UNESCO Heritage Sites Analysis with Power BI: A Global Preservation Initiative

Introduction:

"UNESCO Heritage Sites Analysis with Power BI: A Global Preservation Initiative" is an innovative project aimed at transforming how data on UNESCO heritage sites is visualized and used to drive informed decision-making and enhance preservation efforts. In today's global effort to protect cultural and natural heritage, it is crucial to have comprehensive insights into the status, significance, and threats to these sites to empower stakeholders with actionable information.

This project seeks to create a dynamic and intuitive platform using Power BI, where data from various UNESCO heritage sites, including their cultural, natural, and mixed significance, as well as their risk status and geographical distribution, can be transformed into interactive visualizations and insightful analytics. By leveraging Power BI's capabilities effectively, the "UNESCO Heritage Sites Analysis" project aims to empower stakeholders with actionable insights, foster data-driven decision-making, and drive global preservation success by facilitating a deeper understanding of heritage site dynamics and promoting evidence-based conservation strategies.

Scenarios:

Scenario 1:

The "UNESCO Heritage Sites Analysis" project aims to monitor the preservation status of heritage sites globally. Using Power BI, the project will create a comprehensive dashboard that visualizes the condition of sites, highlighting those at risk. This dashboard will allow heritage conservationists and policymakers to identify sites needing immediate attention, allocate resources efficiently, and develop targeted preservation strategies. By providing real-time data on the health of these sites, the project will facilitate proactive measures to protect and sustain the world's cultural and natural heritage.

Scenario 2:

The project seeks to analyze the impact of tourism on UNESCO heritage sites. Through Power BI, it will develop an interactive visualization tool that integrates data on visitor numbers, tourism revenue, and site degradation levels. This tool will enable heritage site managers to understand the correlation between tourism activities and site preservation, assess the sustainability of current tourism practices, and implement policies that balance tourist access with conservation efforts. By leveraging these insights, the project aims to promote sustainable tourism that safeguards heritage sites for future generations.

Scenario 3:

The "UNESCO Heritage Sites Analysis" project aims to enhance international cooperation in heritage site management. Using Power BI, the project will create a portal that visualizes shared heritage sites and cross-border conservation efforts. This portal will provide insights into collaborative preservation initiatives, funding allocations, and the effectiveness of joint management practices. By fostering transparency and data-sharing among countries, the project will support coordinated efforts to protect transboundary heritage sites, promote cultural exchange, and strengthen global heritage conservation networks.

Technical Architecture:
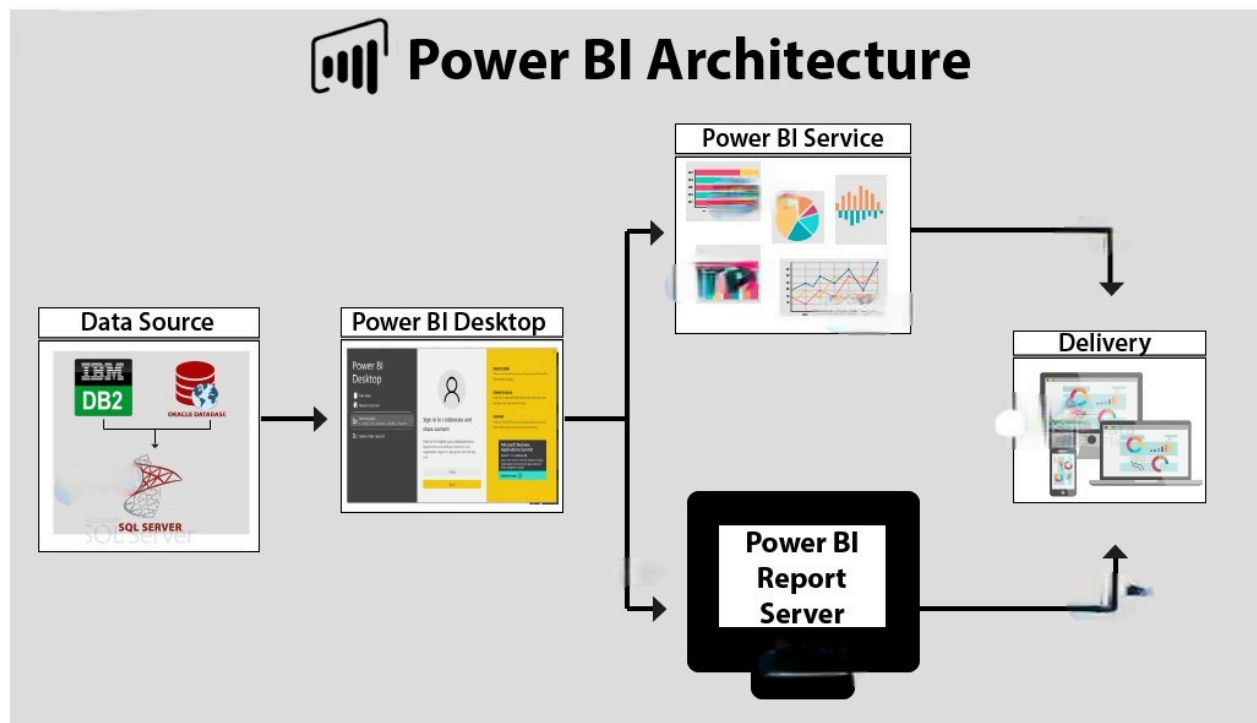
Project Flow:

To accomplish this, we have to complete all the activities listed below,

- Data Collection
  - Collect the dataset,
  - Connect Data with Power BI
- Data Preparation
  - Prepare the Data for Visualization
- Data Visualizations

- o Visualizations
- ● Dashboard
  - o Responsive and Design of Dashboard
- ● Report
  - o Report Creation
- ● Performance Testing
  - o Amount of Data Rendered to DB
  - o Utilization of Data Filters
  - o No. of Calculation fields
  - o No. of Visualizations/Graphs
- ● Project Demonstration & Documentation
  - o Record explanation Video for project end to end solution
  - o Project Documentation-Step by step project development procedure

Milestone 1: Data Collection & Extraction from Database

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, evaluate outcomes and generate insights from the data.

Activity 1: Downloading the dataset

Please use the link to download the dataset: http://surl.li/srlrbf

Activity 1.1: Understand the data

Data contains all the meta information regarding the columns described in the CSV files

Column Description of the Dataset:

- · Category: Cultural site, Mixed site, Natural site

- · State_name_en: Country

- · Region_en: Asia and the Pacific, Europe and North America, Arab States, Africa, Latin America and Caribbean

- · Unique_number:

· Id_no:

· Name_en: Names of the UNESCO Heritage site

· Short_description: Description of the sites

· Justification_en: Additional description

· Date_inscribed: Date when the site was listed in the world heritage site

· Danger: site which is in danger assign 1 and 0 for not in danger

· Date_end: Date When Risk Status Was Removed from the Site

· Danger_list: Period When Risk Was Imposed on the Site

· Longitude: Longitude of the site

· Latitude: Latitude of the site

· Area_hectors: Area of the site in hectors

· Criteria_txt:

· Category_short: Category Code

· Transboundary: 1 for site which share boundary with multiple countries and 0 for site which

· Rev_bis:

· Secondary_dates:

· Iso_code:

· Udnp_code:

Milestone 2: Data Preparation

Activity 1: Prepare the Data for Visualization

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily

understandable and ready for creating visualizations to gain insights into the performance and efficiency. In this dataset there are some irrelevant columns and we can remove in Power BI query and load the dataset into the Power BI desktop and move to visualization.

2.1: Data Loading and Cleaning

Link: https://shorturl.at/rKOBA

Milestone 3: Data Visualization

Data visualization is the process of creating graphical representations of data to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

