EARTHQUAKE ANALYSIS

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<u>Introduction</u>

Data is everywhere in sheets, and social media platforms, and feedback, is everywhere. In this latest **information generation**, Data generated can be a company's most valuable asset when data is analyzed correctly. To grow your business even to grow in your product, sometimes all you need to do is Analysis If your business is not growing or you need to make multiple solutions for problems, then you have to look back and recognize your mistakes and make a plan again without repeating those mistakes. And even if your business is growing, then you have to look forward to making the business grow more. All you need to do is analyze whether its business data or other data sets may be related to any product, Company, application, Day today life, and also it can be done for real-life problems by analyzing them and finding solutions from data.

Earthquake data analysis is a crucial field of study that focuses on understanding the seismic activity of our planet. This involves collecting and analyzing data from seismic sensors and other monitoring equipment, as well as studying historical earthquake data. By examining patterns in earthquake occurrences, scientists can better understand the causes of earthquakes and how to predict them. Earthquake data analysis is essential for improving earthquake-resistant building designs and emergency response strategies, helping to mitigate the devastating effects of these natural disasters.

I have **scrubbed** and **organized** the entire data set and performed the analysis of a clean data set as per my requirement for the dashboard. I have **deduced** and **calculated** important resultsfrom the data set with the help of various Tableau features like Calculated fields and functions and represented them in the form of a **dynamic dashboard** using visualizing tools and various charts

<u>Scope of the Analysis</u>

The scope of analysis for earthquake data from 1900-2013 would involve several steps to explore and understand patterns and trends in earthquake activity over time. The analysis would begin by identifying and listing the sources of earthquake data, such as publicly available data sets from reputable organizations. The data would then be cleaned and preprocessed, including removing duplicates and dealing with missing values. Descriptive statistics, such as the number of earthquakes, the magnitude range, and the geographic distribution, would be generated, and visualizations, such as maps and time series plots, would be created to aid in understanding patterns and trends. Statistical analysis, such as time series analysis, correlation analysis, or regression analysis, would be conducted to identify any significant trends or patterns. The results of the analysis would be interpreted, and conclusions would be drawn based on the research question or objective, such as identifying areas that are most prone to earthquakes or determining if there is an increasing trend in earthquake frequency or magnitude over time. Finally, any limitations of the analysis would be identified, and recommendations for future research or improvements to data collection methods would be made.

