Comparative Analysis of Worldwide Earthquakes in 2023

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ABSTRACT

In this project, Analysis of worldwide earthquake in 2023 with the help of using different python libraries like NumPy, pandas, matplotlib, seaborn, beautiful soup, plotty, requests and datetime.

Data in this project is taken from the official website of United States Geological Survey, Wikipedia and earthquake events worldwide 2023 dataset is taken from the Kaggle.

According to data from the Wikipedia, the total number of earthquakes vary in the world over the past few years. Data from the USGS and Kaggle, magnitude, depth and other information are available for a particular location.

In this project, Research questions are like the total number of earthquakes count over time in 2023 for the world ?, Top 10 locations with the most earthquakes at a particular region in 2023? Etc.

One article financial express in month of December 2023, it described about the Turkey, Syria, China and other countries earthquake of 2023 .We need to prove the news article of our dataset that is true or not. Actually, my dataset of earthquake global 2023, which proves the total number of earthquakes on 6 February, 2023 which are Turkey and Syria earthquakes.

1. Introduction and Datasets

❖ Claim

- As per report of financial express in month of December 2023, in 2023, Most deadly earthquakes are Turkey and Syria which came with 7.8 magnitude on 6th February, Afghanistan which came with 6.3 magnitude on October, China which came 6.2 magnitude on 18th December etc.

❖ Data Set

- We got data from the official website of USGS, Wikipedia and one earthquake csv file from the Kaggle. From the Wikipedia source, we got the information about the number of earthquakes worldwide with different magnitude ranges for 2013 to 2023. From the USGS website, first we selected some information like minimum and maximum magnitude, region of our area of interest and time period then we downloaded the csv file and this gave the information about the latitude, longitude, time zone, magnitude, depth, magnitude type and many other information. From the Kaggle dataset, we got the information about the date, latitude, longitude, magnitude, depth, lands and country in the csv file.

❖ Data Source link

1) First dataset taken from the Wikipedia website by using web scrapping with the help of requests and beautiful shop python library which provides the total number of earthquakes data over time period.

- https://en.wikipedia.org/wiki/List_of_earthquakes_in_2023

2) Other dataset taken from the USGS official website and Kaggle which provides the many information like magnitude, depth with a date wise for a particular location.

- https://earthquake.usgs.gov/earthquakes/search/
- https://www.kaggle.com/datasets/syedanwarafridi/earthquake-events-worldwide-2023/data

- In this all datasets, required columns values are available means not null values so that data filtering is not required for this project.

2. Research Questions

❖ Article Source

- Article taken from the financial express told about the list of the most-deadly earthquakes of 2023 that shook the world.

- https://www.financialexpress.com/world-news/year-ender-2023-from-turkey-syria-to-china-earthquake-take-a-look-at-most-deadly-earthquakes-of-2023-that-shook-the-world/3343258/

❖ Claim

- As per report of financial express in month of December 2023, From Turkey-Syria to China earthquake and other countries – Take a look at most deadly earthquakes of 2023 that shook the world.

❖ Research Question

1. **Observe the total number of earthquakes count over time in 2023 for the world ?**

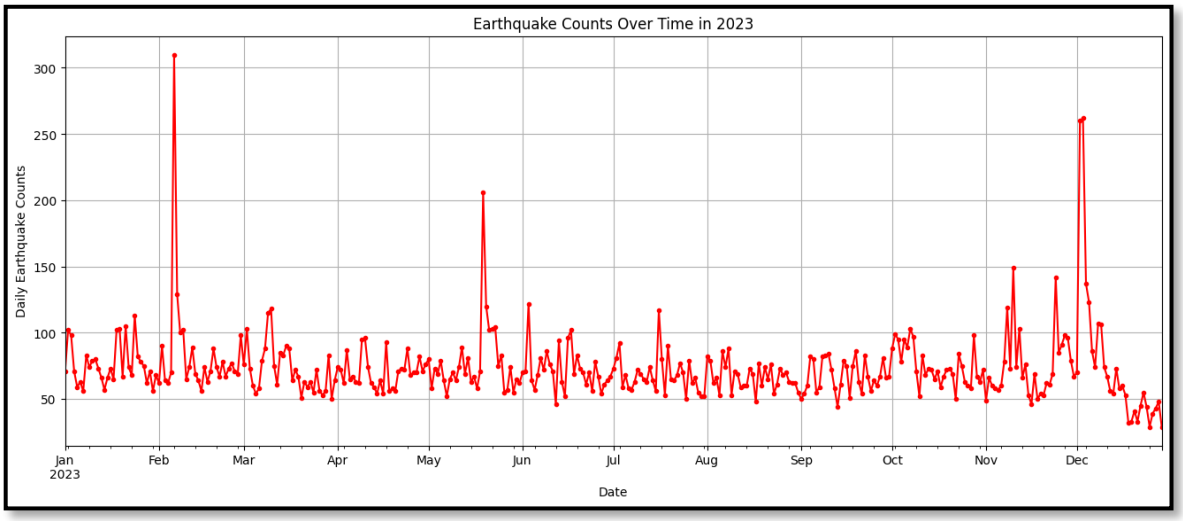
2. **Observe the top 10 countries with the most earthquakes in 2023 for the world ?**