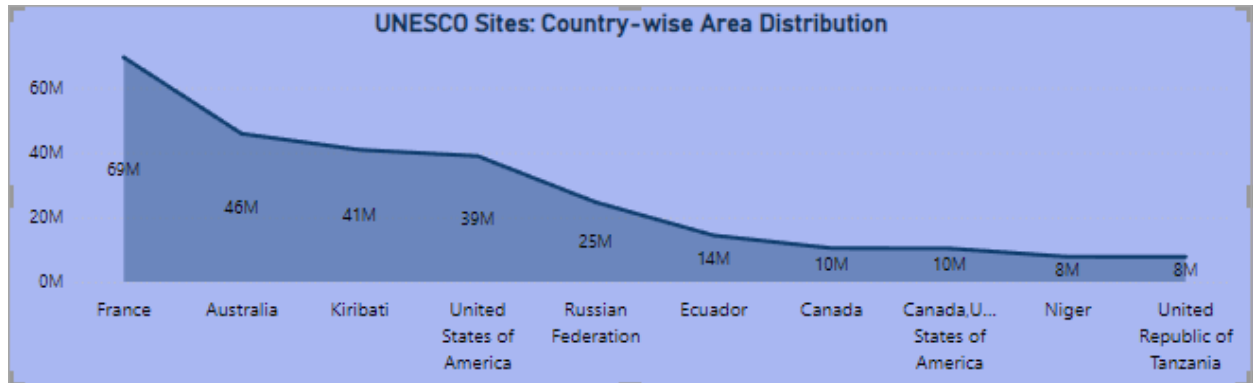**Activity 1: Analysis of UNESCO heritage sites by Area and count by country**
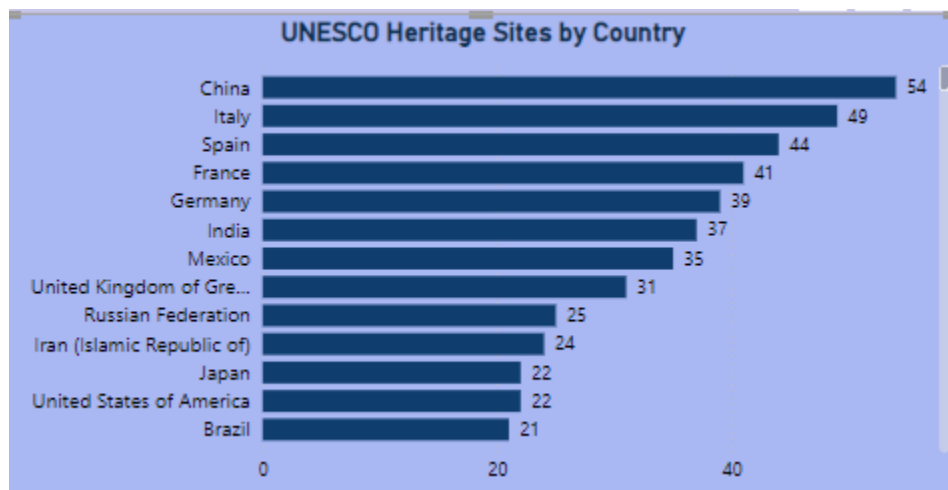
Activity 1.1: Total Area in hectors

370.70M
Total Area in hectares

Activity 1.2: Total number of UNESCO heritage site
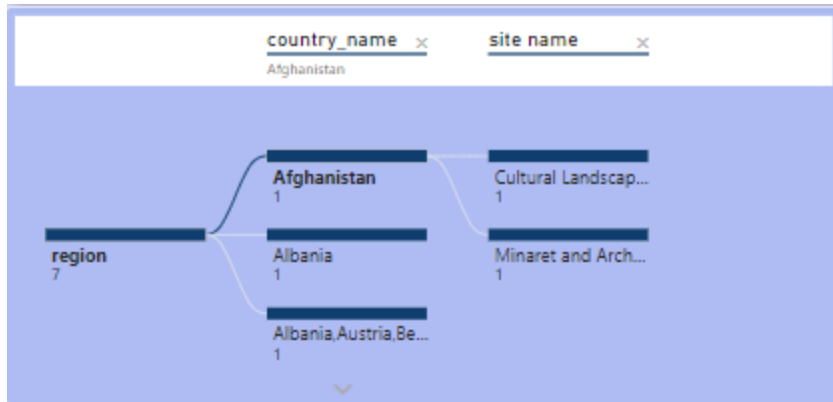