Source of Dataset

Data Set - https://www.kaggle.com/datasets/abhishekchauhan001/earthquake-1900-2013
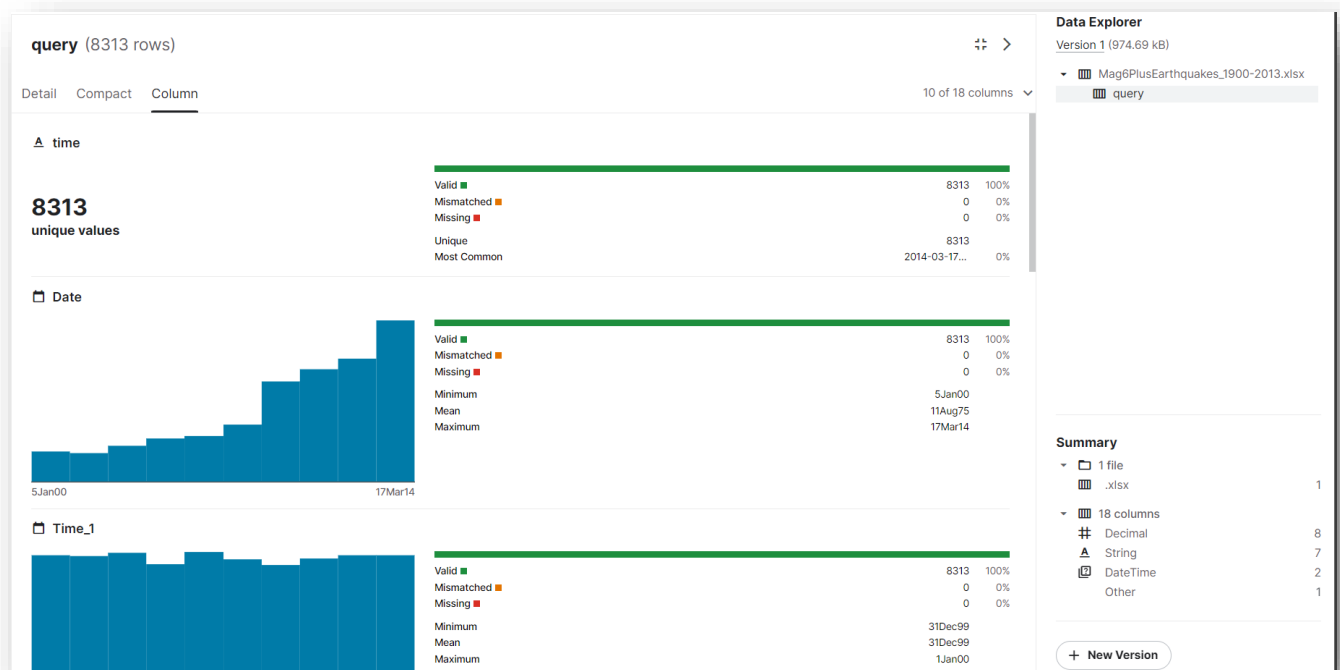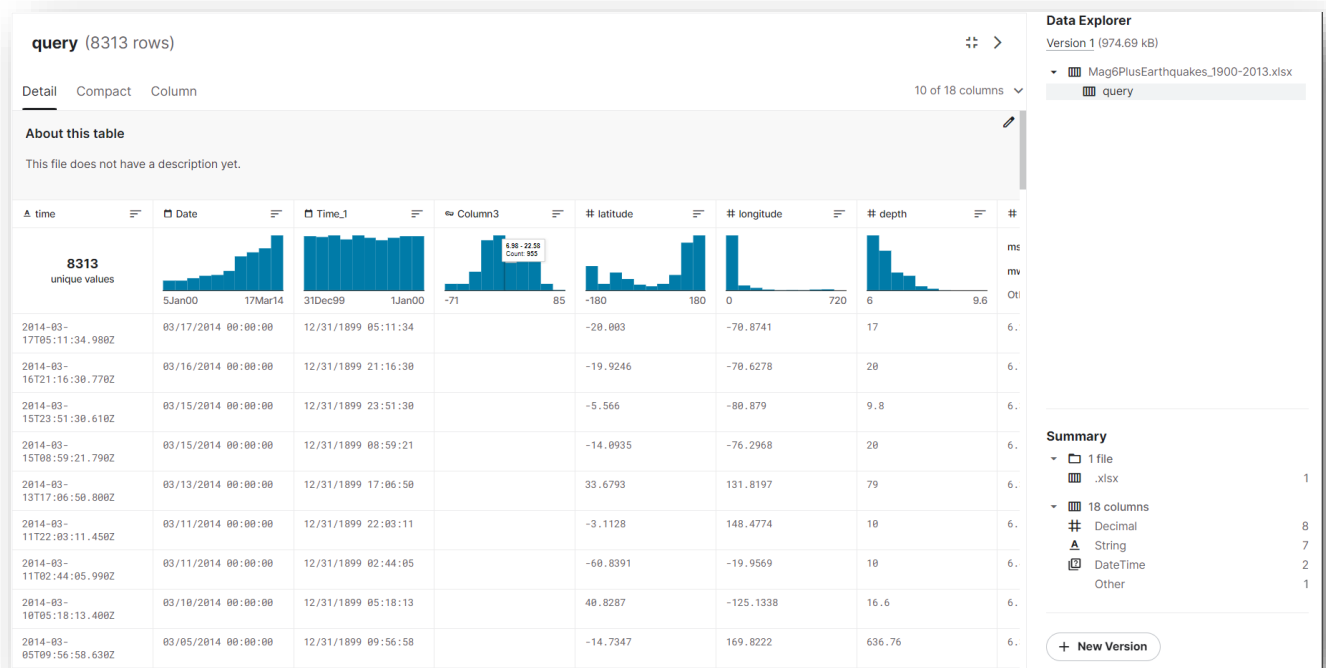
<u>Analysis</u>

