WEBSITE TRAFFIC ANALYSIS

Data Analytics with cognos – Phase 5 DOCUMENTATION

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ABSTRACT:

The project involves using IBM Cognos to predict Website traffic analysis encompasses the collection, measurement, and interpretation of data related to user interactions with a website. It delves into a multitude of metrics, including page views, unique visitors, bounce rates, and conversion rates, to name a few. By scrutinizing this data, organizations can gain profound insights into user behavior, preferences, and engagement patterns, which, in turn, drive informed decision-making.

OBJECTIVE

The objective of website traffic analysis is to serves various objectives that can help organizations make informed decisions, improve user experiences, and optimize their online presence. Here are some key objectives for website traffic analysis

Evaluate Website Performance:
Understand how well the website is performing in terms of loading times, page errors, and overall user experience. Identify areas that need improvement to enhance user satisfaction.

Measure Traffic Volume:
Determine the total number of visitors to the website over a specific period, including daily, weekly, and monthly traffic patterns. This provides insights into website popularity.

Assess User Behavior:
Analyze user behavior, such as which pages are most frequently visited, how long users stay on the site, and what actions they take (e.g., clicks, form submissions, downloads).

Identify Traffic Sources:
Identify where website traffic originates, whether from search engines, direct visits, referral sites, or social media. This helps in understanding the effectiveness of marketing channels.

Monitor User Demographics:
Gather data on user demographics, including location, age, gender, and interests. This information can help tailor content and marketing strategies to specific audience segments.

Evaluate Content Engagement:

Determine which content or pages are most engaging and which ones result in high bounce rates. Use this information to optimize content and layout for better engagement.

Conversion Tracking:
Track conversions, such as sales, sign-ups, or other desired actions on the website. Analyze conversion rates and the effectiveness of calls to action.

Keyword and SEO Analysis:
Evaluate which keywords and search queries drive organic traffic to the site. Optimize content and SEO strategies based on this analysis.

User Journey Mapping:
Understand the typical paths users take on the website, identifying entry and exit points. This helps improve navigation and user flow.

Identify Technical Issues:
Detect and resolve technical issues that may affect website performance, such as broken links, 404 errors, and mobile responsiveness problems.

Competitive Analysis:
Compare website traffic metrics to competitors to gain insights into the industry landscape and identify opportunities for improvement.

Optimize Marketing Campaigns:
Assess the effectiveness of online advertising and marketing campaigns by tracking campaign-specific traffic and conversion data.

Budget Allocation:
Use traffic analysis to allocate resources more effectively, determining which marketing channels and strategies provide the best return on investment.

A/B Testing:
Conduct A/B tests to experiment with different website elements and determine which versions lead to better user engagement and conversions.

Security and Fraud Detection:
Monitor for unusual or suspicious website traffic patterns, helping to identify and mitigate security threats and potential fraud.

User Feedback Integration:
Combine quantitative data with qualitative insights from user feedback, surveys, and reviews to gain a comprehensive understanding of user experiences

By setting and achieving these objectives through website traffic analysis, organizations can continuously improve their online presence, enhance user experiences, and make data-driven decisions that drive success in the digital landscape.

DESIGN THINKING:

Analysis objective :

Website traffic analysis is crucial for understanding how users interact with your website, identifying areas for improvement, and making data-driven decisions to achieve your online goal

Data collection :

Data collection in website traffic analysis refers to the process of gathering, recording, and storing information about how users interact with a website. This data is crucial for understanding user behavior, website performance, and the effectiveness of online marketing efforts..

Visualization Strategy :

A visualization strategy in website traffic analysis involves the effective use of data visualization techniques to present and communicate insights from your website's traffic data in a clear, informative, and visually appealing manner.

Visualization can help stakeholders, including marketing teams, web developers, and decision-makers, understand patterns, trends, and key performance indicators (KPIs) easily.

