DEVELOPMENT PART–1(PHASE 3)

EARTHQUAKE:

(1) An earthquake is a shaking of the Earth's crust caused by a release of energy.
(2) A fault is a break in the lithosphere along which movement has occurred.
(3) The focus of an earthquake is the point at which movement first occurs.
(4) The epicenter of an earthquake is the point on the surface of the Earth directly above the focus.

Abstract:

To begin building an earthquake prediction model, you need to start by acquiring a relevant dataset containing seismic data. Once you've obtained the dataset, the first step is to load it into your preferred data analysis or machine learning environment, such as Python with libraries like Pandas or NumPy. Next, you should perform data preprocessing, which includes tasks like cleaning, normalizing, and feature engineering to make the data suitable for training a predictive model. This preprocessing stage is crucial for ensuring the model's accuracy and effectiveness in earthquake prediction.

Description:

A volcano is like a mountain that has a opening on top. Inside is a pool of molten rock. When the pressure builds up the molten rock shots up through the opening and spills out lava. An eruption can last one day to thousands years. A volcano is measured by the Volcanic Explosivity Index. This determines how big a volcano is,

Diagram Of Earthquake:

Two Major Components Of Earthquake:

The two major seismic belts are the Circum-Pacific Belt, which surrounds the Pacific Ocean, and the Alpide Belt, which stretches from the Azores through the Mediterranean and Middle East to the Himalayas and Indonesia, where it joins the Circum-Pacific Belt.