1121
Total Sites

Activity 1.3: UNESCO Sites: Country-wise Area Distribution

Activity 1.4: Number of UNESCO Heritage Sites by country

Activity 1.5: List of all the UNESCO Heritage sites per country and region using decomposition tree
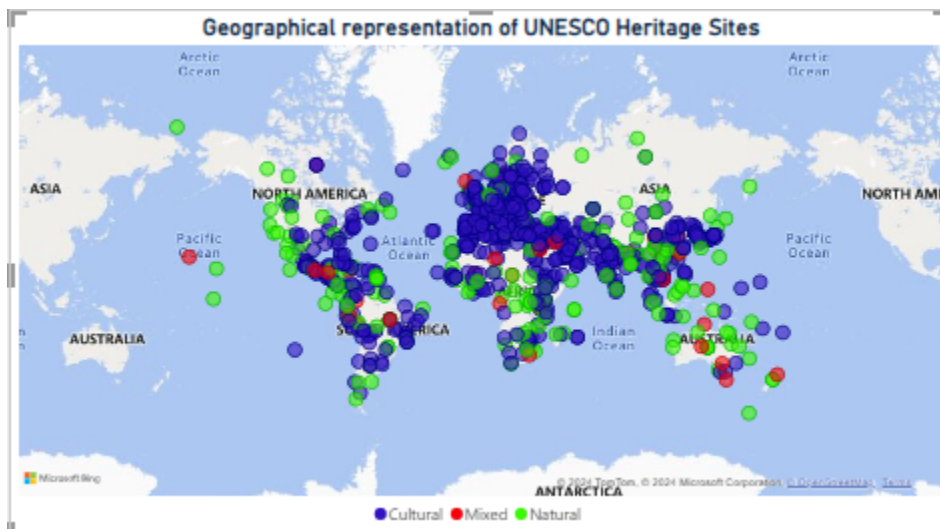
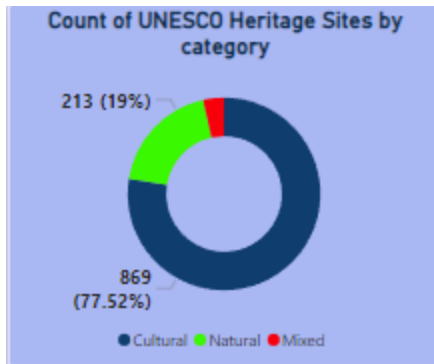**Activity 2: UNESCO Heritage Sites Analysis: Risk, Boundaries, and Categories**
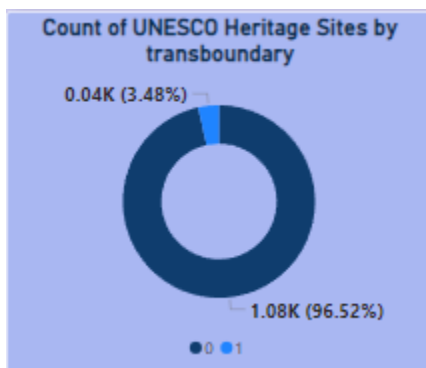
Activity 2.1: Total Danger sites

53
Total Danger Sites

Activity 2.2: Geographical representation of UNESCO Heritage sites

Geographical representation of UNESCO Heritage Sites

● Cultural ● Mixed ● Natural

Activity 2.3: Representation of count of UNESCO heritage sites by different category (Cultural, Natural, Mixed)

Count of UNESCO Heritage Sites by category

213 (19%)

869 (77.52%)

● Cultural ● Natural ● Mixed

Activity 2.4: Representation of count of UNESCO heritage sites by transboundary

Count of UNESCO Heritage Sites by transboundary

0.04K (3.48%)

1.08K (96.52%)

● 0 ● 1

Activity 2.5: Representation of count of UNESCO heritage site by Risk (Danger and

Count of UNESCO Heritage Sites are in danger

0.05K (4.73%)

1.07K (95.27%)
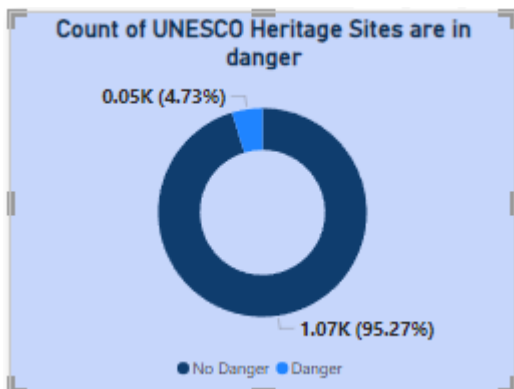
● No Danger ● Danger

Activity 2.6: Representation of Total Danger Sites by region

Total Danger Sites by region
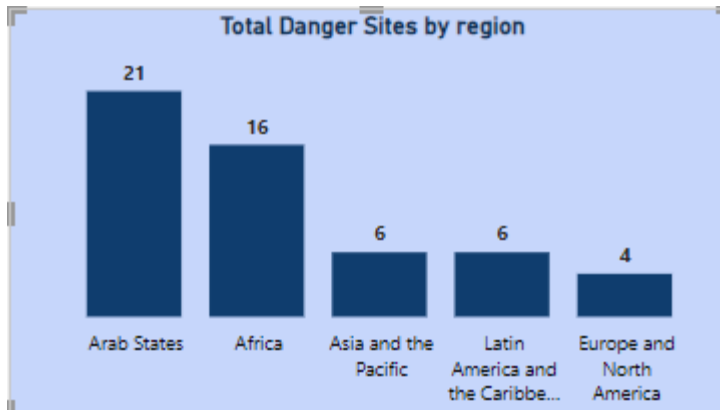
Activity 3: Filters Action to understand UNESCO Heritage site analysis

Activity 3.1: Slicer for Transboundary, Sites in danger, Category

Activity 3.2: Slicer for Region and Country

Activity 4: Narrative Report

Activity 4.1: Report using Narrative AI visual

There are total 1121UNESCO Heritage sites in the world with total area of 370698504.20 in hectors.

