



Seismic Data Analysis

Understating Seismic Patterns for Civil Engineering Applications

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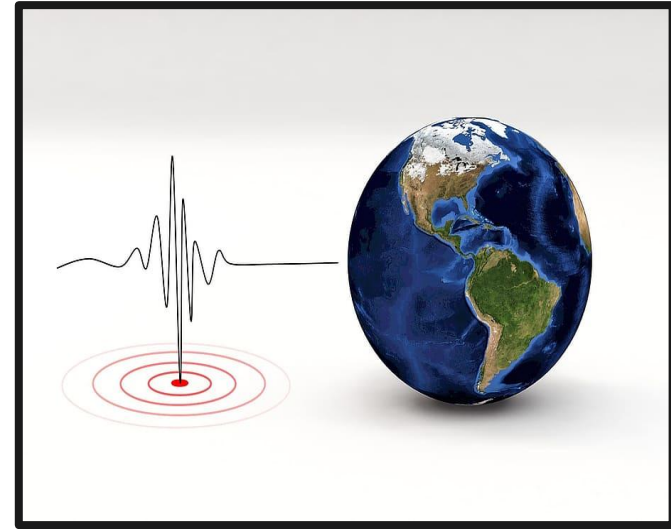
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Introduction

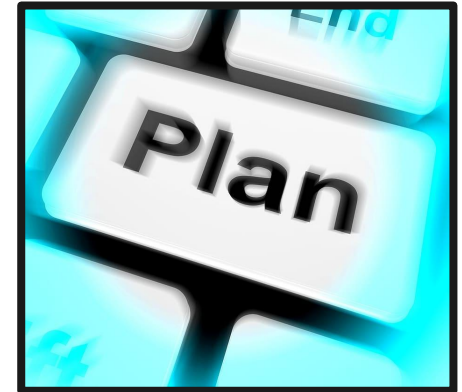
Q- What is Seismic Data Analysis ?

Seismic data analysis involves the examination and interpretation of data collected through seismic surveys or measurements, aiming to unveil subsurface geological structures and properties. This process encompasses steps such as data acquisition, pre-processing, interpretation, and application.



Objectives

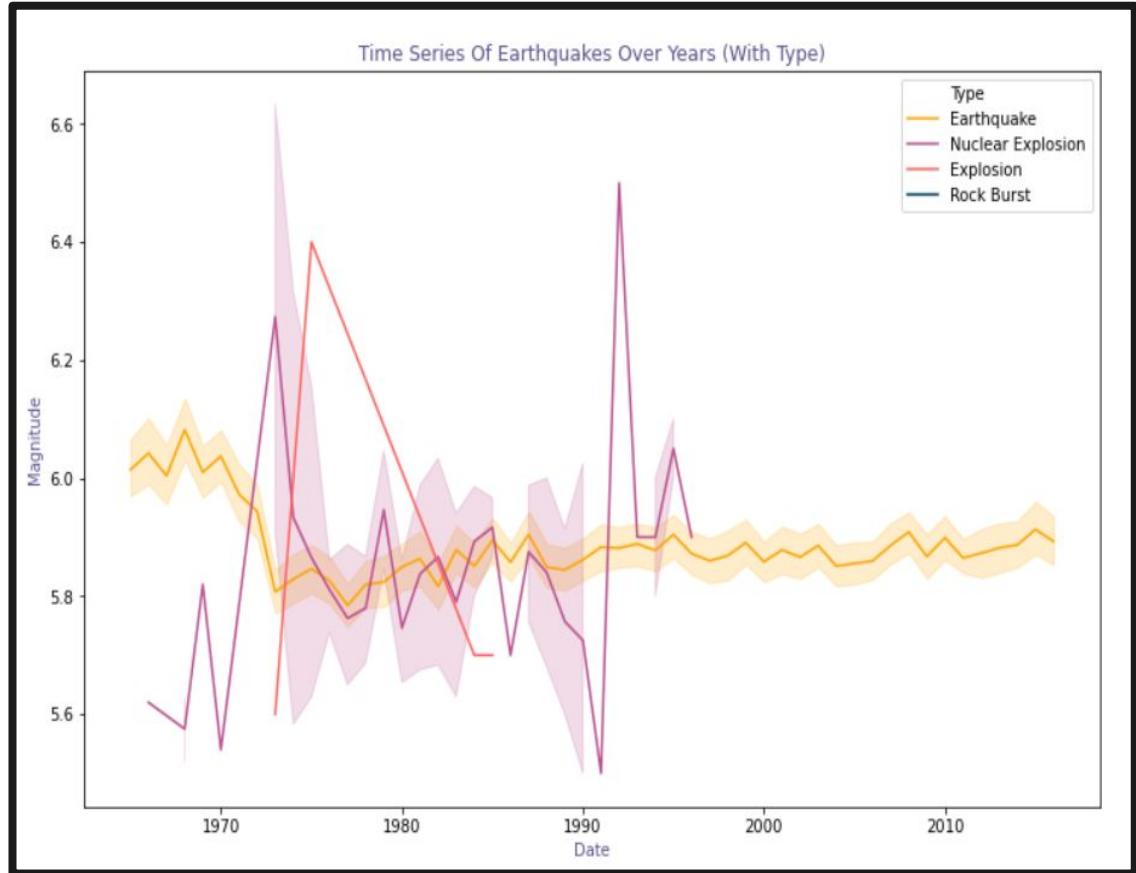
- To understand the basics of seismic data analysis
- To explore various seismic data processing techniques
- To analyze seismic data for potential applications in civil engineering