Two Major Earthquake Zones are,

(1) TURKEY

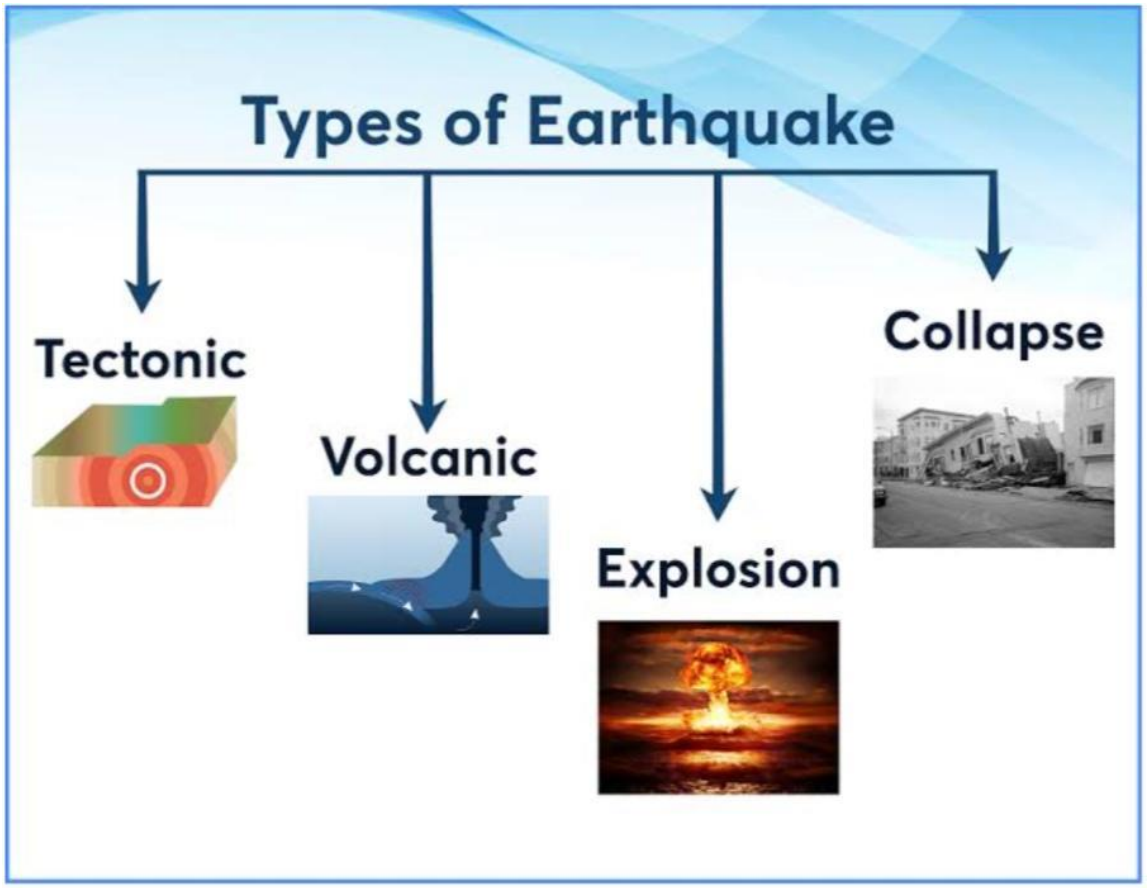
(2) SYRIA

For Example,

TYPES OF EARTHQUAKE:

There are four main types of earthquakes: tectonic, volcanic, collapse and explosion. Each type is caused by a different mechanism and results in a different type of shaking.They are,

- Tectonic Earthquake
- Volcanic Earthquake
- Collapse Earthquake
- Explosion Earthquake



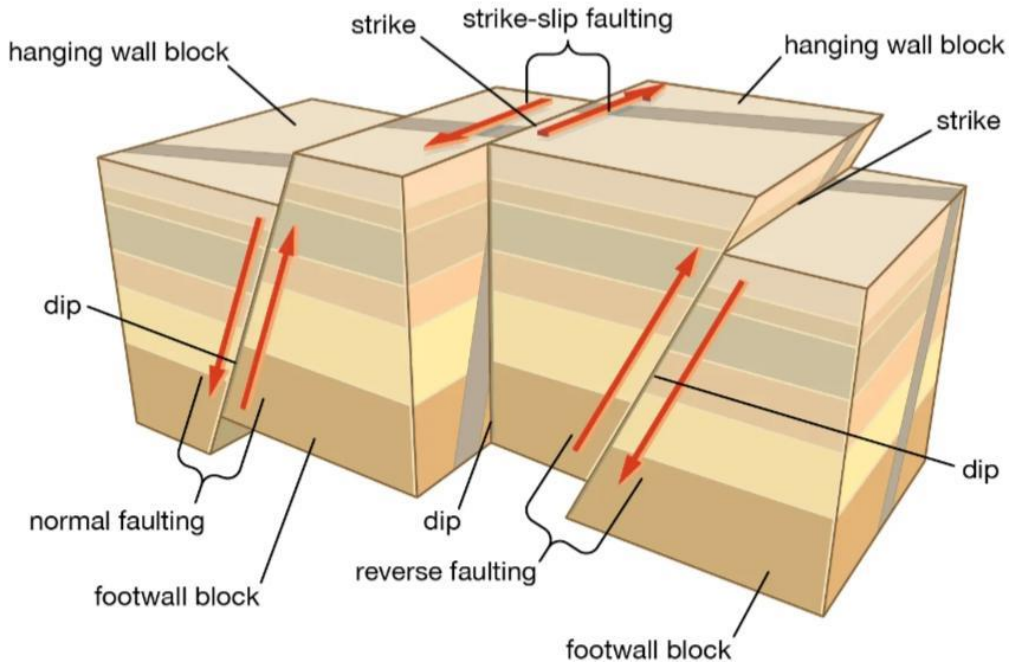
1.Tectonic Earthquake:

Tectonic earthquakes are caused by the movement of the Earth's plates. The energy released during these earthquakes is incredibly powerful and can cause extensive damage.

Causes : Tectonic earthquakes occur when the Earth's plates move. This can happen when two plates collide, when one plate slides underneath another, or when a plate is forced to move by the movement of the mantle.

Effect : Tectonic earthquakes are incredibly powerful and can cause extensive damage. They can also trigger other natural disasters, such as tsunamis and landslides.

