Earthquake Prediction Model Using Python

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Project :Phase –3

What Model predict Earthquake??

- CNN to predict earthquake magnitude based on electromagnetic signals experimental sensor, CNN model perform well in 🌎 earthquake magnitude prediction, with an accuracy of 97.88% … ..

Advantages :::

1. It handle complex problems provide computional efficiency, propogate and treat uncertainties
2. Damage can be controlled by early prediction of earthquakes.

Disadvantages:::

- The Response time that is the prediction need to be improved .
-
- Classification and confusion matrix are not calculated.

Importing The Python Libraries :

```
import urllib.request, urllib.parse, urllib.error
import json

earthquakeURL =  "http://earthquake.usgs.gov/fdsnws/event/1/query?"
paramD = dict()
paramD["format"] = "geojson"                # the format the data will be in
paramD["starttime"] = "2019-06-01T00:00:00"  # the minimum date/time that might be retrieved
paramD["endtime"] = "2019-06-30T23:59:59"    # the maximum date/time that might be retrieved
paramD["minmag"] = 6                        # the smallest earthquake magnitude to return
paramD["limit"] = 5                         # the maximum number of earthquakes to return
                                            # starts with the most recent

params = urllib.parse.urlencode(paramD)
print('Retrieving', earthquakeURL+params)
uh = urllib.request.urlopen(earthquakeURL+params)
data = uh.read().decode()
print('Retrieved', len(data), 'characters')

try:
    js = json.loads(data)
except:
    js = None

if not js or 'type' not in js :
    print('==== Failure To Retrieve ====')
    print(data)

# Output first Record
print("\nFirst Earthquake")
lng = js["features"][0]["geometry"]["coordinates"][0] # retrieve the first item in features array
lat = js["features"][0]["geometry"]["coordinates"][1] # look in "geometry" object
dep = js["features"][0]["geometry"]["coordinates"][2] # get the first, second, and third coordinates
print('lng', lng, 'lat', lat, 'depth', dep)

# retrieve the first item in features array, look in the properties object, return the place object
location = js["features"][0]["properties"]["place"]
print(location, "\n")

# Loop through entire data set
print("\nAll Earthquakes")
for f in js["features"]:
    lng = f["geometry"]["coordinates"][0]
    lat = f["geometry"]["coordinates"][1]
    dep = f["geometry"]["coordinates"][2]
    print('lng', lng, 'lat', lat, 'depth', dep)
    location = f["properties"]["place"]
    print(location, "\n")
```