1. <u>Introduction</u>

I have created a Tableau dashboard for Earthquake data analysis using the different available tools in Tableau the dataset which I took have all the relevant field left with it after the ETL process and formatted table of data created from which I will be analyzing different objective for dashboard creation of important aspects required for better analysis
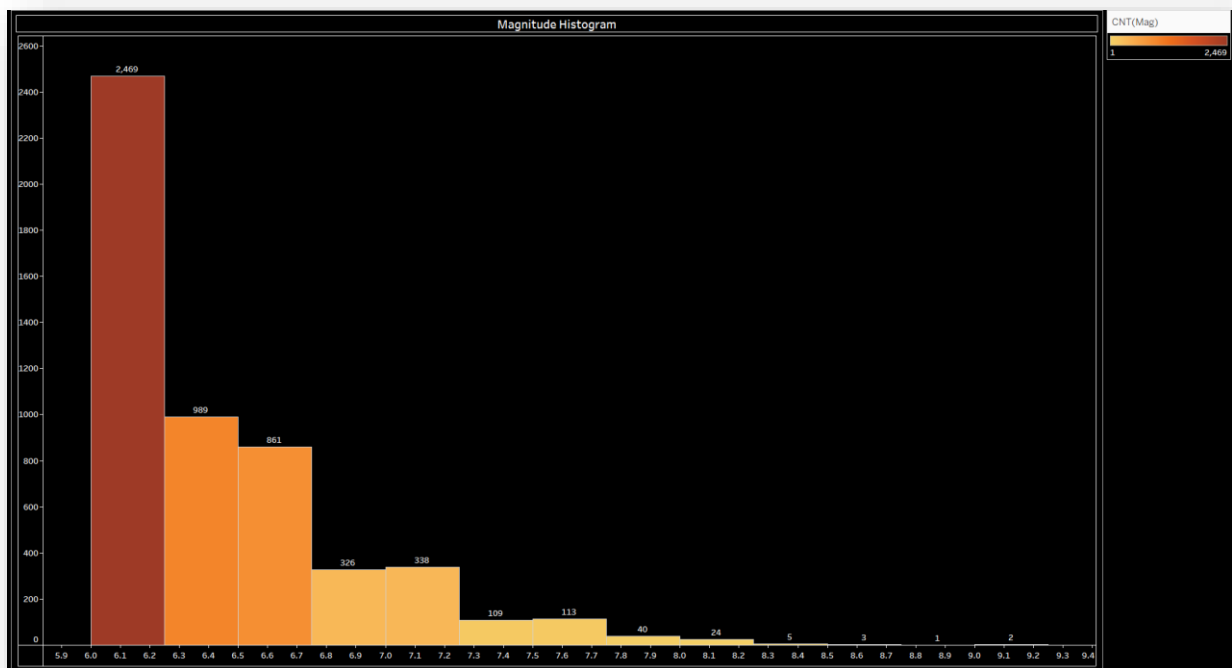
Objective 1 – Magnitude Histogram

Description – The objective is to display the number of earthquakes that occurred respectively to a particular range of magnitude of that earthquake and also represented the label on each bar for a better visual explanation.

Requirement –

- Histogram
- Using magnitude in color and text field

Visualization – To get the count of earthquakes in different magnitude ranges

Objective 2 – Depth in (km) Histogram

Description – The objective is to display the number of earthquakes that occurred respectively to a particular range of depth and represented the label on each bar for a better visual explanation.