TECTONIC DIAGRAM :



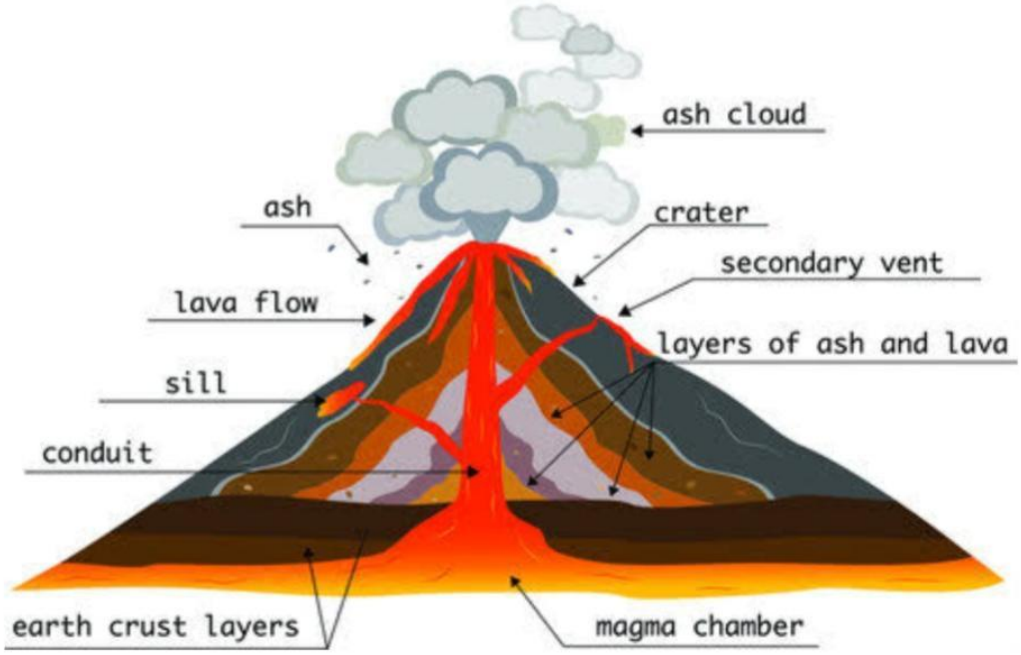
2.Volcanic Earthquake:

Volcanic earthquakes are caused by the movement of magma beneath the Earth's surface. These earthquakes are often smaller than tectonic earthquakes, but they can still cause significant damage.

Causes : Volcanic earthquakes occur when magma moves beneath the Earth's surface. This can happen when the magma is forced up by the movement of the Earth's plates, or when it is released from a volcano.

Effects : Volcanic earthquakes can cause significant damage, even though they are typically smaller than tectonic earthquakes. They can also trigger other natural disasters, such as volcanic eruptions and landslides.

VOLCANIC DIAGRAM :



3.Collapse Earthquake:

Collapse earthquakes occur when buildings or other structures collapse. These earthquakes are typically very small but can be deadly if they occur in a populated area.

Causes : Collapse earthquakes occur when buildings or other structures collapse. This can happen due to a variety of reasons, including poor construction, severe weather, or an earthquake.

Effects : Collapse earthquakes are typically very small but can be deadly if they occur in a populated area. They can also cause secondary disasters, such as fires and gas leaks.

COLLAPSE DIAGRAM :

4.Explosion Earthquake:

Explosion earthquakes are caused by the detonation of explosives. These earthquakes are usually very small but can cause damage if they occur near populated areas.

Causes : Explosion earthquakes are caused by the detonation of explosives. This can happen due to a variety of reasons, including mining, construction, or warfare.

Effects : Explosion earthquakes are typically very small but can cause damage if they occur near populated areas. They can also cause secondary disasters, such as fires and gas leakages

EXPLOSION DIAGRAM :

Here's what the expected output for a few lines in the provided code would look likes,

```python

# Explore the dataset

print(earthquake_data.head())

# Display the first few rows of the dataset

print(earthquake_data.info())

 # Get information about the dataset

```

Function() & Explanation:

The `print(earthquake_data.head())` line would display the first few rows of your dataset, showing the data in tabular format. This helps you get an initial look at your data.

The `print(earthquake_data.info())` line would provide information about your dataset, including the data types of each column and the number of non-null entries. This is useful for understanding the structure and identifying any missing values in your dataset.

A New Technology To Predict Earthquakes is invented:

In today's twenty-first century, technology has developed beyond our imagination.