Count of Heritage sites was highest for China at 54, followed by Italy and Spain. China accounted for 4.82% of Count of Heritage sites.

53 UNESCO heritage sites are in danger.

Arab States has 21 Heritage sites which is the highest among all the region which are in danger.

There are 869 Cultural, 213 Natural and 39Mixed category of Heritage sites in the world.

Note: Video Explanation for the creation of above Visualizations are given in **Report**

Milestone 4: Dashboard

A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

Activity 4.1: UNESCO Heritage Sites Overview: Area and Site Count by Country
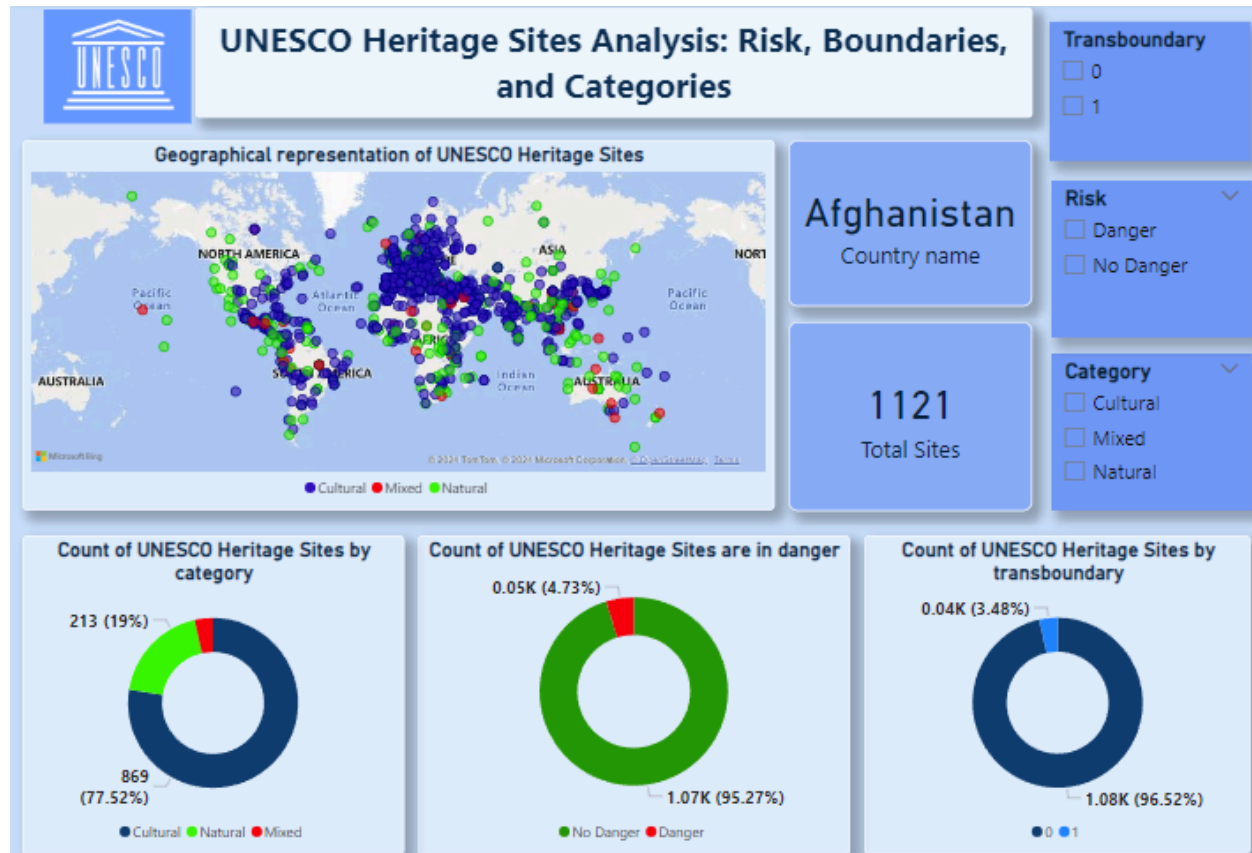
Explanation video link: https://shorturl.at/1TFq7
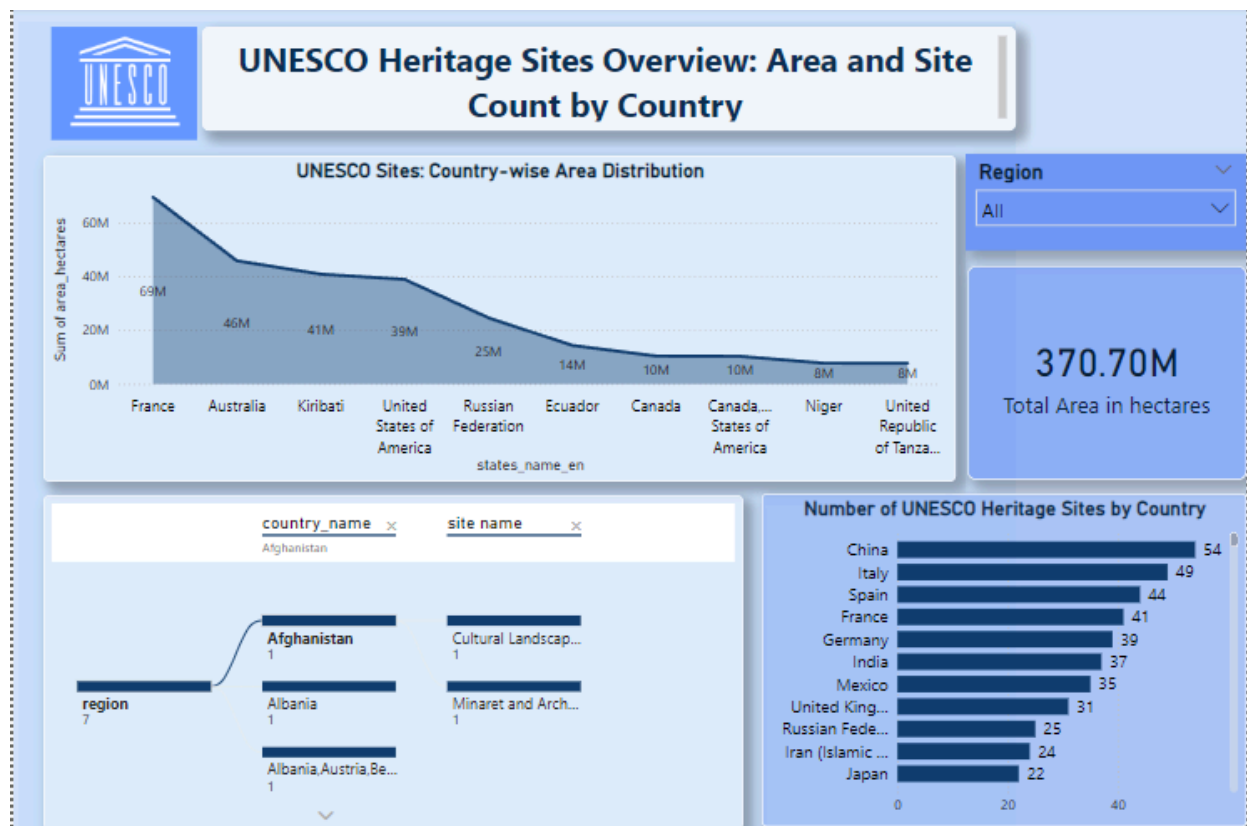
Dashboard 1:

Activity 4.1: UNESCO Heritage Sites Analysis: Risk, Boundaries, and Categories

Explanation video: https://shorturl.at/Y0mOf

Dashboard 2:

Activity 1: Design of Report

Designing a report in Power BI involves connecting to data sources, creating visualizations like charts and graphs, customizing their appearance and interactivity, organizing them logically on the canvas, formatting elements for consistency and clarity, and optionally creating dashboards for a summarized view. Throughout the process, it's essential to consider the audience's needs and ensure the report effectively communicates insights from the data. Finally, iterate based on feedback to continually improve the report's design and usefulness.

Explanation video link : https://shorturl.at/wZnaK
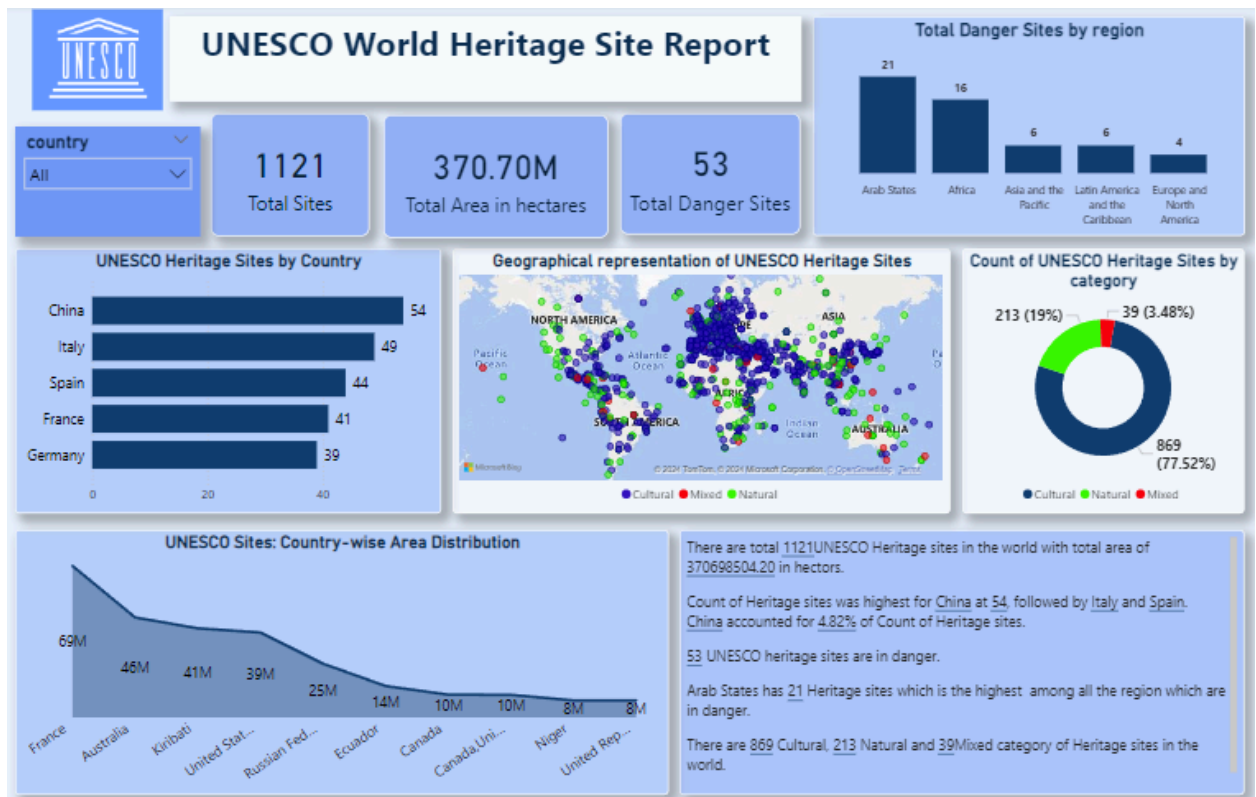
Milestone 6: Performance Testing

Activity 1: Amount of Data Loaded

"Amount of Data Loaded" refers to the quantity or volume of data that has been imported, retrieved, or loaded into a system, software application, database, or any other data storage or processing environment. It's a measure of how much data has been successfully processed and made available for analysis, manipulation, or use within the system.
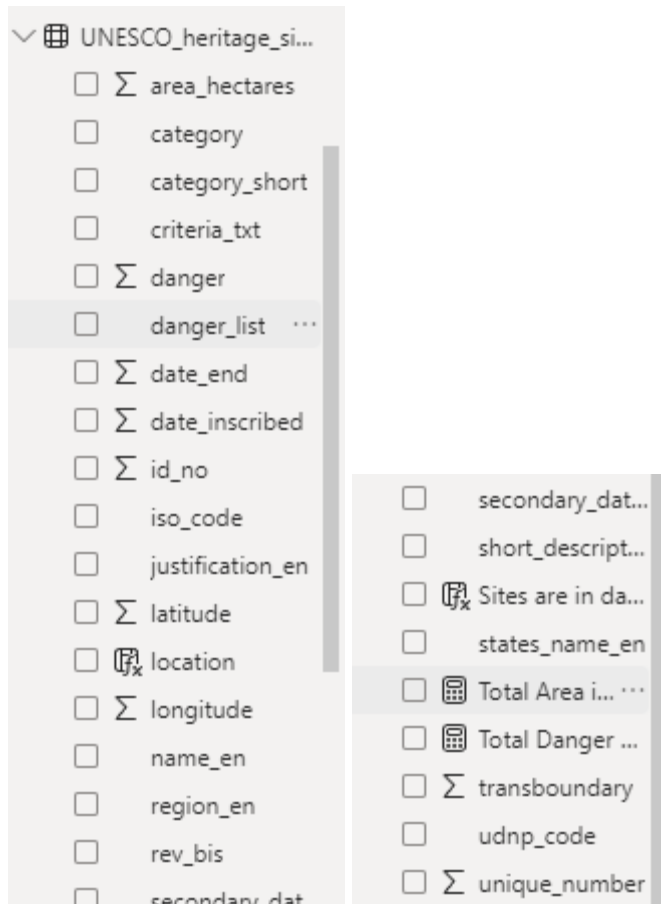
Activity 2: Utilization of Filters

