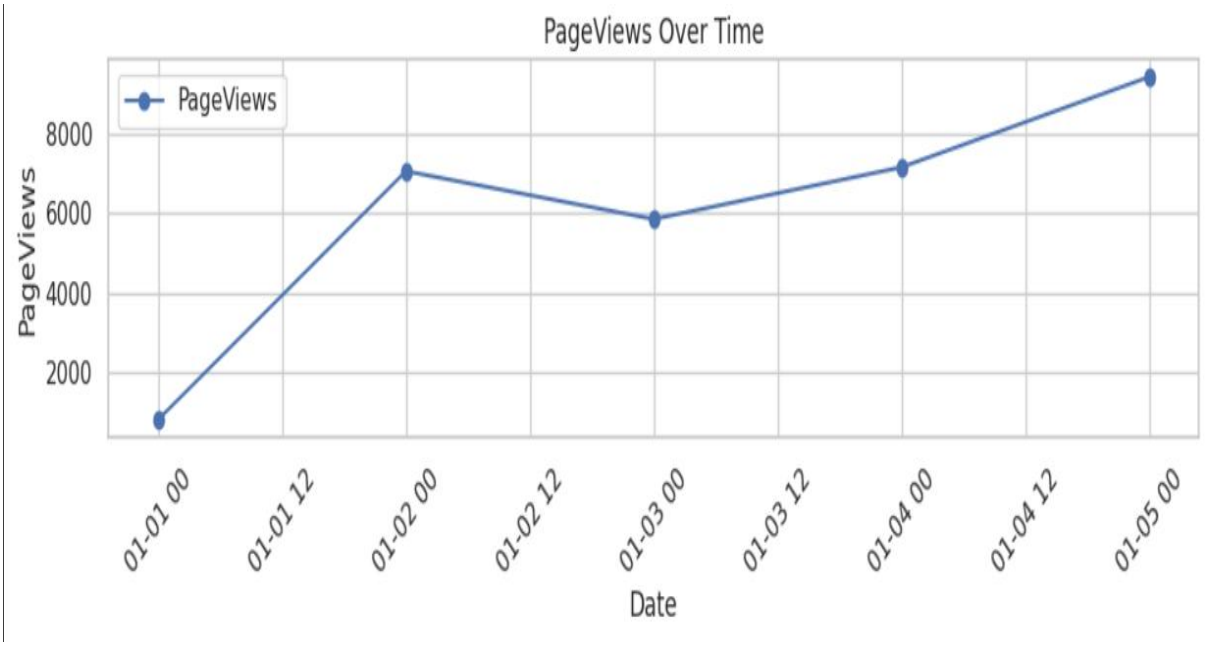
```
# Plot BounceRate
ax[2].plot(df['Date'], df['BounceRate'],
marker='o', color='r', label='BounceRate')
ax[2].set_title('Bounce Rate Over Time')
ax[2].set_xlabel('Date')
ax[2].set_ylabel('Bounce Rate (%)')
ax[2].legend()

# Auto rotate the x-axis labels for better
readability
for axes in ax:
    for label in axes.get_xticklabels():
        label.set_rotation(45)

# Show the plot
plt.tight_layout()
plt.show()
```

4. Output

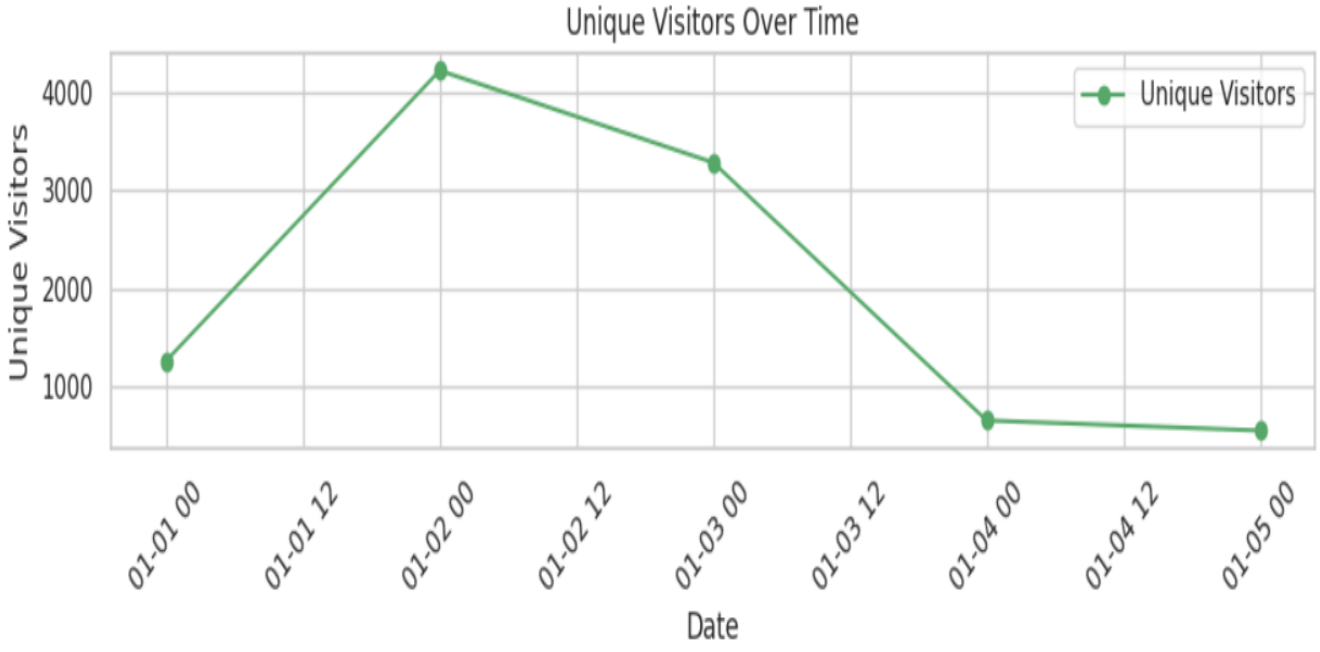
The code produces three line plots that visualize the trends in PageViews, Unique Visitors, and Bounce Rate over the five days in the dataset.