3. **Observe the number of earthquakes with different magnitude ranges for time series data for the world?**

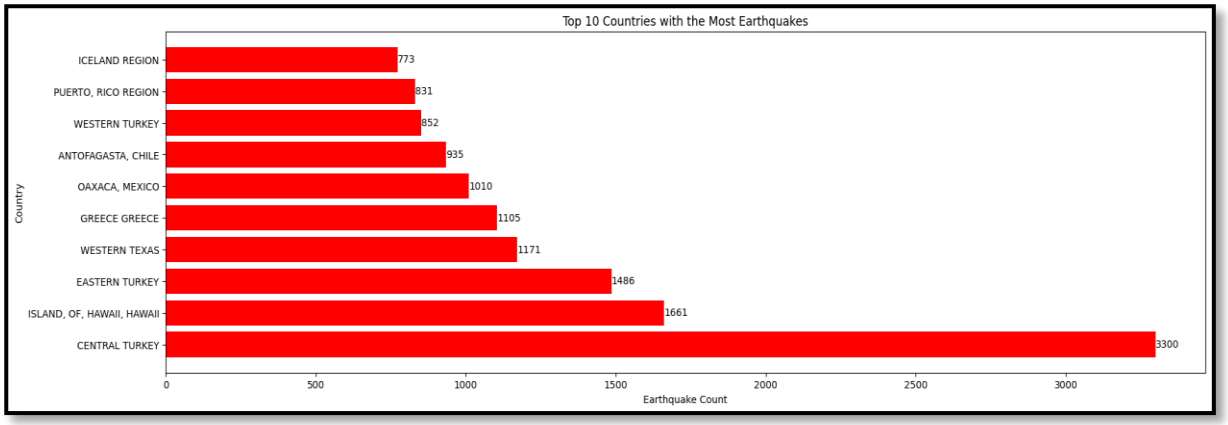
- Based on answer of above researched questions , we concluded that answer also match with the given article.

