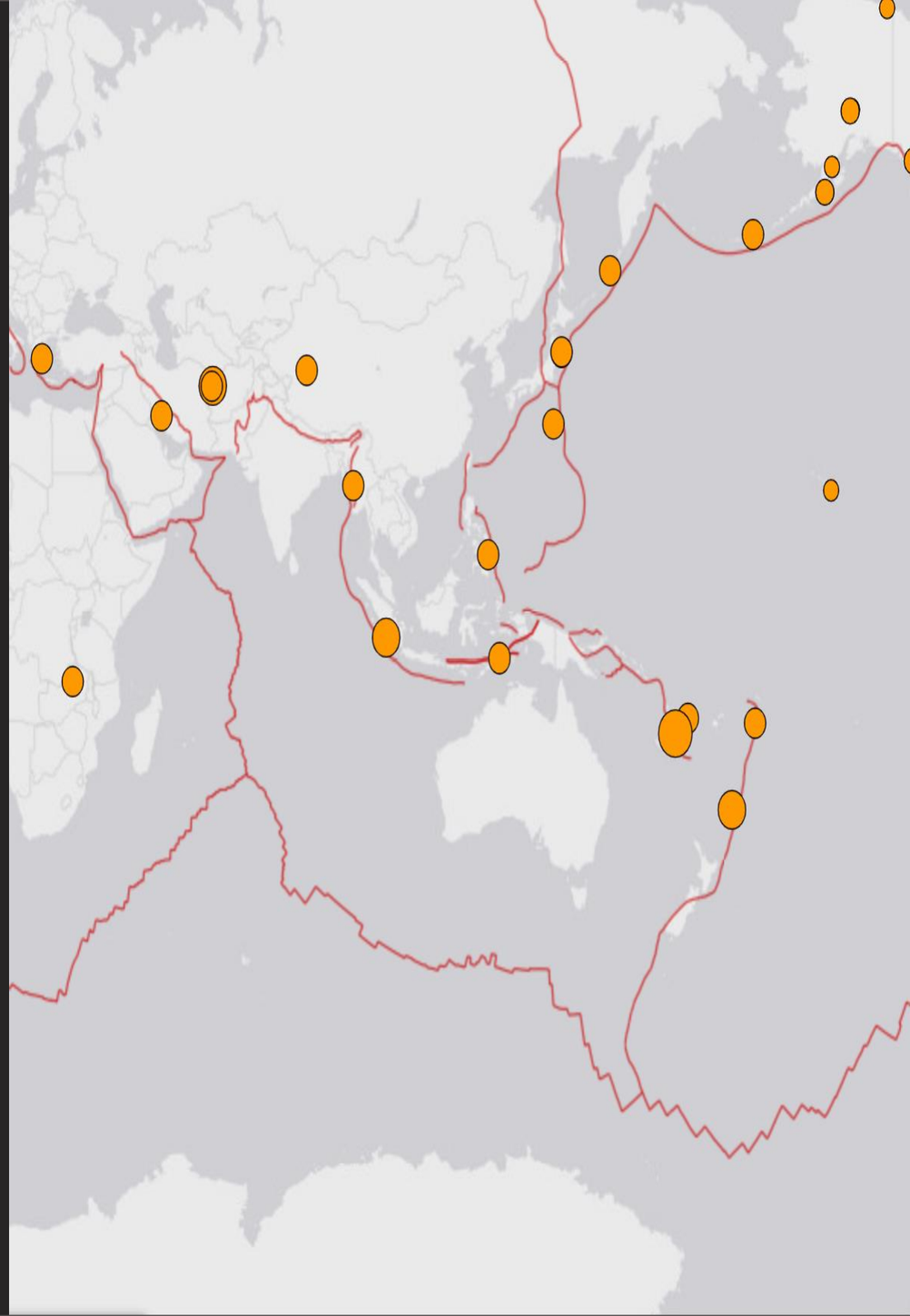
Earthquake Data Analysis Analysis using Python

Kattamreddy Sai Charan



Abstract:

This project leverages real-time earthquake data from the USGS (United States Geological Survey) API, providing a dynamic analysis of seismic activity. Through this data analysis and analysis endeavour, we not only pinpoint earthquake locations but also showcase their magnitudes, enhancing our understanding of recent seismic events.