DEVELOPEMENT PHASE

Data Collection

Implement web analytics tools: Start by setting up web analytics tools like Google Analytics, Adobe Analytics, or other third-party tools. These tools help track and collect data on website traffic.

Dataset Link: https://www.kaggle.com/datasets/bobnau/daily-website-visitors

Data Preprocessing

❖ Clean and prepare the data for analysis.

❖ Handle missing values, outliers, and inconsistencies.

❖ Normalize or scale the data as needed

Data preprocessing in website traffic analysis refers to the series of steps and techniques used to clean, transform, and prepare raw data collected from a website's traffic for further analysis. It's a crucial stage in the data analysis process, as it ensures that the data is accurate, consistent, and structured in a way that makes it suitable for various analytical tasks

LOADING THE DATASET:

Importing libraries

Here, for preprocessing the dataset and manipulate the data, pandas is the library used to frame the data.

Code:

import pandas as pd

Loading the dataset

In this step, we are framing the data into the table using DataFrame in pandas, and display the head or 5 rows of the dataset.

Code:

```
# Replace with the actual filename
data=pd.read_csv("C:/Users/dhanu/OneDrive/Desktop/PHASE 3.csv")
```
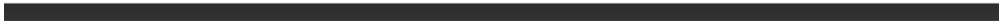
EXPLORING THE DATA SET:

After framing data, the first few or five rows of the data in displayed using the head() function.

Code:

data

OUTPUT:

Row	Day	Day.Of.Week	Date	Page.Loads	Unique.Visits	First.Time.Visits	Returning.Visits
0	1	Sunday	1	9/14/2014	2,146	1,582	1,430	152
1	2	Monday	2	9/15/2014	3,621	2,528	2,297	231
2	3	Tuesday	3	9/16/2014	3,698	2,630	2,352	278
3	4	Wednesday	4	9/17/2014	3,667	2,614	2,327	287
4	5	Thursday	5	9/18/2014	3,316	2,366	2,130	236
...	...	...	...	...	...	...	...	...
2162	2163	Saturday	7	8/15/2020	2,221	1,696	1,373	323
2163	2164	Sunday	1	8/16/2020	2,724	2,037	1,686	351
2164	2165	Monday	2	8/17/2020	3,456	2,638	2,181	457
2165	2166	Tuesday	3	8/18/2020	3,581	2,683	2,184	499
2166	2167	Wednesday	4	8/19/2020	2,064	1,564	1,297	267

2167 rows × 8 columns

DATA VISUALIZATION:

CORRELATION GRAPH:

	Row	Day	day_of_week	Date	page_loads	unique_visits	first_visits	returning_visits
0	1	Sunday	1	9/14/2014	2146	1582	1430	152
1	2	Monday	2	9/15/2014	3621	2528	2297	231
2	3	Tuesday	3	9/16/2014	3698	2630	2352	278
3	4	Wednesday	4	9/17/2014	3667	2614	2327	287
4	5	Thursday	5	9/18/2014	3316	2366	2130	236
...	...	...	...	...	...	...	...	...
2162	2163	Saturday	7	8/15/2020	2221	1696	1373	323
2163	2164	Sunday	1	8/16/2020	2724	2037	1686	351

|	Row	Day	day_of_week	Date	page_loads	unique_visits	first_visits	returning_visits
2164	2165	Monday	2	8/17/2020	3456	2638	2181	457
2165	2166	Tuesday	3	8/18/2020	3581	2683	2184	499
2166	2167	Wednesday	4	8/19/2020	2064	1564	1297	267

