4222-SURYA GROUP OF INSTITUTIONS

VIKRAVANDI-605652

PROJECT NAME:

EARTHQUAKE-PREDICTION-USING-PYTHON

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ECE DEPARTMENT

EARTHQUAKE-PREDICTION-USING-PYTHON

INTRODUCTION:

Earthquake prediction is a challenging and complex task that is still an active area of research. It is a way to predict the magnitude of earthquake based on parameters such as longitude, latitude, depth, and duration magnitude, country. These approaches are based on the analysis of seismic data, historical earthquake data, and other relevant factors. People used to minimize loss of life and property.

ML MODELS USED:

- Linear Regression
- Decision Tree
- K-Nearest Neighbors

STEPS TAKEN:

- Data source
- Feature exploration
- Visualization
- Data splitting
- Training and evaluation

DATA SOUCE:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

import os
print(os.listdir("../input"))
```

['database.csv']

SI NO	Date	Time	Latitude	Longitude	Depth	Magnitude
0	01/02/1965	13:44:18	19.246	145.616	131.6	6.0
1	01/04/1965	11:29:49	1.863	127.352	80.0	5.8
2	01/05/1965	18:05:58	-20.579	-173.972	20.0	6.2
3	01/08/1965	18:49:43	-59.076	-23.557	15.0	5.8
4	01/09/1965	13:32:50	11.938	126.427	15.0	5.8

FEATURE EXPLORATION:

```
Index(['Date', 'Time', 'Latitude', 'Longitude', 'Type', 'Depth', 'Depth Error',
 'Depth Seismic Stations', 'Magnitude', 'Magnitude Type',
 'Magnitude Error', 'Magnitude Seismic Stations', 'Azimuthal Gap',
 'Horizontal Distance', 'Horizontal Error', 'Root Mean Square', 'ID',
 'Source', 'Location Source', 'Magnitude Source', 'Status'],
 dtype='object')
```

Figure out the main features from earthquake data and create a object of that features, namely, Date, Time, Latitude, Longitude, Depth, Magnitude.

```
data = data[['Date', 'Time', 'Latitude', 'Longitude', 'Depth', 'Magnitude']]
data.head()
```

Out[4]:

	Date	Time	Latitude	Longitude	Depth	Magnitude
0	01/02/1965	13:44:18	19.246	145.616	131.6	6.0
1	01/04/1965	11:29:49	1.863	127.352	80.0	5.8
2	01/05/1965	18:05:58	-20.579	-173.972	20.0	6.2
3	01/08/1965	18:49:43	-59.076	-23.557	15.0	5.8
4	01/09/1965	13:32:50	11.938	126.427	15.0	5.8

Visualization:

Here, all the earthquakes from the database in visualized on to the world map which shows clear representation of the locations where frequency of the earthquake will be more.

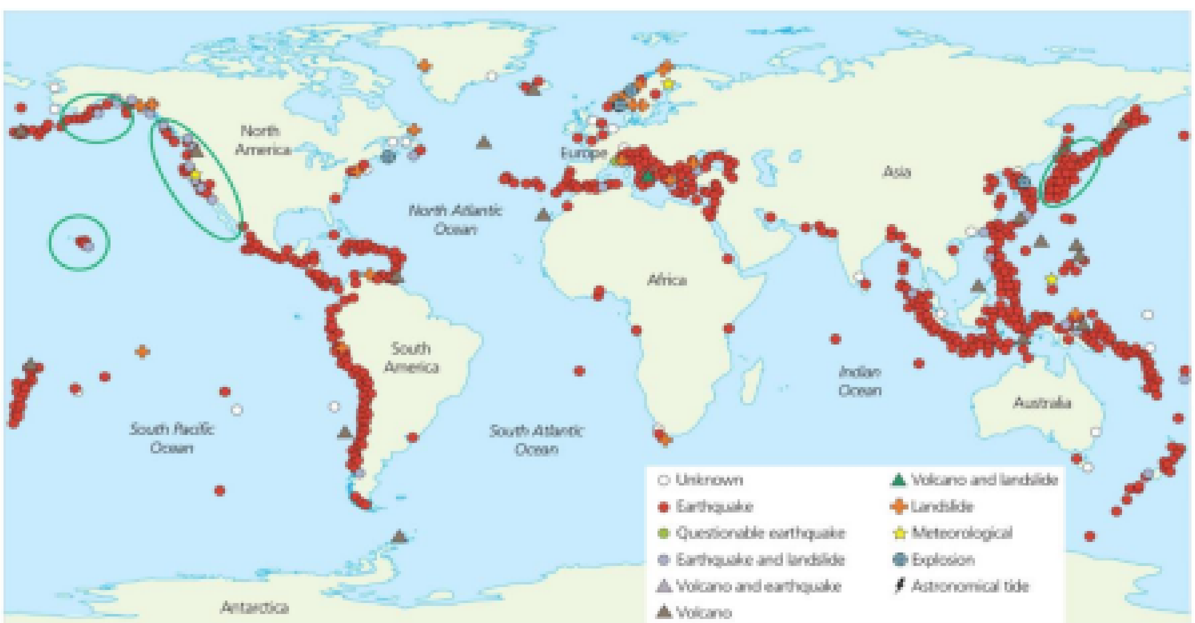
In [8]:

```
from mpl_toolkits.basemap import Basemap

m = Basemap(projection='mill',llcrnrlat=-80,urcrnrlat=80, llcrnrlon=-180,urcrnrlon=180,lat_ts=20,resolution='c')
longitudes = data["Longitude"].tolist()
latitudes = data["Latitude"].tolist()
#m = Basemap(width=12000000,height=9000000,projection='lcc',
 #resolution=None,lat_1=80.,lat_2=55,lat_0=80,lon_0=-107.)
x,y = m(longitudes,latitudes)
```

In [9]:

```
fig = plt.figure(figsize=(12,10))
plt.title("All affected areas")
m.plot(x, y, "o", markersize = 2, color = 'blue')
m.drawcoastlines()
m.fillcontinents(color='coral',lake_color='aqua')
m.drawmapboundary()
m.drawcountries()
plt.show()
```



Data splitting:

The data split was 90% train and 10% test.

Weekly model

	Records	Balance	Events
Train	95,181 (90%)	6.95%	6,612
Test	11,084 (10%)	8.46%	938

Daily model

	Records	Balance	Events
Train	666,688 (90%)	1.72%	11,450
Test	77,606 (10%)	2.16%	1,677

TRAINING AND EVALUATION

```
# demonstrate that the train-test split procedure is repeatable
from sklearn.datasets import make_blobs
from sklearn.model_selection import train_test_split
# create dataset
X, y = make_blobs(n_samples=100)
# split into train test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.33, random_state=1)
# summarize first 5 rows
print(X_train[:5, :])
# split again, and we should see the same split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.33, random_state=1)
# summarize first 5 rows
print(X_train[:5, :])
```

```
[[-2.54341511 4.98947608]
[ 5.65996724 -8.50997751]
[-2.5072835 10.06155749]
[ 6.92679558 -5.91095498]
[ 6.01313957 -7.7749444 ]]

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