New inventions are being introduced to the world day by day.

They make the daily activities of the people easier and benefit the lives of the people of the world.

Seismic Potential:

In that way, University of Texas researchers have successfully invented and tested an earthquake detection algorithm using artificial intelligence technology.

It is also said that it can be used to identify the zone where an earthquake is likely to occur a week in advance.

Distance:

Scientists say that this artificial intelligence system can even predict the size of an earthquake that can occur at a distance of approximately 321KM.

And to gauge its accuracy, scientists say tests are being conducted in seismically-prone countries like Italy, Japan and Greenland.

Program With Output:

Program : 1

```
 import pandas as pd

data=pd.read_csv("earthquake.csv",sep=",")

print(data)
```

Output :

```
                 id        date         time  ...   mw   ms   mb
0      2.000000e+13  2003.05.20  12:17:44 AM  ...  NaN  0.0  0.0
1      2.010000e+13  2007.08.01  12:03:08 AM  ...  NaN  0.0  0.0
2      1.980000e+13  1978.05.07  12:41:37 AM  ...  NaN  0.0  3.7
3      2.000000e+13  1997.03.22  12:31:45 AM  ...  NaN  0.0  0.0
4      2.000000e+13  2000.04.02  12:57:38 AM  ...  NaN  0.0  0.0
...             ...         ...          ...  ...  ...  ...  ...
24002  2.020000e+13  2017.03.10  12:23:42 AM  ...  4.0  0.0  0.0
24003  2.020000e+13  2017.03.10  12:42:44 AM  ...  3.6  0.0  0.0
24004  2.020000e+13  2017.04.05  12:08:11 AM  ...  4.1  0.0  0.0
24005  2.020000e+13  2017.04.05  12:35:09 AM  ...  3.8  0.0  0.0
24006  2.020000e+13  2017.04.05  12:25:25 AM  ...  3.5  0.0  0.0

[24007 rows x 17 columns]
```

Program : 2

```
import datetime

import time

timestamp = []

for d, t in zip(data['Date'], data['Time']):

    try:

        ts = datetime.datetime.strptime(d+' '+t,
'%m/%d/%Y %H:%M:%S')

        timestamp.append(time.mktime(ts.timetuple()))

    except ValueError:

        # print('ValueError')

        timestamp.append('ValueError')

timeStamp = pd.Series(timestamp)

data['Timestamp'] = timeStamp.values

final_data = data.drop(['Date', 'Time'], axis=1)

final_data = final_data[final_data.Timestamp != 'ValueError']

final_data.head()
```

Output:

	Latitude	Longitude	Depth	Magnitude	Timestamp
0	19.246	145.616	131.66	6.0	-1.57631e+08
1	1.863	127.352	80.0	5.8	-1.57466e+08
2	-20.579	-173.972	20.0	6.2	-1.57356e+08
3	-59.076	-23.557	15.0	5.8	-1.57094e+08
4	11.938	126.427	15.0	5.8	-1.57026e