2167 rows × 8 columns

Checking for the null values if any

PLOT:

px.line(df,x='Date',y=['page_loads' ,'unique_visits' ,'first_visits' ,'returning_visits'],

labels={'value':'Visits'}
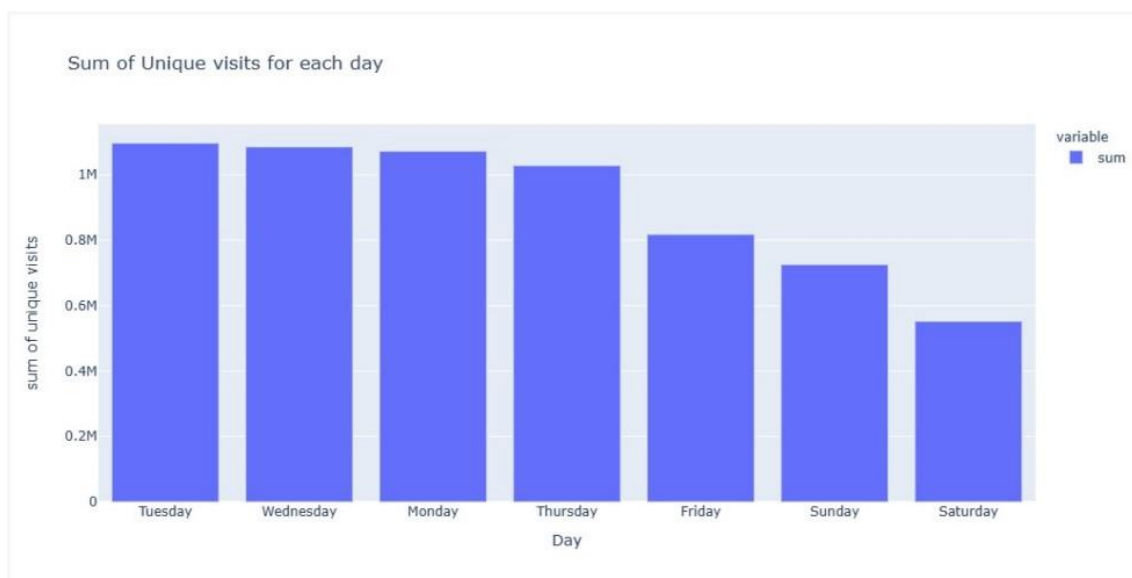
title='Page Loads & visitors over Time')

OUTPUT:

Page Loads & visitors over Time
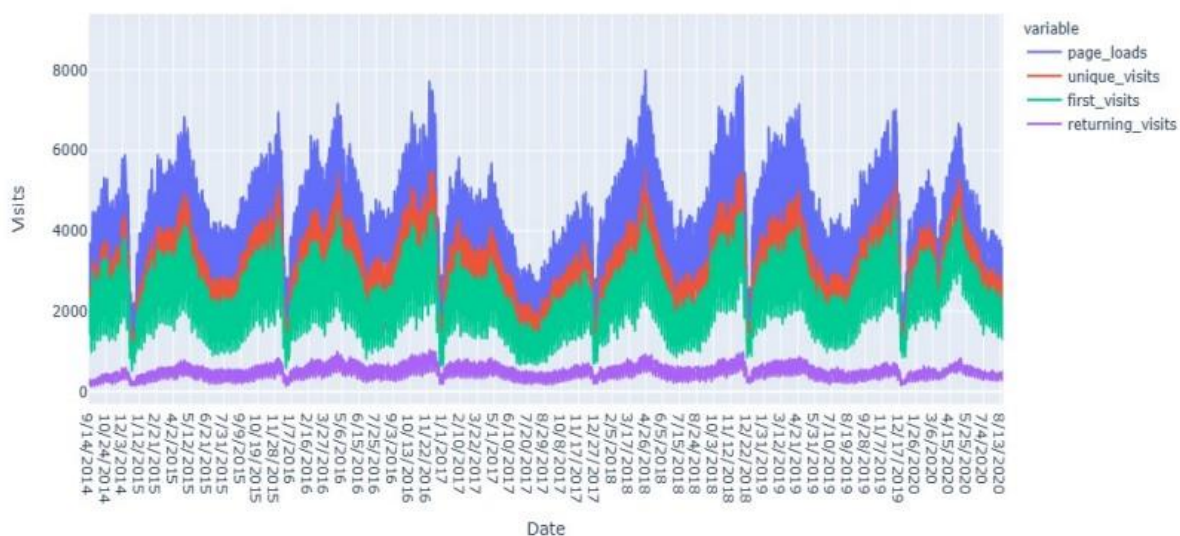
PIE PLOT:

day_imp=df.groupby(['Day'])['unique_visits'].agg(['sum']).sort_values(by='sum',ascending=False)

px.bar(day_imp,labels={'value':'sum of unique visits'},title='Sum of Unique visits for each day')
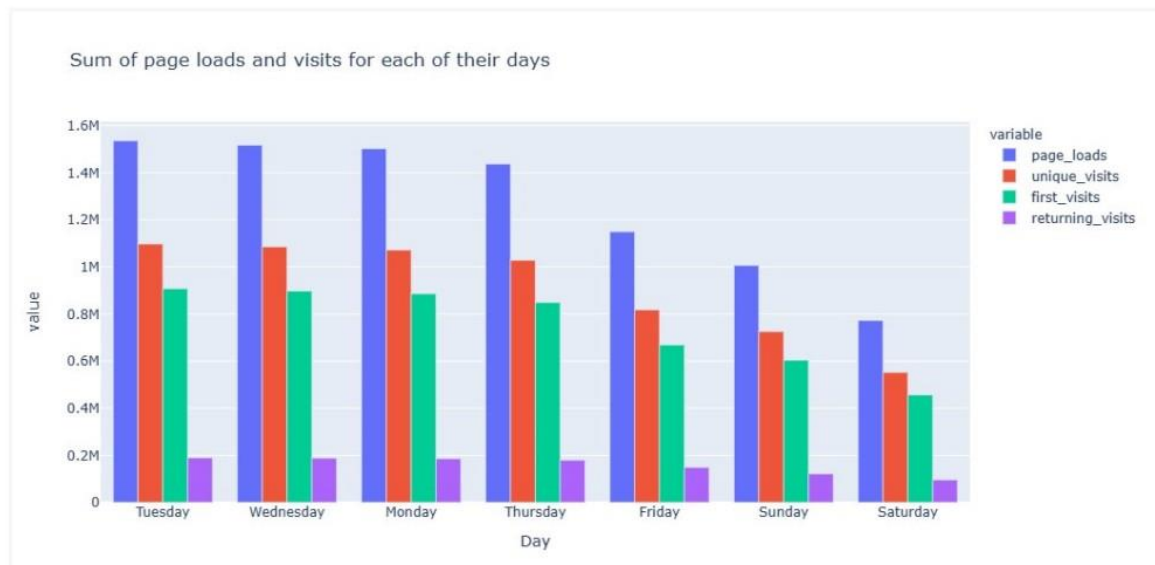
OUTPUT:

Sum of Unique visits for each day

HISTOGRAM

px.bar(sums,barmode='group',title='Sum of page loads and visits for each of their days')

OUTPUT:

DATA VISUALIZATION
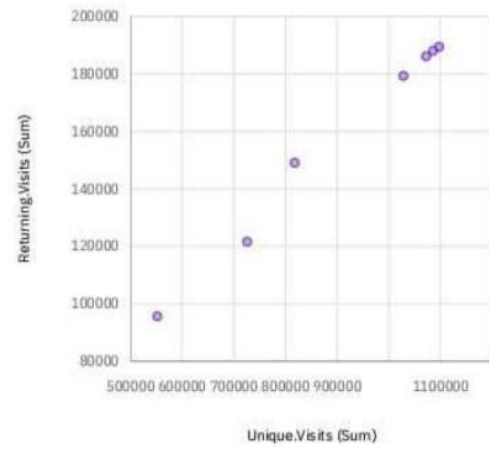
DATA ANALYTICS WITH IBM COGNOS

❖ IBM Cognos Introduction
  ♦ Introduce IBM Cognos as a tool for data analytics.
❖ Data Exploration
  ♦ Showcase how IBM Cognos aids in exploring and understanding the dataset.
❖ Visualization
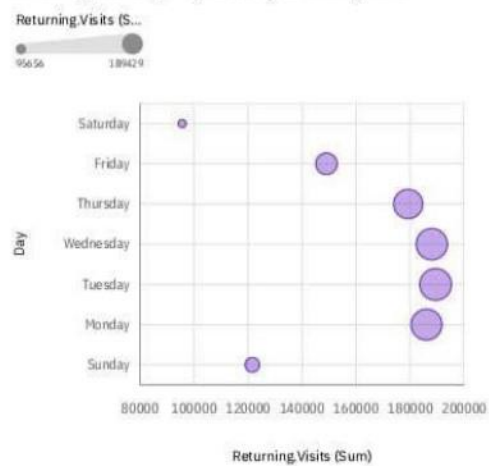 ♦ Demonstrate the creation of visualizations in IBM Cognos.
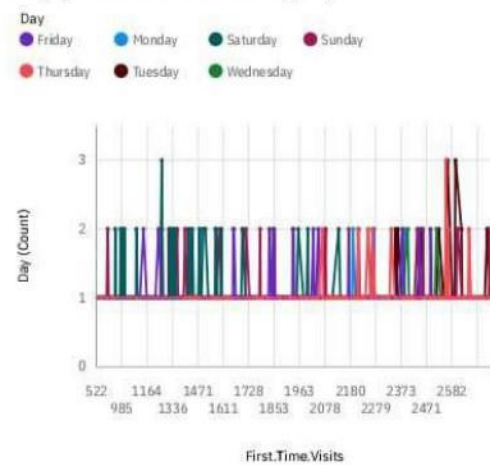
Unique.Visits by Day colored by Day
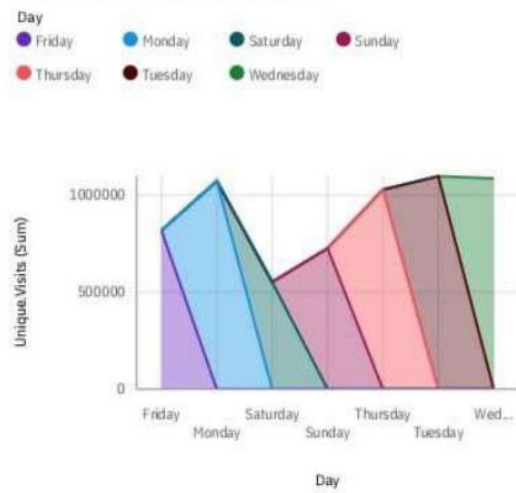
Unique.Visits by Returning.Visits with points for Day
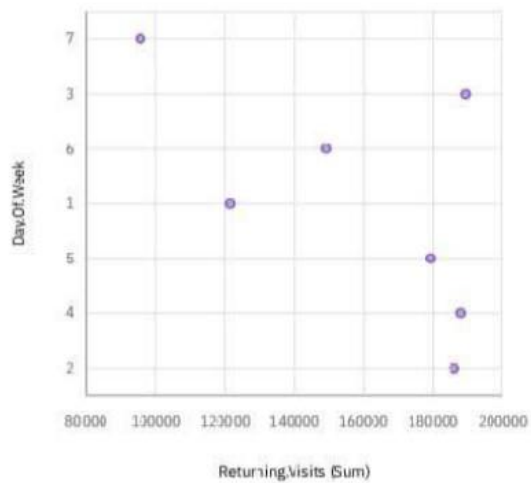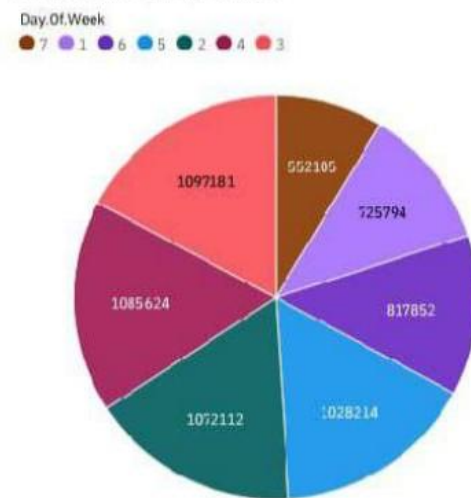