Requirement –

- Histogram
- Using depth in color and text field

Visualization –   To get the count of earthquakes in different Depth ranges
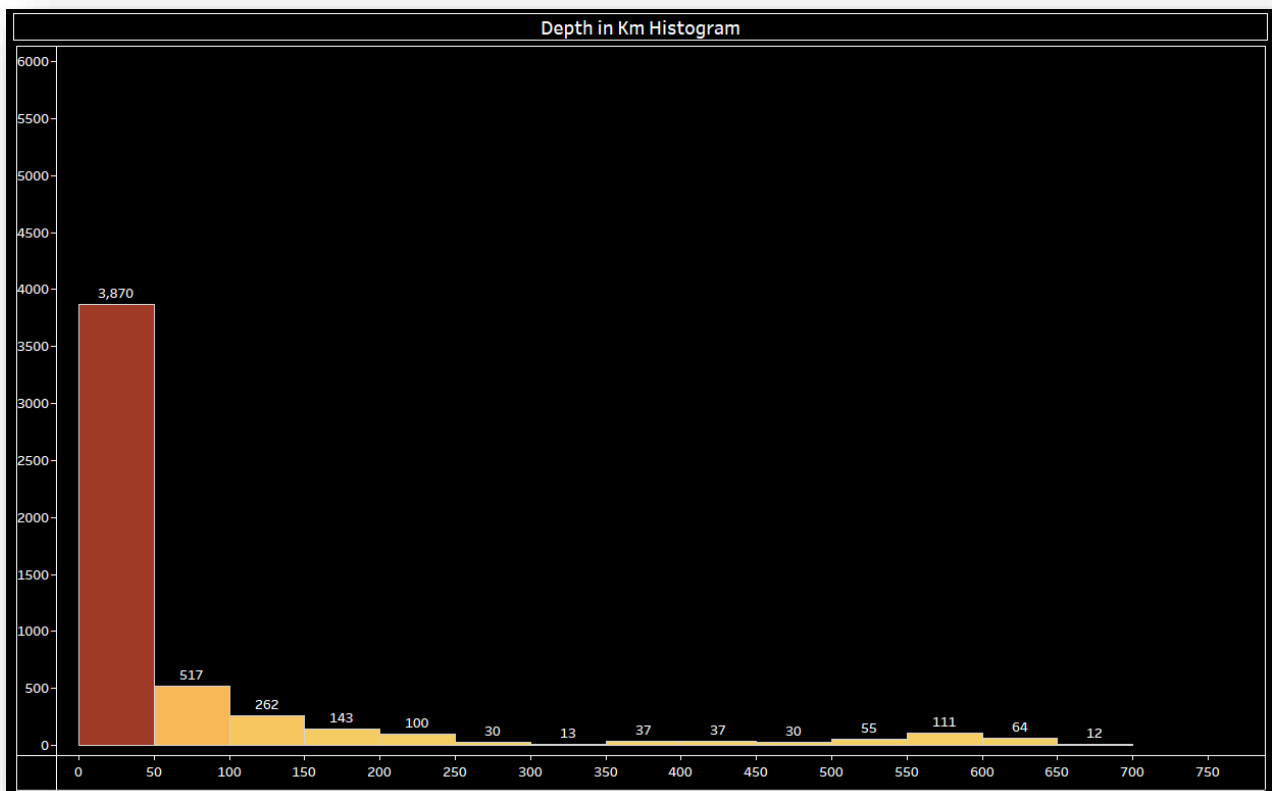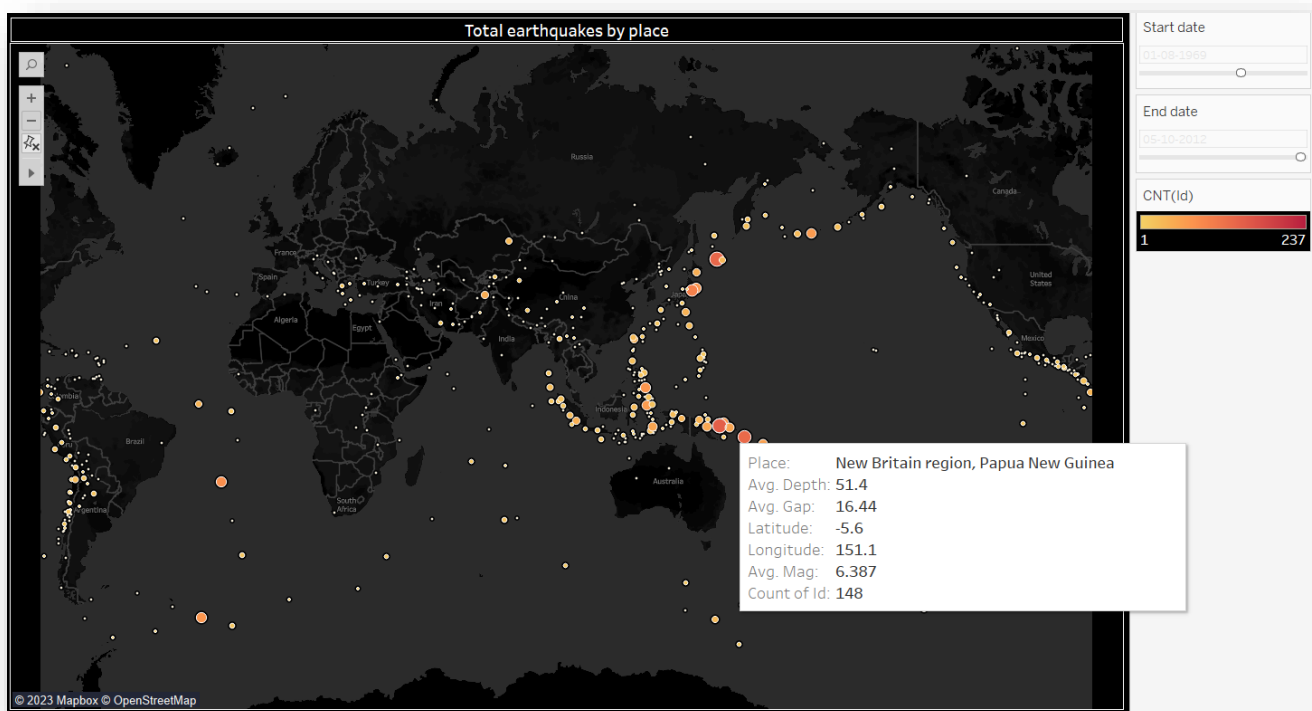
Objective 3 – Total earthquakes by place

Description – The objective is to display the location of the earthquake using a map chart differentiating the earthquakes on bases of their intensity. Showcasing the location of the earthquake by color. The visualization shows the details once hover over any earthquake.