RESULTS

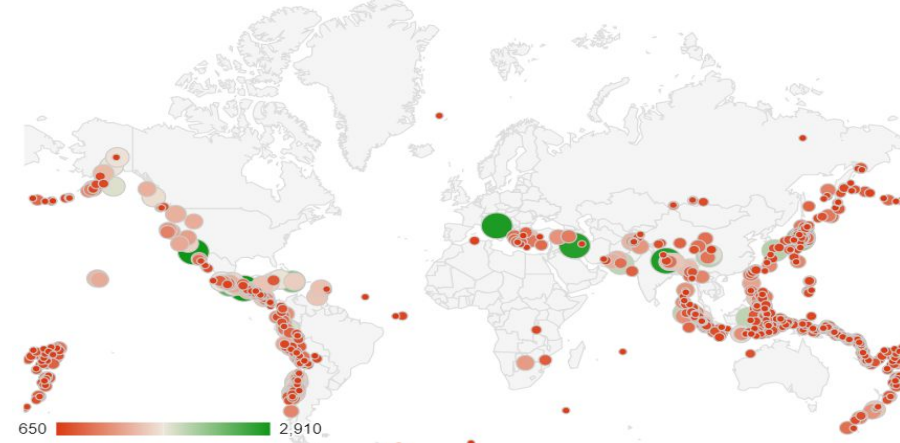
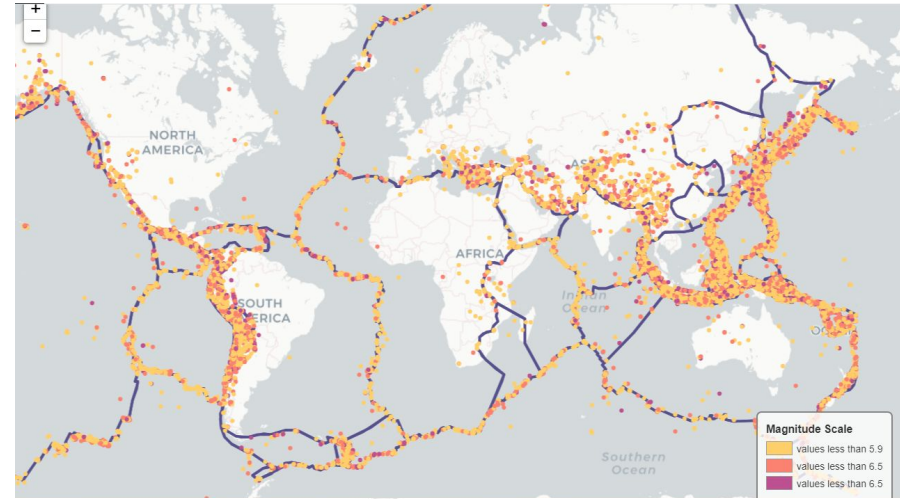
Magnitude Vs Year