3. Analysis

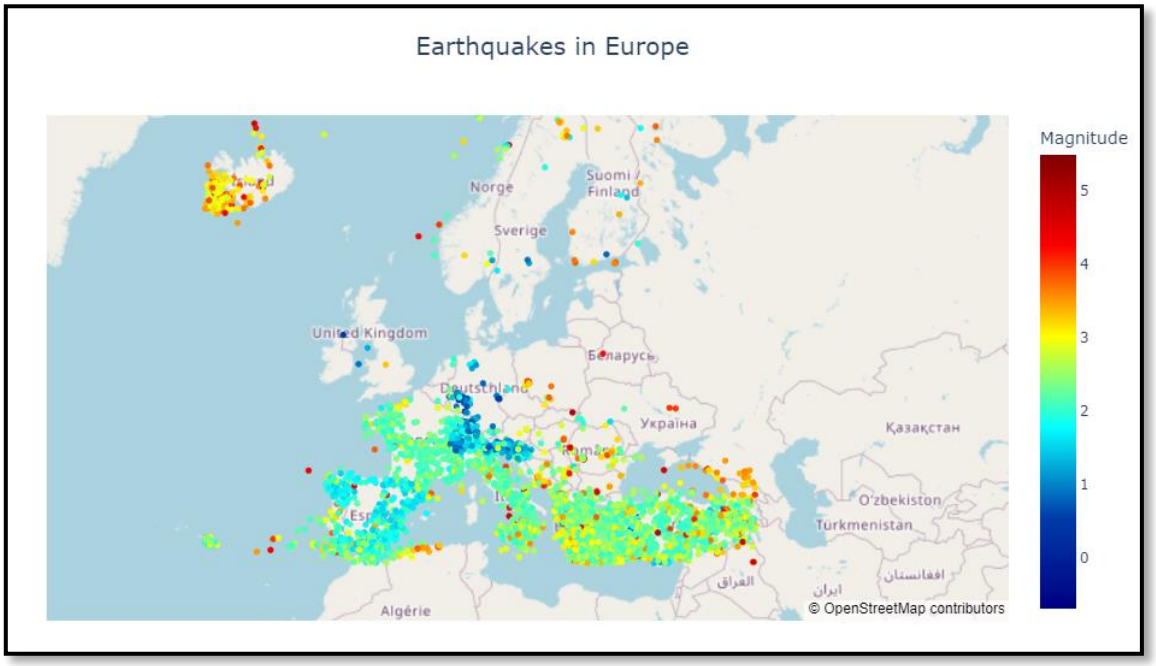
- First, I made a line chart number of earthquake over time (day wise) in 2023 by using matplotlib and seaborn library. In this chart, we show that high number of earthquake on 6th February, 2023 and this day most of earthquake came in Turkey and Syria. We can also show this details in article.

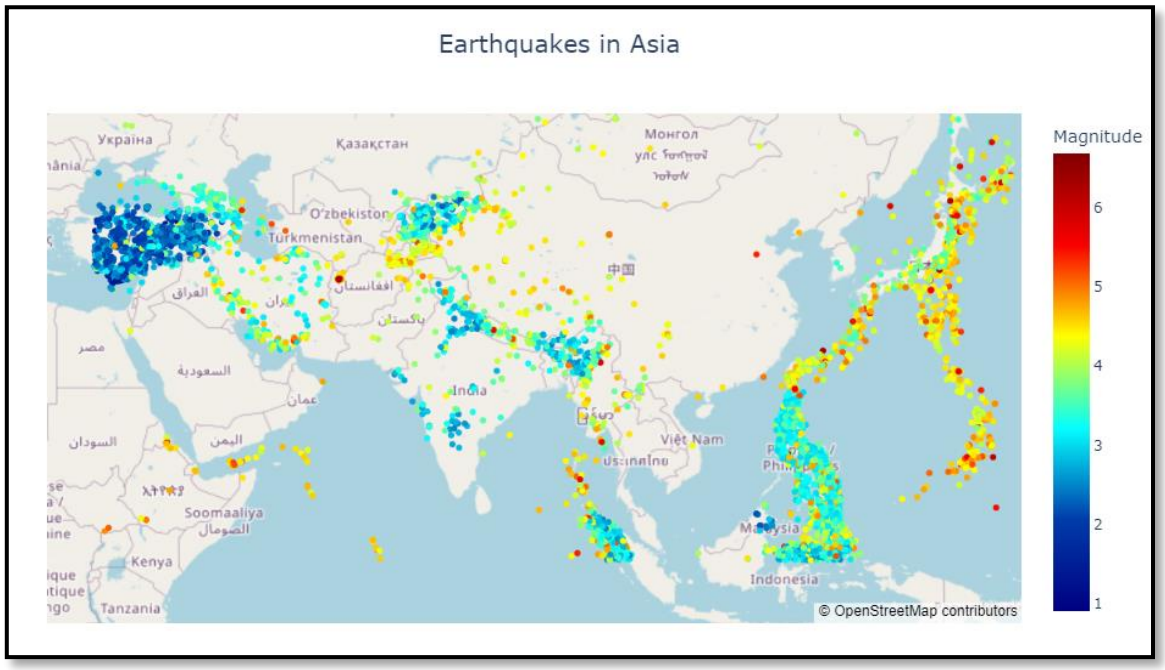


- Second, I made a vertical bar plot for top 10 countries with most earthquakes which is made by using mat plot library. In this plot, we can also see the number of most earthquakes came in different region of Turkey. In Central Turkey, 3300 number of earthquakes came in 2023.