"Utilization of Filters" refers to the application or use of filters within a system, software application, or data processing pipeline to selectively extract, manipulate, or analyze data based on specified criteria or conditions. Filters are used to narrow down the scope of data, focusing only on the relevant information that meets certain predefined criteria.
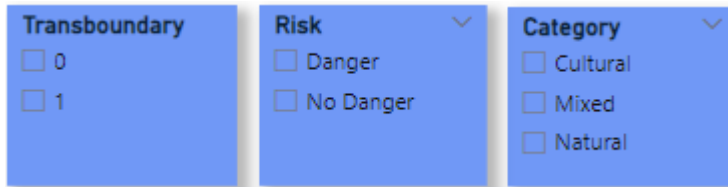
In PowerBI , Filtering is done in 2 ways

1. By using filter pane
2. By Using Slicers

Activity 2.1: Selected "Region" as Slicer in Dashboard 1

Activity 2.2: Select "Transboundary", "Risk" and "Category" as slicers in the Dashboard 2

Activity 2.3: Selected "Country" as slicer in the Report

Activity 3: No of Calculation Fields

Activity 3.1: Conditional Columns

In Power BI, you can add conditional column summaries by creating calculated columns or measures that incorporate logical conditions based on your data. These conditions can involve calculations like sum, average, count, etc., depending on the requirements. Once defined, these calculated columns or measures dynamically summarize data based on the specified conditions, providing valuable insights into different subsets of your data.

In all of the above datasets, we used Index Column tool for creating primary key – "Index", which we can see in all the tables

Activity 3.2: Calculated Column

In Power BI, a calculated column is a column that you add to an existing table by defining a formula using DAX (Data Analysis Expressions). This formula allows you to perform calculations based on data within your dataset. Calculated columns can be used to create new data by combining, transforming, or aggregating existing columns. They are useful for deriving new insights, categorizing data, or creating conditional logic that enhances your data model and analysis.

1.Calculated column "Sites are in danger" using pre-existing column "danger"

```
Sites are in danger = if('UNESCO_heritage_site_data'[danger] = 1, "Danger", "No Danger")
```

2.Calculated column "location" using pre-existing column "name_en" and "states_name_en"

```
location = 'UNESCO_heritage_site_data'[name_en]&","&'UNESCO_heritage_site_data'[states_name_en]
```

Activity 3.3: Measure

In Power BI, a measure is a calculation based on data in your dataset. Measures are created using DAX (Data Analysis Expressions), a formula language that allows you to perform calculations, create aggregations, and define business logic. Measures can perform various functions such as summing values, calculating averages, counting occurrences, or performing complex calculations based on conditions.

1.Calculated Measure "total no of UNESCO sites per country" using "states_name_en" and "name_en"

```
total no of UNESCO sites per country = SUMMARIZE('UNESCO_heritage_site_data','UNESCO_heritage_site_data'[states_name_en],"Count_of_Sites",
    count('UNESCO_heritage_site_data'[name_en]))
```

2.Calculated Measure "Total Danger sites" using "name_en" and "Sites are in danger"

```
Total Danger Sites = CALCULATE(COUNT('UNESCO_heritage_site_data'[name_en]),'UNESCO_heritage_site_data'[Sites are in danger] = "danger")
```

3.Calculated Measure "Total Area in hectares" using "area_hectares"

```
Total Area in hectares = round(SUM('UNESCO_heritage_site_data'[area_hectares]),1)
```

Activity 4: No of Visualizations/ Graphs

1. UNESCO Sites: Country-wise Area Distribution

2. Number of UNESCO Heritage site by country

3. Total Area in hectares

4. List of UNESCO Heritage Sites per country and region

5.Count of UNESCO Heritage Sites by category

6.Count of UNESCO Heritage Sites by danger

7.Count of UNESCO Heritage Sites by transboundary

8. Total Sites

9. Total Danger Sites by region

10. Total Danger Sites

11. Report: Using Narrative AI

12. Geographical representation of UNESCO Heritage Sites