Requirement –

- Map chart
- Used fields – Avg gap, Avg mag, Avg Depth, id, longitude and latitude

Visualization –   To get the location of different earthquakes in the particular time frame
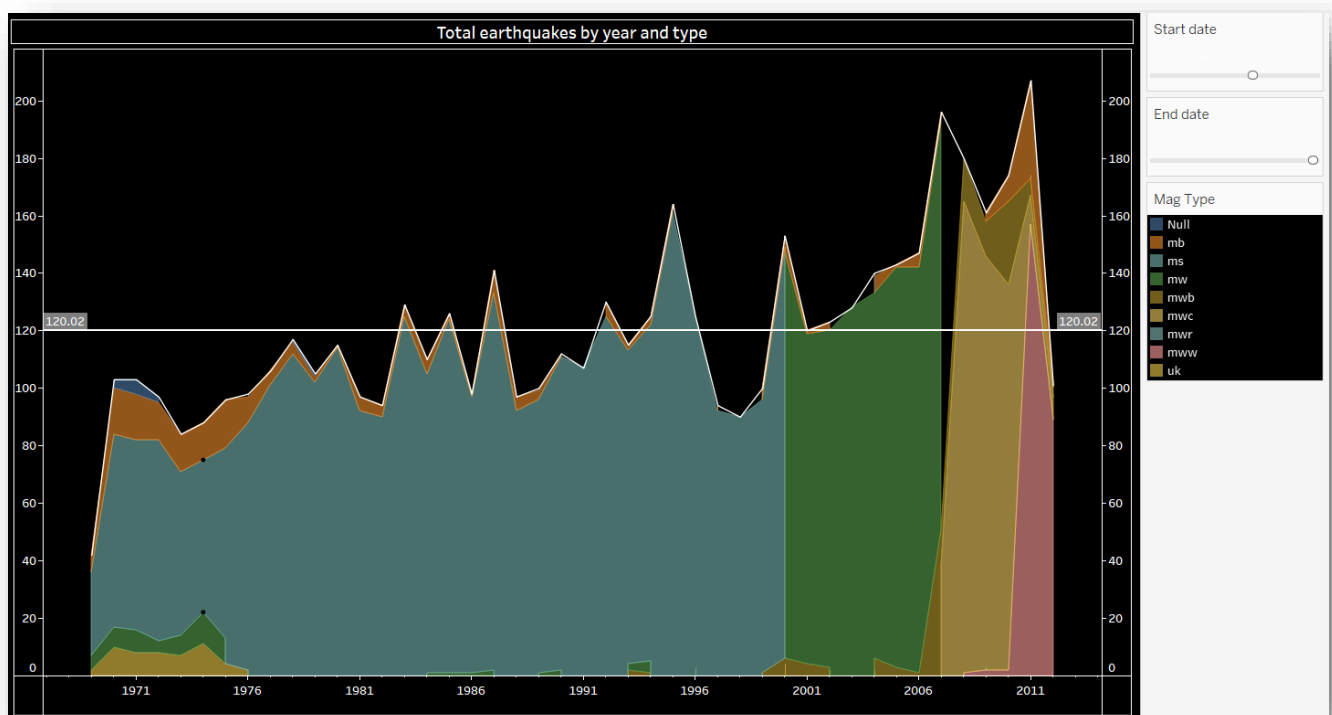
Objective 4 – Total earthquakes by year and type

Description – The objective is to display of all magnitude type earthquakes that has occurred since 1900 to 2013 and then getting average of all those year to get the value which further is used to get earthquakes location and strengths more accurately

Requirement –

- Area Chart
- Used fields – years, id and magnitude type(mw, mb , mi , mww)

Visualization – To compare all the magnitude type in area chart for high and low values in chart for each type

Objective 5 – Total earthquakes by month and type

Description – The objective is to display the magnitude types earthquakes that occurred in the each month with respective to the years select in the date slider all using a stacked bar chart for better and easy to understand visualization.

