Earthquake prediction model using python

INTRODUCTION:

An earthquake prediction model is a cutting-edge and essential tool in the field of seismology and disaster management. Earthquakes are natural phenomena that can cause significant damage and loss of life, making their prediction a matter of paramount importance. Such a model aims to harness the power of data analysis, advanced technologies, and scientific knowledge to forecast the occurrence, location, magnitude, and potential impact of seismic events**.**

DATASET:

The dataset can be taken from the following below link,

Dataset link: https://www.kaggle.com/datasets/usgs/earthquake-database

The above dataset is being used for the earthquake prediction. This dataset is the data of past time. It include the latitude, longitude , time, date, magnitude, etc..

DATA COLLECTION AND PREPROCESSING:

Data collection for earthquake prediction involves gathering various types of data related to seismic activity, geological features, and environmental conditions. The goal is to acquire comprehensive and high-quality data to feed into earthquake prediction models**.**

Data preprocessing is a critical step in earthquake prediction as it involves cleaning, transforming, and preparing the raw data for analysis and model training. This ensures that the data used for prediction is of high quality and can effectively reveal patterns and insights**.**

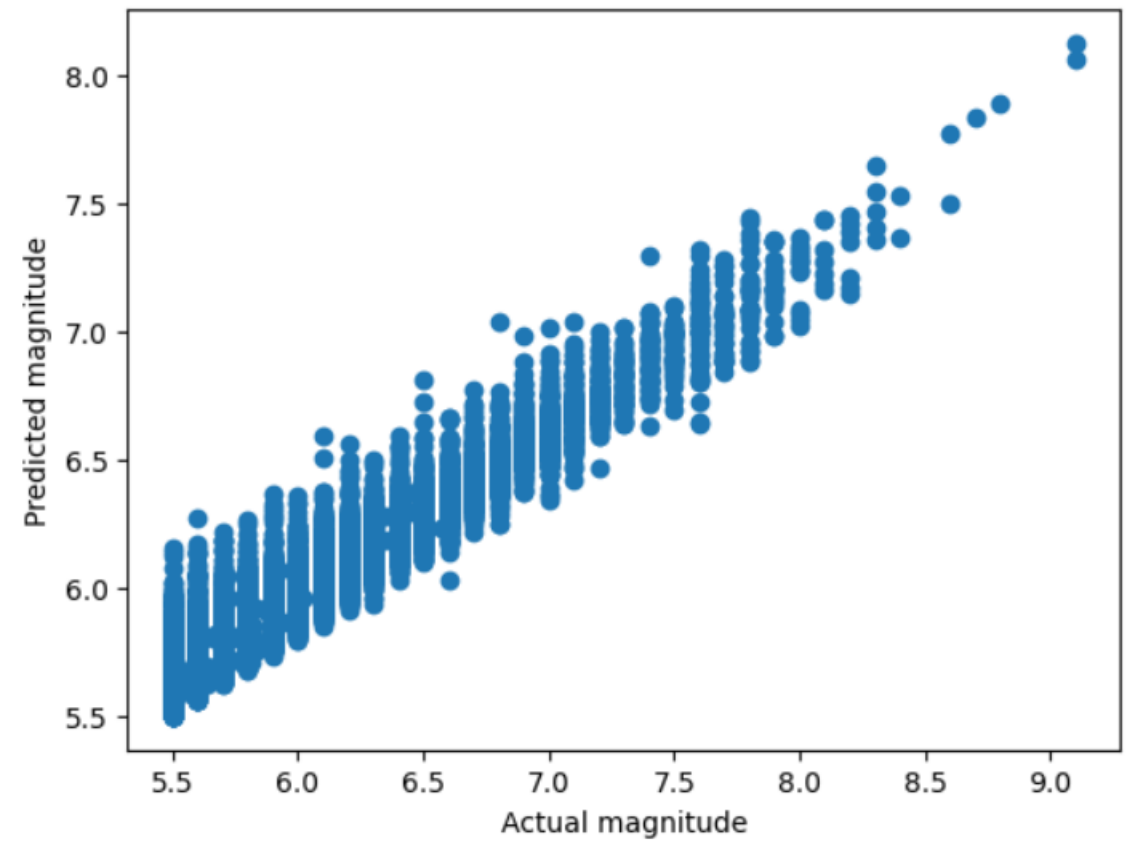
PROGRAM:

```
import pandas as pd
import numpy as np
from sklearn.ensemble import RandomForestRegressor

df = pd.read_csv('/content/database.csv.zip')


X = df[['Latitude', 'Longitude']]
y = df['Magnitude']


model = RandomForestRegressor()
```

```
model.fit(X, y)


predictions = model.predict(X)


print(model.score(X, y))


import matplotlib.pyplot as plt
plt.scatter(y, predictions)
plt.xlabel('Actual magnitude')
plt.ylabel('Predicted magnitude')
plt.show()
```