- Based on the above graph, we show that top 10 countries names are mostly of the Europe and Asian region. So, we made a map for particular Europe and Asian region based on the latitude and longitude location. We show that the earthquake point colour is based on the magnitude of that particular point. This maps are made by using plotty python library. In python file, if we hover the particular location on the map, give the information latitude, longitude, magnitude and depth at the particular location.



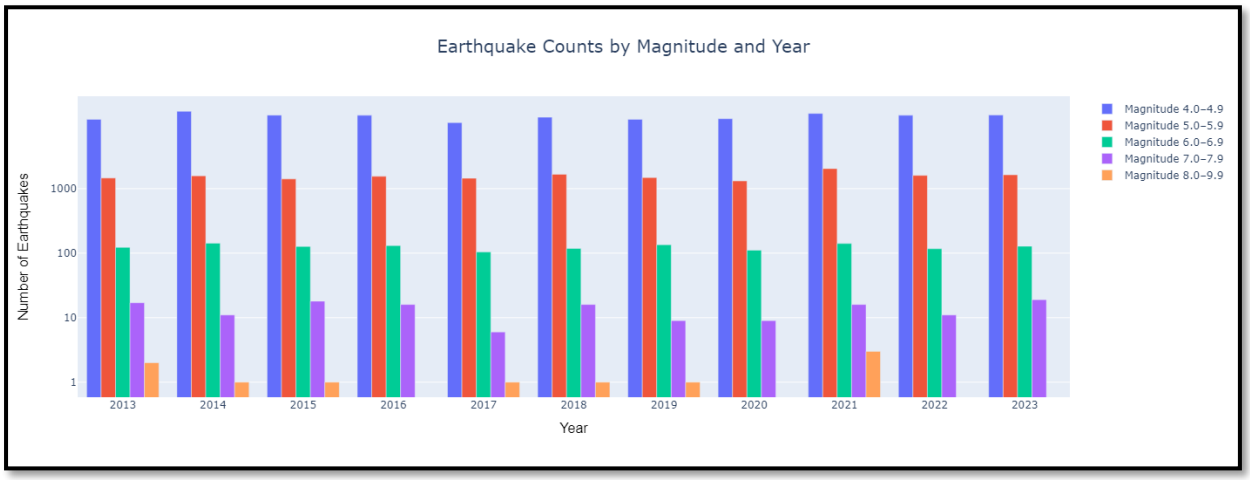


- At last, we made a grouped bar chart by using plotty library. For making this chart, we changed the data frame structure from the main data frame which data is web scrapping by Wikipedia.

- From below chart, we observed that the total number of earthquakes vary in the world over the past few years. It is unpredictable.

- Most earthquakes are weaker (4.0-4.9 or 5.0-5.9) and usually don't cause much harm.

- Rare but powerful earthquakes (magnitude 6 and higher) can lead to significant damage due to their increased strength.



4. Conclusion

- In the USGS dataset, we conclude that earthquakes on February 6, 2023, centred in Turkey and Syria, emphasizing regional concentrations.

- In the Wikipedia dataset, we conclude that historical observation emphasized the unpredictability of global earthquake occurrences over the past few years.

- While most earthquakes are weak(magnitude <6), rare, strong ones (magnitude >6) can cause significant damage.

- In the Kaggle dataset, we conclude that most earthquakes came in Europe and Asia regions.

- According to data I conclude that the claim is true.

REFRENCES

1. **Earthquake Wikipedia - List of earthquakes in 2023.**

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2. **Earthquake data from USGS website.**

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3. **Earthquake data from Kaggle.**

   - https://www.kaggle.com/datasets/syedanwarafridi/earthquake-events-worldwide-2023/data

4. **Article of financial express in month of December 2023, From Turkey-Syria to China earthquake and other countries.**

   - https://www.financialexpress.com/world-news/year-ender-2023-from-turkey-syria-to-china-earthquake-take-a-look-at-most-deadly-earthquakes-of-2023-that-shook-the-world/3343258/