Requirement –

- Stacked bar chart
- Used fields – Magnitude type, earthquake id, date = month

Visualization – To compare all the magnitude type in stacked bar chart for each month
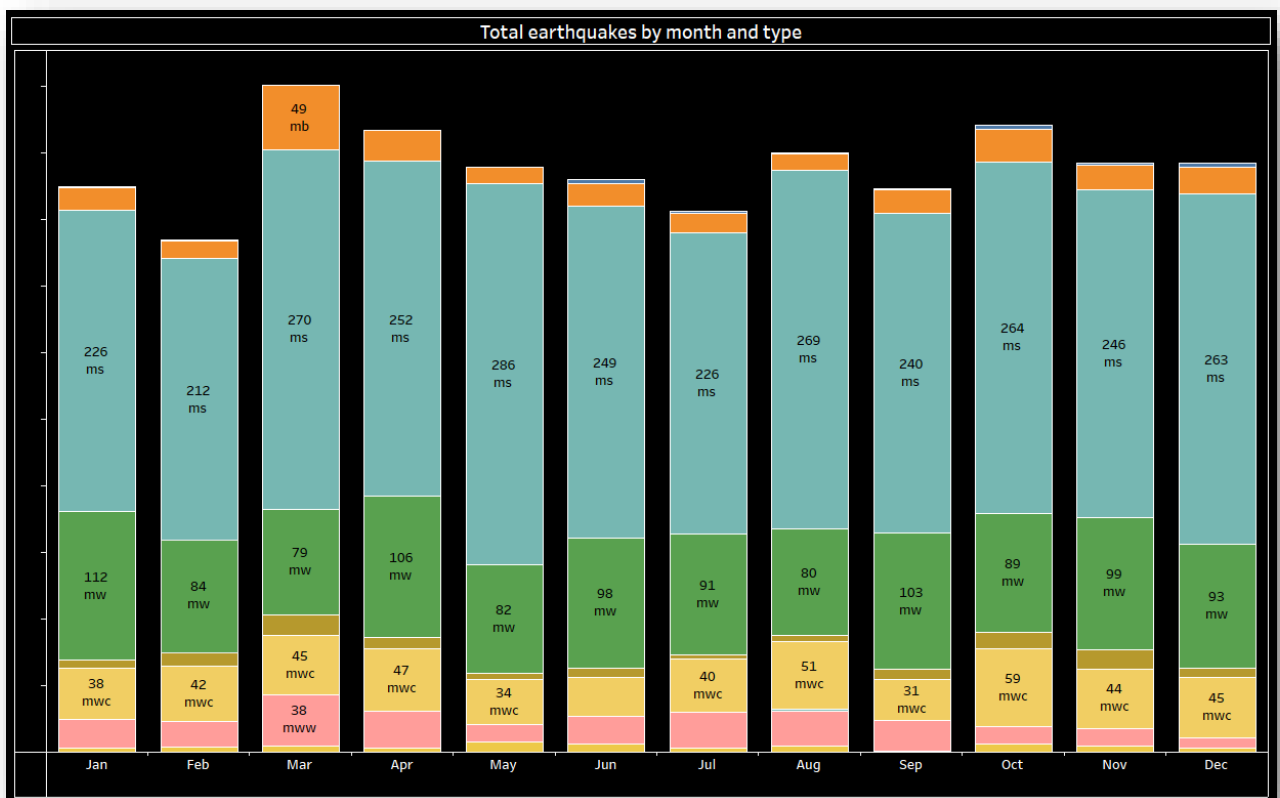
Objective 6 – Earthquakes details with NST

Description – The objective is to display the total NST(number of seismic station) which lies in the zone of earthquakes effect

Requirement –

- Table
- Used fields – Date, Place, Magnitude, Depth and NST

Visualization – To get the NST for each earthquakes with other location details

Date1	Place	Mag	Depth	
August 4, 1969	Banda Sea	6.3	525.7	201
August 5, 1969	Molucca Sea	7	26.7	192
August 8, 1969	southern Mid-Atlantic Ridge	6	21.4	104
August 11, 1969	Kuril Islands	6	4.9	46
			31.3	36
		8.2	45.6	112
	Molucca Sea	7.1	27.4	145
August 12, 1969	east of the Kuril Islands	6.2	29.2	169
		6.5	26.5	251
	Kuril Islands	6.3	21.2	215
August 13, 1969	Kuril Islands	6.1	37.3	222
August 14, 1969	Kuril Islands	6.5	19.4	274
August 15, 1969	Mariana Islands region	6	304.1	226
August 17, 1969	Gulf of California	7	32	53
August 18, 1969	southern East Pacific Rise	6.4	13.6	78
August 20, 1969	Kuril Islands	6	113.9	252
September 2, 1969	Kermadec Islands region	6	19.2	33
September 6, 1969	Azores-Cape St. Vincent Ridge	6	39.4	154
	Solomon Islands	6.1	45.1	145
September 9, 1969	eastern Honshu, Japan	6	7	177
September 12, 1969	Andreanof Islands, Aleutian Islan..	6.6	34.6	277
September 20, 1969	Reykjanes Ridge	6	6.3	163
September 24, 1969	northern Mid-Atlantic Ridge	6.4	17	224
September 29, 1969	South Africa	6.3	15	158
September 30, 1969	Kermadec Islands region	6.1	15	139
October 1, 1969	central Peru	6.2	6	163
	east of the South Sandwich Islan..	6	5	72
October 17, 1969	Myanmar	6.1	25	214
October 26, 1969	south of Africa	6.1	25.2	130
October 27, 1969	Bosnia and Herzegovina	6.1	15	136
October 31, 1969	Andreanof Islands, Aleutian Islan..	6.3	9.7	277
November 1, 1969	Gulf of California	6.6	13.3	96
November 7, 1969	southeastern Iran	6.1	76	229
November 13, 1969	offshore Atacama, Chile	6	23.3	145
November 21, 1969	off the west coast of northern Su..	7.6	10.3	288
November 22, 1969	near the east coast of the Kamch..	7.0	9.2	