- This is visual showing a line chart of Magnitude of Earthquake Vs Corresponding Year.
- Here we can clearly see the magnitude of earthquakes at different decades with its types.
- This shows that more intense earthquakes occurred during early 1980s and late 1990s which later reduced after the 2000s.



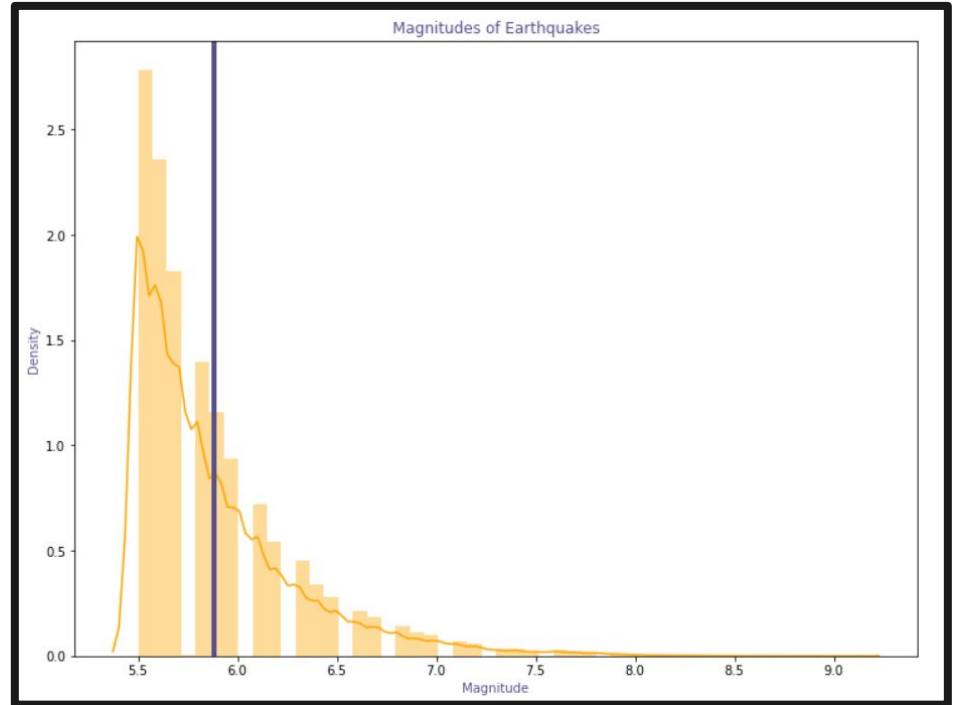
World Map

- Here we can clearly see the intensity of earthquakes across the globe.
- Most of the earthquakes occur near the tectonic plate boundaries represented by purple lines in first image.
- The second image shows depth varying across the map.
- Through both the visuals we can say that earthquakes are most likely to occur at coastal regions which are exposed to open oceans.