Python Libraries Used:

urllib.request:

This library is part of the Python standard library and is used for making HTTP requests to fetch earthquake data from the USGS API.

json:

A standard library module, it is used to parse and manipulate JSON data retrieved from the API response.

JSON (JavaScript Object Notation) is a common data interchange format.

matplotlib.pyplot:

It is used to create and display a bar chart that visualizes the total number of felt reports for different earthquake locations, providing a graphical representation of the data.

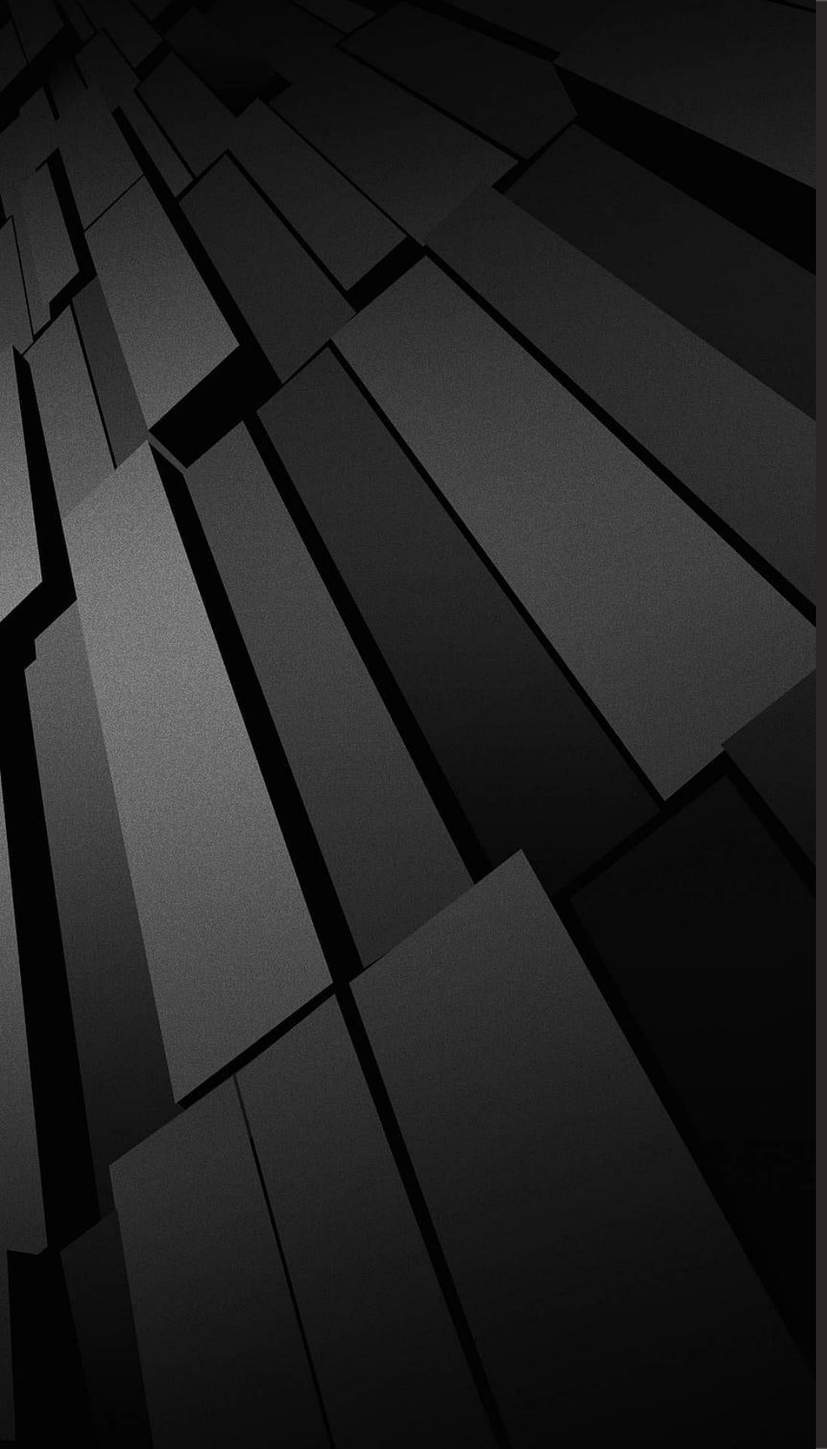
CODE:

```
import urllib.request
import json
import matplotlib.pyplot as plt

def printresults(data):
    theJSON = json.loads(data)
    print("\n Events that were felt in last 48 hours: \n")
    data_dict = {}

    for i in theJSON["features"]:
        feltreport = i["properties"]["felt"]
        magnitude = i["properties"]["mag"]
        place = i["properties"]["place"]

        if feltreport is not None and feltreport > 0:
            if place in data_dict:
                data_dict[place]["felt_reports"] += feltreport
                data_dict[place]["magnitudes"].append(magnitude)
            else:
                data_dict[place] = {
                    "felt_reports": feltreport,
                    "magnitudes": [magnitude],
                }

    for place, data in data_dict.items():
        print(
            place,
            ", Total Magnitude=",
            sum(data["magnitudes"]),
            ", Total Felt Reports:",
            data["felt_reports"],
        )
```

```
 # Create a bar chart to show the total felt reports for each earthquake location
    places = data_dict.keys()
    felt_reports = [data["felt_reports"] for data in data_dict.values()]

    plt.figure(figsize=(12, 6))
    plt.bar(places, felt_reports)
    plt.xlabel('Earthquake Location')
    plt.ylabel('Total Number of Felt Reports')
    plt.title('Total Felt Reports for Earthquake Locations')
    plt.xticks(rotation=90)  # Rotate x-axis labels for better readability
    plt.show()

def main():
    urlData =
"https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/2.5_day.geojson"
    weburl = urllib.request.urlopen(urlData)
    if weburl.getcode() == 200:
       data = weburl.read()
       printresults(data)
    else:
        print("Received an error from the server, can't print results",
weburl.getcode())

if __name__ == "__main__":
    main()
```