Earthquakes details with total Nst

Objective 7– Location Quality Parameters & KPI

Description – The objective is to display the KPI for different location parameter which combines and gives the accurate location and strengths of earthquakes. Such as "gap" which show the distance from the epicenter to the station location in terms of Degree and more such parameters Rms, Gap, Depth, Dmin

Requirement –

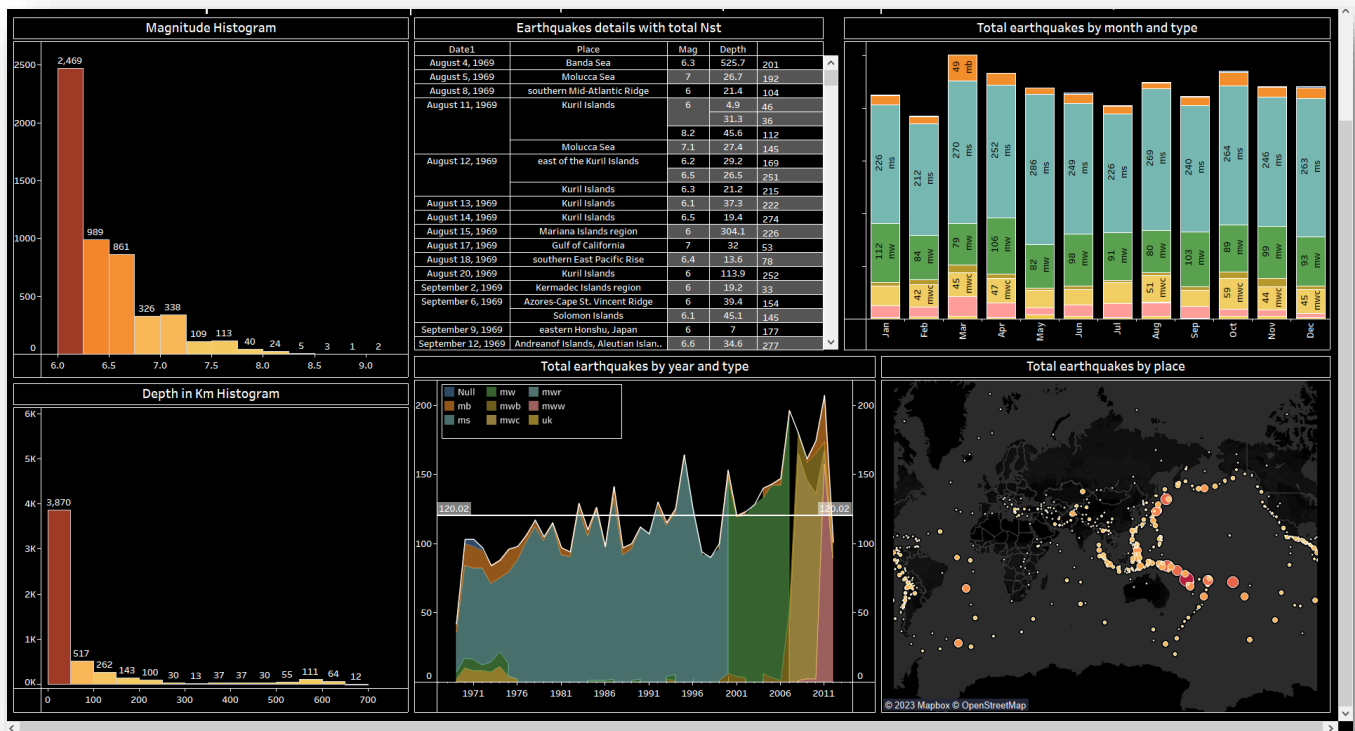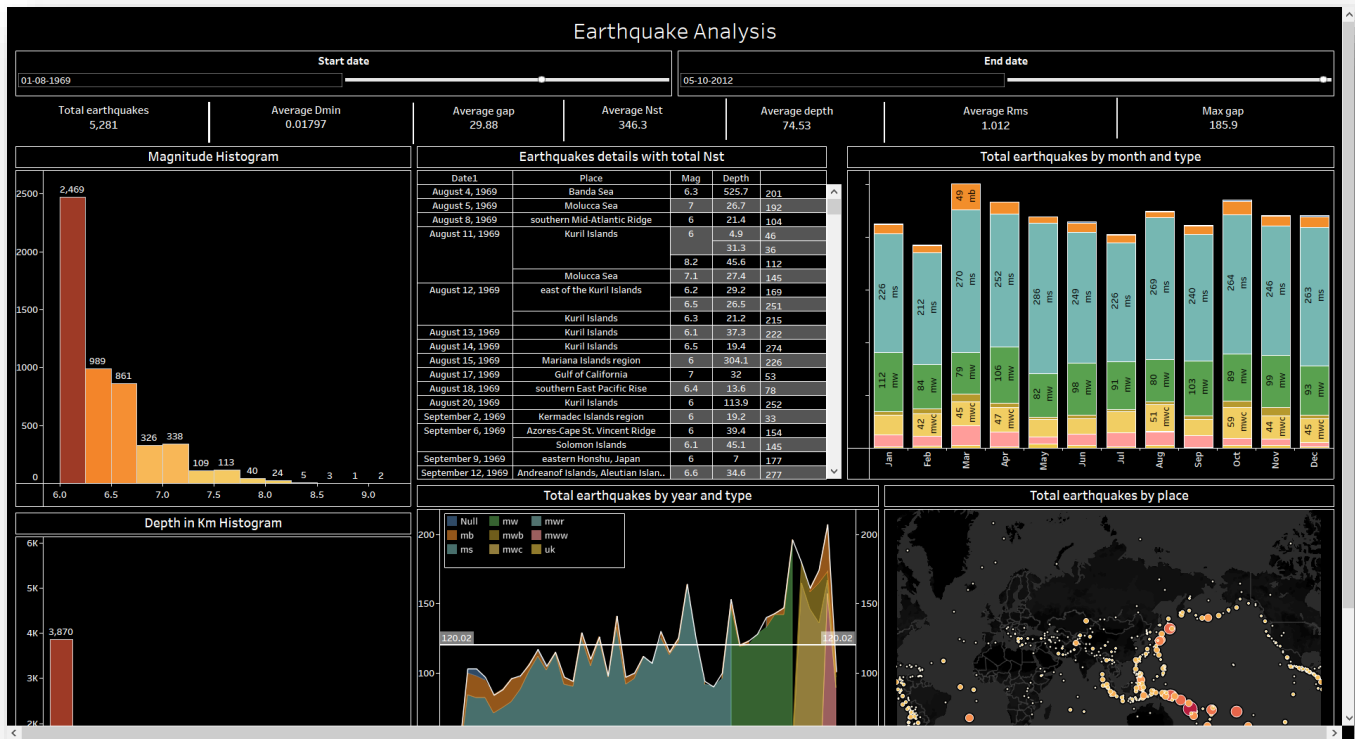- Used fields – Avg Dmin, Avg Gap, Average Nst, Total earthquakes