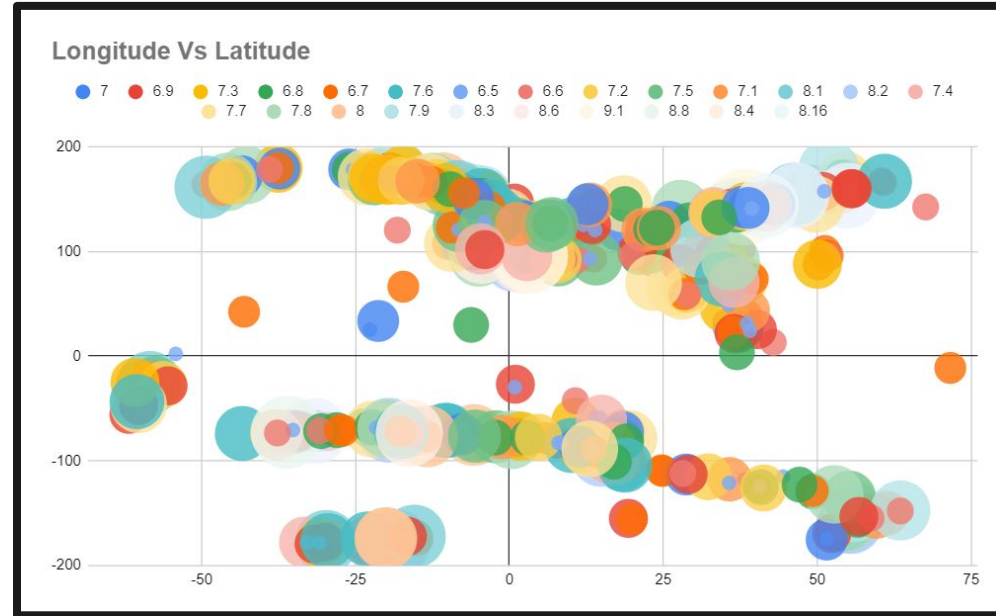
Density Vs Magnitude

- Image displayed shows a bar graph plotted against Density Vs Magnitude
- Results displayed after analysis shows a decreasing slope , where Density is decreasing as magnitude increases.
- This shows that earthquakes having more magnitude are less dense.



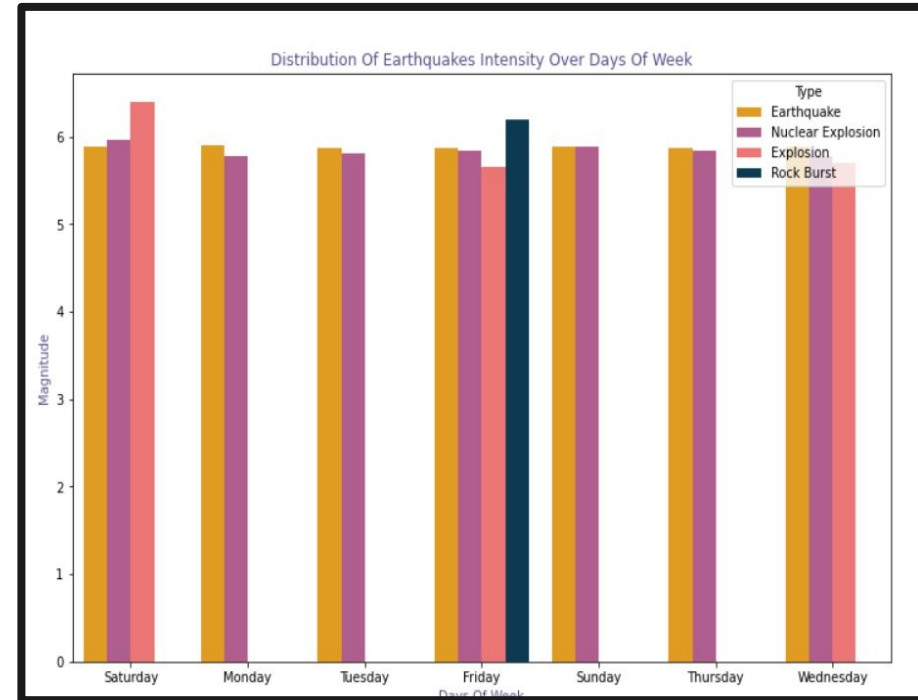
Latitude Vs Longitude

- Figure displays a bubble plot between longitude and latitude with magnitude being a common point between them.
- Every magnitude value is displayed with different colour.
- More the magnitude , more is the size of the bubble.