OUTPUT:

```
0.842767534568865
```



```
import requests

def get_recent_earthquakes():
    url =
"https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_hour.geojso
n"
    response = requests.get(url)
    data = response.json()
    return data

def display_earthquake_data(earthquake_data):
    for feature in earthquake_data['features']:
        magnitude = feature['properties']['mag']
        place = feature['properties']['place']
        time = feature['properties']['time']
        print(f"Magnitude: {magnitude}, Location: {place}, Time: {time}")

if __name__ == "__main__":
    earthquake_data = get_recent_earthquakes()
    if earthquake_data:
        print("Recent Earthquakes:")
        display_earthquake_data(earthquake_data)
    else:
        print("Failed to retrieve earthquake data.")
```

OUTPUT:

```
Recent Earthquakes:
Magnitude: 1.9, Location: 10 km WSW of Tyonek, Alaska, Time: 1697637040060
Magnitude: 1, Location: 22 km ESE of Anza, CA, Time: 1697636672440
Magnitude: 1.1400000000000001, Location: 7 km ENE of Mossyrock, Washington, Time: 1697634995980
Magnitude: 1.83, Location: 14 km E of Petrolia, CA, Time: 1697634487910
Magnitude: 3, Location: 14 km SSW of Susitna, Alaska, Time: 1697633832993
```

```
train = pd.read_csv('/content/database.csv.zip', nrows=6000000,
dtype={'acoustic_data' : np.int16, 'time_to_failure':np.float64})

 train.head(10)
```

OUTPUT:

	Date	Time	Latitude	Longitude	Type	Depth	Depth Error	Depth Seismic Stations	Magnitude	Magnitude Type	...	Magnitude Seismic Stations	Azimuthal Gap	Horizontal Distance	Horizo E
0	01/02/1965	13:44:18	19.246	145.616	Earthquake	131.6	NaN	NaN	6.0	MW	...	NaN	NaN	NaN	
1	01/04/1965	11:29:49	1.863	127.352	Earthquake	80.0	NaN	NaN	5.8	MW	...	NaN	NaN	NaN	
2	01/05/1965	18:05:58	-20.579	-173.972	Earthquake	20.0	NaN	NaN	6.2	MW	...	NaN	NaN	NaN	
3	01/08/1965	18:49:43	-59.076	-23.557	Earthquake	15.0	NaN	NaN	5.8	MW	...	NaN	NaN	NaN	
4	01/09/1965	13:32:50	11.938	126.427	Earthquake	15.0	NaN	NaN	5.8	MW	...	NaN	NaN	NaN	
5	01/10/1965	13:36:32	-13.405	166.629	Earthquake	35.0	NaN	NaN	6.7	MW	...	NaN	NaN	NaN	
6	01/12/1965	13:32:25	27.357	87.867	Earthquake	20.0	NaN	NaN	5.9	MW	...	NaN	NaN	NaN	
7	01/15/1965	23:17:42	-13.309	166.212	Earthquake	35.0	NaN	NaN	6.0	MW	...	NaN	NaN	NaN	
8	01/16/1965	11:32:37	-56.452	-27.043	Earthquake	95.0	NaN	NaN	6.0	MW	...	NaN	NaN	NaN	
9	01/17/1965	10:43:17	-24.563	178.487	Earthquake	565.0	NaN	NaN	5.8	MW	...	NaN	NaN	NaN	

10 rows × 21 columns

CONCLUSION:

In conclusion, earthquake prediction is a field of paramount importance, marked by its complexity and the potential to save lives and mitigate damage. The development of earthquake prediction models represents a significant stride forward in our understanding of seismic activity and disaster preparedness. This advanced technology leverages a multifaceted approach, integrating data from seismic sensors, geological surveys, environmental observations, and historical earthquake records to provide insights into when, where, and with what intensity earthquakes might occur.