Visualization – KPI

Total earthquakes	Average Dmin	Average gap
5,281	0.01797	29.88

Average Nst	Average depth	Average Rms	Max gap
346.3	74.53	1.012	185.9

DASHBOARD

- I have created this dashboard by combining all the results obtained in the data analysis, then connecting the required sheets table and charts.

<u>Summary of Report</u>

In this report I have discussed in detail my project, its working, making, features, and application, I have explained each and every step of making an Earthquake dashboard using raw data on Tableau.

This report highlights all the process involved in making serial order from using several Tableau features like table, filtering, sorting,and formulas to perform data analysis and deduce important results then representing them graphically using charts.

I have also attached the preview of the dashboard and all the objectives in this report.

<u>References</u>

- Earthquakes (Data Set) -
  https://www.kaggle.com/datasets/abhishekchauhan001/earthquake-1900-2013

- https://www.tableau.com/learn/articles/data-visualization

- https://www.educba.com/tableau-charts/

Bibliography

First and foremost, I would like to thank the LPU B.Tech CSE branch for giving me this opportunity to enhance and polish my skills. I would also like to thank all the other teachers for their support. Next, Hats-off to all my friends who help me throughout the process for their dedication and efforts put into it. I worked tirelessly and stayed up nights solving all the problems and errors.

I got all the information that I needed to do the analysis and documentation itself.

I surfed YouTube to get ideas on how to make design my application

For working with different Tableau tools and their features I brainstormed as an individual to getfamiliar with all the necessary things.

IMPORTANT LINKS :

Project - **Visit**