Source of the Data:

- The United States Geological Survey, founded as the Geological Survey, is an agency of the United States government whose work spans the disciplines of biology, geography, geology, and hydrology.
- LINK: https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/2.5_day.geojson
- JSON is used as the data transfer format for reading items and manipulating data in ScienceBase
- While running the code Internet connection is required.

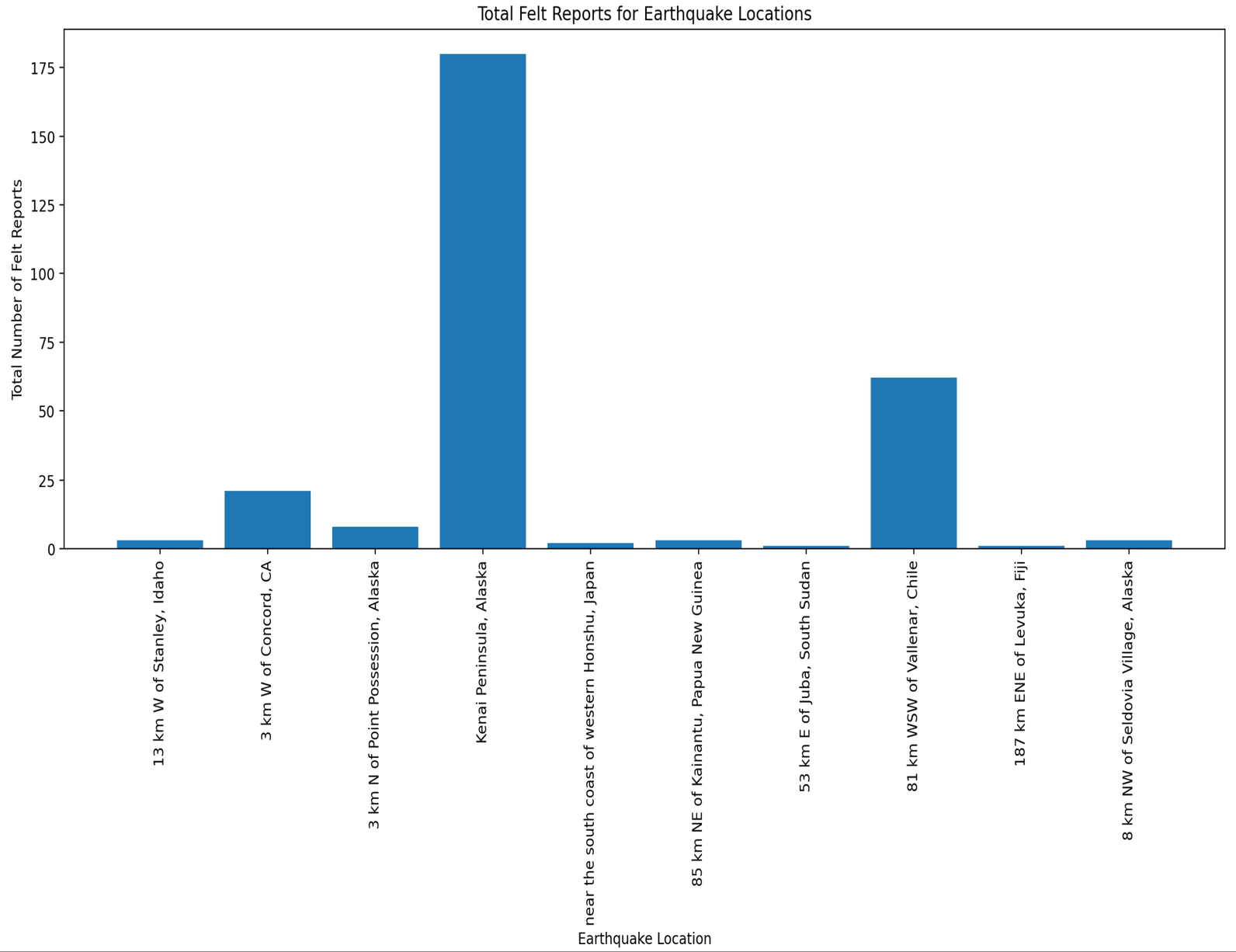


Output:

Events that were felt in last 48 hours:

13 km W of Stanley, Idaho , Total Magnitude= 3.5 , Total Felt Reports: 3
3 km W of Concord, CA , Total Magnitude= 2.67 , Total Felt Reports: 21
3 km N of Point Possession, Alaska , Total Magnitude= 3 , Total Felt Reports: 8
Kenai Peninsula, Alaska , Total Magnitude= 4 , Total Felt Reports: 180
near the south coast of western Honshu, Japan , Total Magnitude= 4.8 , Total Felt Reports: 2
85 km NE of Kainantu, Papua New Guinea , Total Magnitude= 5.2 , Total Felt Reports: 3
53 km E of Juba, South Sudan , Total Magnitude= 4.8 , Total Felt Reports: 1
81 km WSW of Vallenar, Chile , Total Magnitude= 6.6 , Total Felt Reports: 62
187 km ENE of Levuka, Fiji , Total Magnitude= 6.5 , Total Felt Reports: 1
8 km NW of Seldovia Village, Alaska , Total Magnitude= 2.8 , Total Felt Reports: 3

Data Visualization:



Applications:

1

Public Awareness and Safety

Providing real-time or recent earthquake information to the general public to raise awareness about seismic activity and promote earthquake safety measures.

2

Infrastructure Planning

Assisting engineers and urban planners in designing earthquake-resistant infrastructure by providing historical and real-time earthquake data for specific regions.

3

Tsunami Warning Systems

Integrating earthquake data with tsunami warning systems to assess the potential for tsunamis following undersea earthquakes.

Future Developments

1

Real-time Alerts

Implement a notification system that sends alerts to users when earthquakes of a certain magnitude or in specific geographical areas occur.

2

Mobile App Enhancements

Improve the project's mobile application to provide a user-friendly and on-the-go experience, including offline access to earthquake data and additional features.

3

Social Media Integration

Integrate with social media platforms to facilitate information sharing and emergency response coordination during earthquake events.

Conclusion

In conclusion, our earthquake data analysis project serves as a vital tool for enhancing public awareness, scientific research, and emergency response in the face of seismic events. By providing real-time access to earthquake data and dynamic analysis, we empower individuals, communities, and professionals with the knowledge they need to stay safe and make informed decisions. As we look to the future, our commitment to innovation and collaboration ensures that this project will continue to evolve, offering new features and capabilities, and ultimately contributing to safer and more resilient communities around the world.


thank
you.