Program : 3

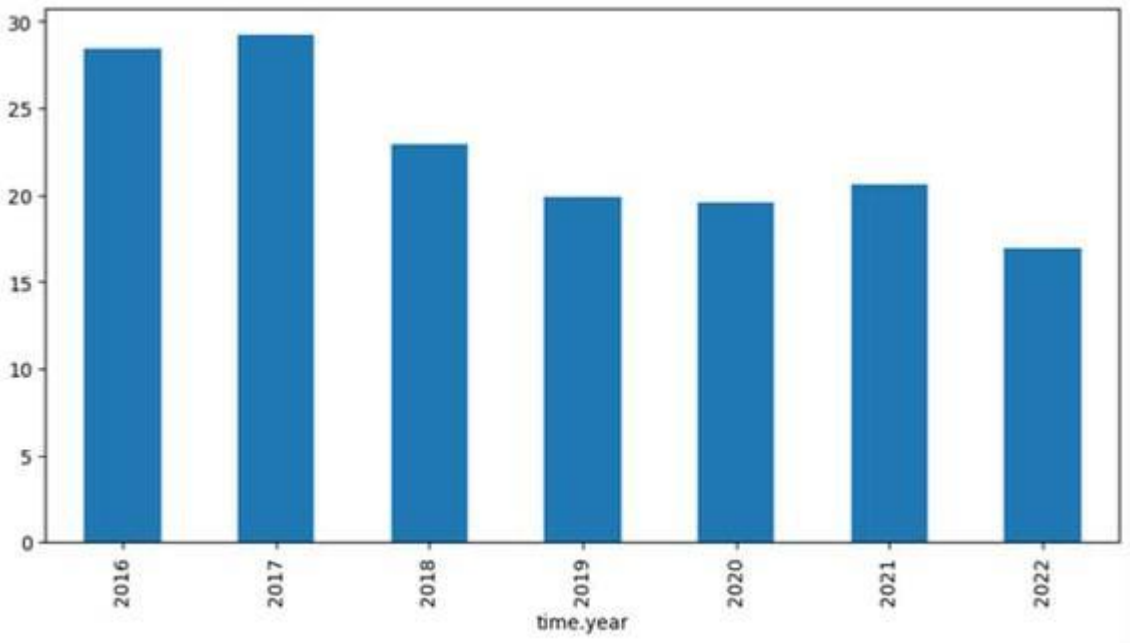
```
pltt.figure(figsize=(10, 5))

x1 = df1.groupby('time.year').mean()['location.depth']

x1.plot.bar()

pltt.show()
```

Output :



Program : 4

```
reg = RandomForestRegressor(random_state=42)

reg.fit(X_train, y_train)

reg.predict(X_test)
```

Output :

```
array([[  5.96,  50.97],
       [  5.88,  37.8 ],
       [  5.97,  37.6 ],
       ...,
       [  6.42,  19.9 ],
       [  5.73, 591.55],
       [  5.68,  33.61]])
```

Program : 5

```
model = Sequential()

model.add(Dense(16, activation='relu',

 input_shape=(3,)))

model.add(Dense(16, activation='relu'))
```

```
model.add(Dense(2, activation='softmax'))

model.compile(optimizer='SGD',

loss='squared_hinge', metrics=['accuracy'])

model.fit(X_train, y_train, batch_size=10, epochs=20, verbose=1,
validation_data=(X_test, y_test))
```

Output :

```
18727/18727 [==============================] - 6s 322us/step - loss: 0.5038 - acc: 0.9182 - v
al_loss: 0.5038 - val_acc: 0.9242
Epoch 16/20
18727/18727 [==============================] - 6s 323us/step - loss: 0.5038 - acc: 0.9182 - v
al_loss: 0.5038 - val_acc: 0.9242
Epoch 17/20
18727/18727 [==============================] - 6s 322us/step - loss: 0.5038 - acc: 0.9182 - v
al_loss: 0.5038 - val_acc: 0.9242
Epoch 18/20
18727/18727 [==============================] - 6s 321us/step - loss: 0.5038 - acc: 0.9182 - v
al_loss: 0.5038 - val_acc: 0.9242
Epoch 19/20
18727/18727 [==============================] - 6s 321us/step - loss: 0.5038 - acc: 0.9182 - v
al_loss: 0.5038 - val_acc: 0.9242
Epoch 20/20
18727/18727 [==============================] - 6s 322us/step - loss: 0.5038 - acc: 0.9182 - v
al_loss: 0.5038 - val_acc: 0.9242

<keras.callbacks.History at 0x7ff0a8db8cc0>
```

Program : 6

```
import plotly.express as pxx

import pandas as pdd


fig_w = pxx.scatter_geo(df1, lat='location.latitude',

   lon='location.longitude',

   color="impact.magnitude",

   scope='usa')

fig_w.show()
```

Output :

Conclusion:

In the initial stages of building an earthquake prediction model, you would focus on loading and preprocessing the dataset. This involves collecting, cleaning, and preparing the data for further analysis and modeling. Once the data is appropriately preprocessed, you can proceed to select a suitable machine learning algorithm, train the model, and evaluate its performance. Building an accurate earthquake prediction model is a complex task that may require domain expertise in seismology and geology, as well as continuous refinement and monitoring.