Returning.Visits by Day sized by Returning.Visits

Day by First.Time.Visits colored by Day

Returning.Visits by Day.Of.Week

Unique.Visits by Day.Of.Week

Day.Of.Week
● 7 ● 1 ● 6 ● 5 ● 2 ● 4 ● 3

DATA VISUALIZATION WITH JUPYTER NOTEBOOK

❖ Jupyter Notebook
   ♦ Introduction Present Jupyter Notebook as a tool for data analysis and visualization.
      ➢ Visualizing WEBSITE TRAFFIC ANALYSIS
      ➢ Use Jupyter Notebook to create visualizations of website traffic analysis
❖ Geographic Mapping
   ♦ Visualize visitors by location using Jupyter Notebook.
❖ Time Series Analysis
      ➢ Analyze temporal changes in website using Jupyter Notebook

PREDICTIVE MODELLING:

Predictive modeling for website traffic analysis involves using statistical and machine learning techniques to forecast future website traffic patterns, trends, and performance based on historical data. This type of analysis can provide valuable insights for making data-driven decisions, optimizing marketing strategies, and improving the overall user experience on your website. Here are the steps involved in predictive modeling for website traffic analysis:

1. Data Collection and Preprocessing:

Gather historical website traffic data, which includes metrics like page views, unique visitors, bounce rates, conversion rates, traffic sources, and other relevant data.

Clean and preprocess the data, addressing missing values, outliers, and other data quality issues.

2. Feature Selection:

Identify which features (variables) are most relevant for predicting website traffic. This may include factors like seasonality, marketing campaigns, and external events.

3. Time-Series Analysis:

If your website traffic data has a time component, apply time-series analysis techniques to understand patterns and trends over time. Common models include ARIMA (AutoRegressive Integrated Moving Average) and Exponential Smoothing.

4. Machine Learning Models:

Utilize machine learning algorithms to build predictive models. Some common algorithms for website traffic prediction include:

Regression Models: Linear regression, polynomial regression, or ridge regression can be used to predict continuous traffic metrics like page views.

Classification Models: Logistic regression or decision trees can be used for binary outcomes, such as predicting whether a user will convert or bounce.

Time-Series Forecasting Models: SARIMA (Seasonal ARIMA), Prophet, or deep learning models like LSTM (Long Short-Term Memory) can be employed for forecasting time-dependent traffic patterns.

5. Feature Engineering:

Create new features or transformations of existing ones that can improve the predictive power of your models. For example, you might create lag variables to account for time dependencies.

6. Model Training and Validation:

Split your data into training and testing sets to assess model performance. Use techniques like cross-validation to select the best-performing model.

7. Hyperparameter Tuning:

Optimize model hyperparameters to improve accuracy and generalization.

8. Model Evaluation:

Evaluate models using appropriate metrics like Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), or relevant business-specific metrics.

9. Model Interpretation:

Interpret the model results to understand the importance of each feature and how they contribute to website traffic predictions. This can inform decision-making and strategy adjustments.

10. Deployment and Monitoring:

Once a satisfactory predictive model is developed, deploy it to make real-time predictions about website traffic. Continuously monitor model performance and update it as new data becomes available.

11. Scenario Analysis:

Use predictive models to simulate different scenarios, such as the impact of changing marketing budgets, launching new products, or adjusting website features on future traffic.

12. Report Generation:

Communicate the results of predictive modeling to stakeholders through reports and dashboards, making the insights easily accessible and understandable.

Predictive modeling for website traffic analysis can help you make informed decisions about resource allocation, content creation, marketing strategies, and website optimization. It allows you to proactively respond to changes in user behavior and external factors, ultimately improving the performance and effectiveness of your online presence.