Data Visualization

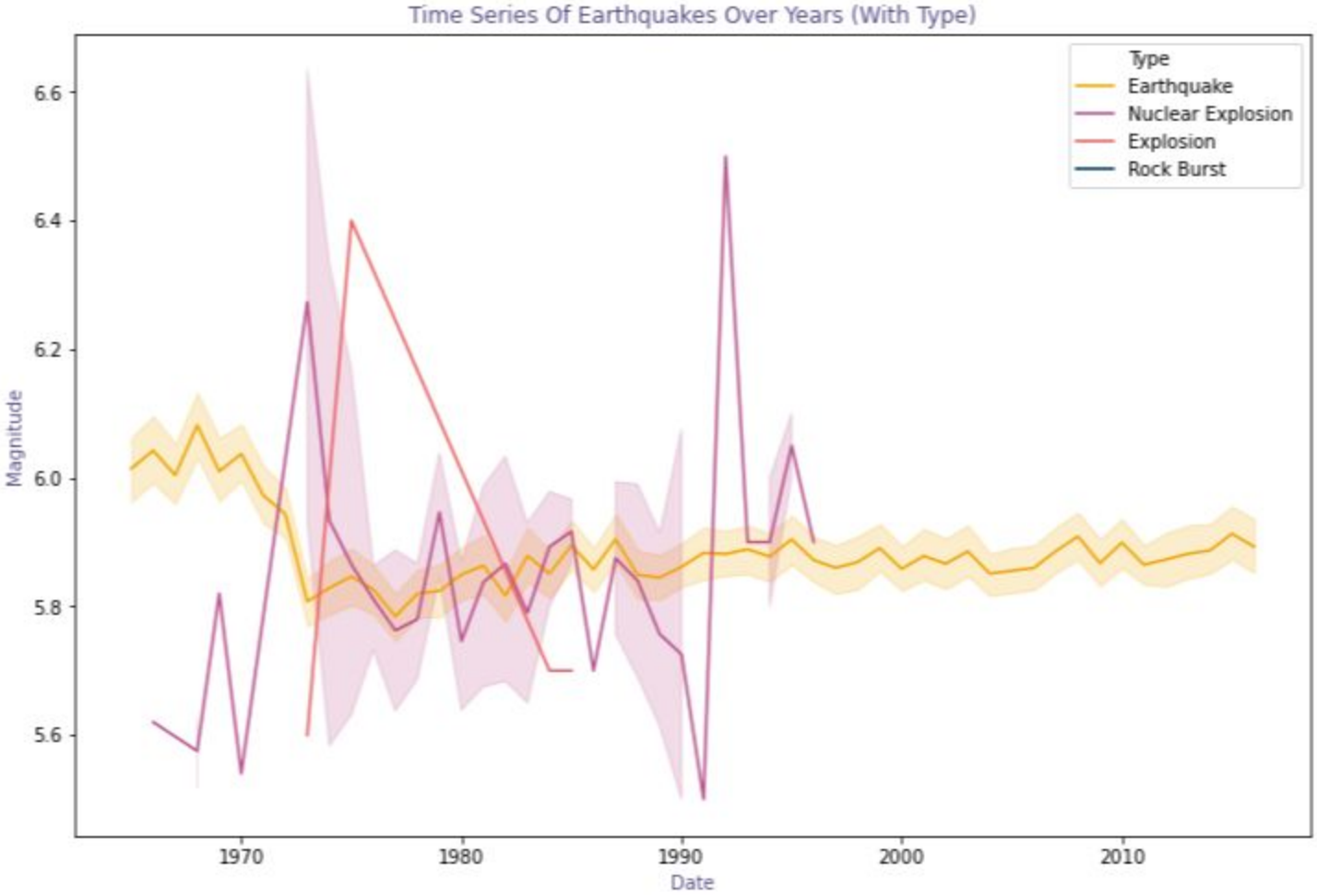
```
Best: 0.957655 using
{'activation': 'relu',
'batch_size': 10, 'epochs': 10,
'loss': 'squared_hinge',
'neurons': 16, 'optimizer':
'SGD'} 0.333316 (0.471398)
with: {'activation': 'sigmoid',
'batch_size': 10, 'epochs': 10,
'loss': 'squared_hinge',
'neurons': 16, 'optimizer':
'SGD'} 0.000000 (0.000000)
with: {'activation': 'sigmoid',
'batch_size': 10, 'epochs': 10,
'loss': 'squared_hinge',
'neurons': 16, 'optimizer':
'Adadelta'} 0.957655 (0.029957)
with: {'activation': 'relu',
'batch_size': 10, 'epochs': 10,
'loss': 'squared_hinge',
'neurons': 16, 'optimizer':
'SGD'} 0.645111 (0.456960)
with: {'activation': 'relu',
'batch_size': 10, 'epochs': 10,
'loss': 'squared_hinge',
'neurons': 16, 'optimizer':
'Adadelta'}
```

```
for d, t in zip(data['Date'], data['Time'
    try:
        ts = datetime.datetime.strptime(d
        timestamp.append(time.mktime(ts.t
    except ValueError:
        # print('ValueError')
        timestamp.append('ValueError')
timeStamp = pd.Series(timestamp)
data['Timestamp'] = timeStamp.values
final_data = data.drop(['Date', 'Time'],
final_data = final_data[final_data.Timest
final_data.head()
```

earthquake.py hosted with ❤ by GitHub view raw

	Latitude	Longitude	Depth
0	19.246	145.616	131.6
1	1.863	127.352	80.0
2	-20.579	-173.972	20.0
3	-59.076	-23.557	15.0
4	11.938	126.427	15.0

Seismic Analysis With Python :


Time Series Of Earthquakes Over Years (With Type)
Type
Earthquake
Nuclear Explosion
Explosion
Rock Burst
6.6
6.4
6.2
6.0
5.8
5.6
Magnitude
1970
1980
1990
2000
2010
Date

Causes Of 🌎 Earthquake :

- Movement of tectonic plates
- Volcanic Eruptions
- Underground Explosions
- Induced Quaking.. Etc… ,

Conclusion : Thus we can conclude that integration of seismic activity with machine learning technology yields efficient and significant results and can be used to predict earthquakes widely, given the past history of the same is well maintained..