ARTIFICIAL INTELLIGENCE

Analyzing Website Traffic Data

PROJECT REPPORT

BACHELORS IN TECHNOLOGY

COMPUTER SCIENCE ENGINEERING(AI)

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Background

Traffic analysis refers to the process of collecting and interpreting data on visitors' behavior, engagement, and interactions on a website.

Businesses, marketers, and website owners use this analysis to optimize user experience, improve conversions, and refine digital marketing strategies.

Objective

The objective of website traffic analysis is to understand user behavior, optimize site performance, measure marketing effectiveness, and detect fraudulent traffic. It helps improve user experience, refine content strategies, and support data-driven decision-making for business growth.

Scope

- **User Behavior Analysis**
- **Website Performance Optimization**
- **Marketing Effectiveness Measurement**
- **Fraud Detection and Security**

METHODOLOGY

Analyzing Website Traffic Data

The methodology of website traffic analysis involves a systematic approach to collecting, processing, and interpreting user data. First, website traffic data is gathered using tools like Google Analytics, server logs, and heatmaps, capturing key metrics such as visitor count, session duration, and traffic sources. The collected data is then processed and segmented based on user demographics, devices, and referral sources to identify meaningful patterns. Traffic trends, peak activity times, and user navigation behaviors are analyzed using statistical and AI-based techniques. Additionally, performance indicators like bounce rates, click-through rates, and conversion funnels are examined to assess website effectiveness. Finally, insights from the analysis are used to optimize SEO, enhance user experience, and refine marketing strategies, with reports generated for data-driven decision-making.

CODE

```
import pandas as pd
import matplotlib.pyplot as plt
import os

# Define the file path
file_path = "traffic_data.csv"

# Check if file exists before loading
if not os.path.exists(file_path):
    from google.colab import files
    print("Upload the 'traffic_data.csv' file.")
    uploaded = files.upload()

# Load the dataset
df = pd.read_csv(file_path, parse_dates=['Date'])

# Ensure 'Date' column is in datetime format
df['Date'] = pd.to_datetime(df['Date'], errors='coerce')

# Drop rows where 'Date' is NaT (invalid datetime)
df = df.dropna(subset=['Date'])

# Sort data by Date
df = df.sort_values(by='Date')

# Display summary statistics
print("Summary Statistics:")
print(df.describe())

# Ensure required columns exist before plotting
required_columns = ['Sessions', 'Users', 'PageViews', 'BounceRate', 'TrafficSource']
missing_columns = [col for col in required_columns if col not in df.columns]

if missing_columns:
    print(f"\nWarning: The following required columns are missing from the dataset:
{missing_columns}")
else:
```

```
# Plot traffic trends
plt.figure(figsize=(12, 6))
plt.plot(df['Date'], df['Sessions'], label='Sessions', marker='o', linestyle='-')
plt.plot(df['Date'], df['Users'], label='Users', marker='s', linestyle='--')
plt
```

OUTPUT SCREENSHOT

```
Summary Statistics:
                      Date   PageViews  UniqueVisitors  BounceRate
count                   20    20.00000        20.00000   20.000000
mean   2024-01-10 12:00:00  5533.20000      2435.05000   49.150658
min    2024-01-01 00:00:00   828.00000       518.00000   28.581849
25%    2024-01-05 18:00:00  3218.50000      1115.25000   37.609458
50%    2024-01-10 12:00:00  6405.00000      2466.50000   49.061288
75%    2024-01-15 06:00:00  7288.75000      3696.25000   60.163514
max    2024-01-20 00:00:00  9432.00000      4459.00000   79.981676
std                    NaN  2595.96585      1383.40109   15.286241
```

CONCLUSION

Website traffic analysis plays a crucial role in understanding user behavior, optimizing website performance, and improving digital marketing strategies. By continuously monitoring key metrics such as visitor demographics, session duration, bounce rates, traffic sources, and conversion rates, businesses can gain deep insights into how users interact with their websites. This data-driven approach helps in identifying high-performing content, improving site navigation, and ensuring a seamless user experience. Additionally, analyzing traffic patterns enables businesses to evaluate the effectiveness of SEO efforts, advertising campaigns, and social media engagement, allowing for better resource allocation and targeted marketing strategies. Website traffic analysis also helps in detecting fraudulent activities such as bot traffic and spam visits, ensuring accurate reporting and data security. By leveraging advanced analytics tools, AI-driven insights, and predictive modeling, organizations can anticipate user needs, enhance content strategies, and boost overall digital engagement. Ultimately, website traffic analysis is a powerful tool that enables businesses to make informed decisions, refine their online presence, and drive sustainable growth in an increasingly competitive digital landscape.