INSIGHTS OF WEBSITE TRAFFIC ANALYSIS:

Website traffic analysis provides valuable insights into how users interact with your website. These insights can inform decision-making, content strategies, and website optimization efforts. Here are some common insights gained from website traffic analysis:

1. Traffic Volume: Understand the total number of visitors to your website, allowing you to monitor trends, seasonality, and overall performance.

2. Traffic Sources: Identify where your website visitors are coming from, such as search engines, social media, referrals, direct traffic, or paid advertising. This helps you allocate resources to the most effective channels.

3. User Demographics: Gain insights into the demographics of your website visitors, including age, gender, location, and interests. Tailor your content and marketing strategies accordingly.

4. User Behavior: Analyze how visitors interact with your website, including which pages they visit, how long they stay, and the actions they take (e.g., form submissions, downloads, purchases).

5. Conversion Rate Optimization: Measure and improve the conversion rates on your website, such as sign-ups, purchases, or any other desired actions. Identify bottlenecks in the conversion funnel.

6. Bounce Rate: Monitor the bounce rate to identify pages that may need improvement. A high bounce rate indicates that visitors are leaving your site quickly without engaging.

7. Page Performance: Examine the load times and performance of your web pages. Slow-loading pages can lead to user frustration and high bounce rates.

8. Content Analysis: Determine which types of content are most popular and engaging. This helps you create more of what your audience enjoys.

9. Keyword and SEO Analysis: Analyze which keywords are driving organic search traffic and how your website ranks in search engine results. Optimize your content for better search engine visibility.

10. Mobile vs. Desktop Traffic: Understand the breakdown of traffic between mobile and desktop devices. Ensure your website is responsive and provides a good user experience on all platforms.

11. Top Exit Pages: Find out which pages have the highest exit rates. This can help you improve those pages to keep visitors engaged.

12. User Journey Mapping: Create a user journey map to understand the typical path visitors take through your website. This can help you optimize the user experience.

13. A/B Testing Results: Compare different versions of web pages or features to determine which ones perform better in terms of conversions or user engagement.

14. Technical Issues: Monitor for technical issues like broken links, 404 errors, and other website errors that may negatively impact user experience.

15. Competitive Analysis: Compare your website's traffic and performance with competitors to identify strengths, weaknesses, and opportunities for improvement.

16. User Feedback and Surveys: Gather user feedback through surveys, comments, or feedback forms to gain qualitative insights into user satisfaction and areas of improvement.

17. Cost Per Acquisition (CPA): Calculate the cost per acquisition for various marketing channels to determine the effectiveness of your advertising spend.

18. Social Media Engagement: Analyze how well your website content is shared on social media and the impact of social media traffic on your site.

These insights empower you to make data-driven decisions, tailor your website to meet user expectations, improve the user experience, optimize marketing efforts, and ultimately achieve your online goals. Website traffic analysis is an ongoing process, and regularly reviewing these insights can help you adapt and refine your strategies as your website evolves.

CONCLUSION:

website traffic analysis is a vital practice that provides actionable insights into user behavior, content performance, and the effectiveness of marketing efforts. By monitoring traffic volume, sources, user demographics, and behavior, businesses and website owners can make data-driven decisions to optimize their online presence, enhance user experiences, and achieve their goals. Regular analysis and the use of data visualization and predictive modeling further contribute to successful website management and growth.

GITHUB LINK:

PHASE 1:https://github.com/Dhanusha-Teenu/WebsiteTraffic/blob/main/DAC_phase1.pdf

PHASE 2:https://github.com/Dhanusha-Teenu/WebsiteTraffic/blob/main/DAC_Phase2.pdf

PHASE 3:https://github.com/Dhanusha-Teenu/WebsiteTraffic/blob/main/DAC_PHASE%203.pdf

PHASE 4:https://github.com/Dhanusha-Teenu/WebsiteTraffic/blob/main/DAC_Phase%204.pdf