Output:

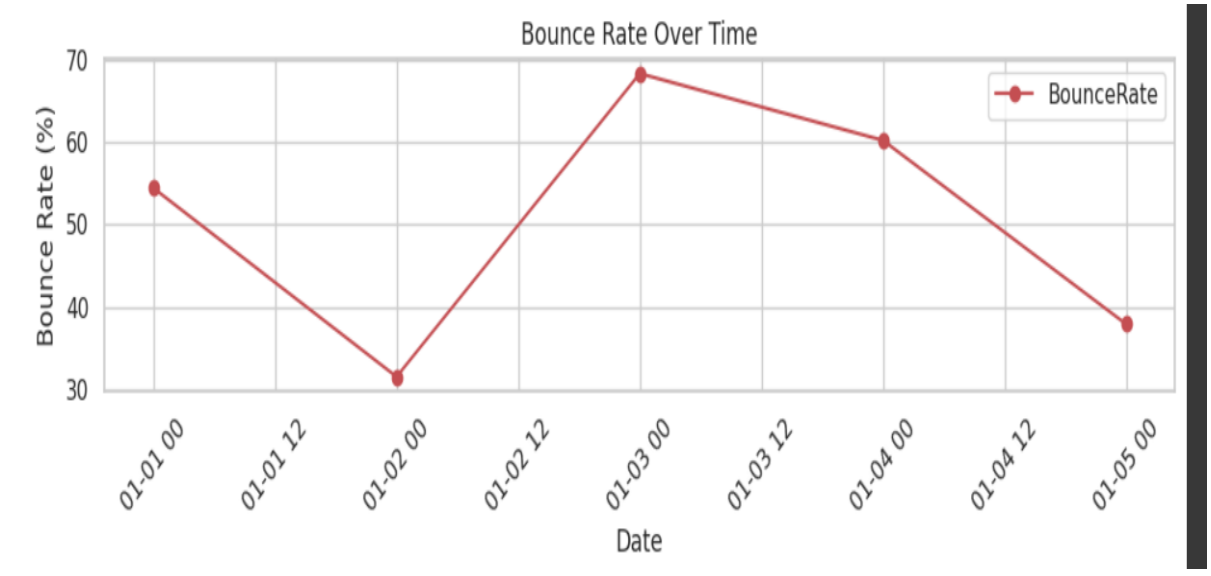
- **Graph 1: PageViews Over Time**
  - **This plot shows the number of page views each day. On January 1st, the number of page views was relatively low (828), but it increased significantly over the next few days. January 5th had the highest number of page views (9432).**



- **Graph 2: Unique Visitors Over Time**
  - **This plot illustrates the daily count of unique visitors to the website. On January 1st, there were 1261 unique visitors, but this number grew substantially, reaching 4225 on January 2nd before declining sharply on January 4th (651).**



- **Graph 3: Bounce Rate Over Time**
  - **This plot shows how the bounce rate changes daily. On January 3rd, the bounce rate peaked at 68.28%, indicating a larger percentage of visitors left the site without further interaction. On January 2nd, the bounce rate was the lowest at 31.58%, suggesting better user engagement.**



5. Conclusion

From the analysis and the graphs, we observe the following:

1. **Increased Engagement: On January 2nd and 5th, both PageViews and Unique Visitors peaked, suggesting successful content or campaigns.**
2. **Fluctuations in Bounce Rate: The high bounce rate on January 3rd suggests potential issues, such as slow loading times, irrelevant content, or changes in user experience.**
3. **Overall Trends: There is a general increase in PageViews and Unique Visitors across the five days, but with significant variations in the BounceRate.**

Future Recommendations:

- **Further Investigation of Bounce Rate: Investigate the reasons for the high bounce rate on January 3rd, including possible technical issues or changes in content.**
- **Focus on Content Engagement: As the number of visitors increases, there may be an opportunity to increase user engagement, such as by adding more interactive or dynamic content.**