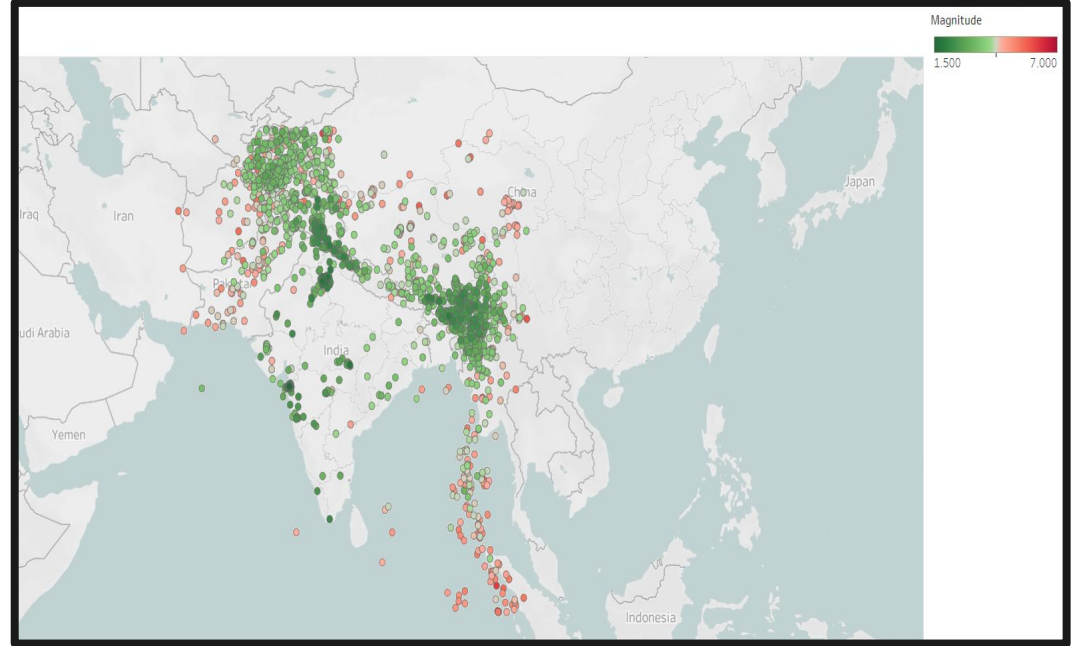
Magnitude Vs Days of Week

- A bar graph is displayed between magnitude of Earthquake and different days of week.
- It is sub divided between natural phenomenon like rock burst , nuclear explosion, earthquake etc.
- Going through the visual we can clearly see that magnitude and equally divided with the days of week.



Indian Subcontinent

- Lastly there is a visualisation displaying earthquake distribution over indian subcontinent.
- Displayed over magnitude as a medium.
- Most of the earthquakes occur near the himalayan region of the and near the islands .
- This result matches with the world data as it sinks with the tectonic plates .



Conclusion



- The analysis has revealed a significant correlation between seismic activity and proximity to tectonic plate boundaries, particularly in coastal regions adjacent to open oceans.
- The importance of implementing robust seismic mitigation strategies, particularly in high-risk areas such as Japan, where the convergence of tectonic plates is known to result in frequent and intense seismic events.
- From a civil engineering perspective, special considerations must be made when designing infrastructure in regions prone to seismic activity.
- Additionally, the development of early warning systems and evacuation protocols can play a crucial role in minimizing the impact of seismic events on densely populated coastal areas.
- At last, this project highlights how important it is to take action early to reduce the effects of earthquakes in coastal areas close to where tectonic plates meet.

Tools Used and References



- Python , R language
- Google Sheets
- Tableau

Data used for the project is world wide data, indian subcontinent data, asian data , high magnitude earthquake data.

All of the above are in CSV files

Taken From :-

<https://www.kaggle.com/datasets>

<https://www.usgs.gov/programs/earthquake-hazards/science/earthquake-data>

<https://seismo.gov.in/data-portal>

THANKYOU
