Analysis of Significant Earthquakes Data Set
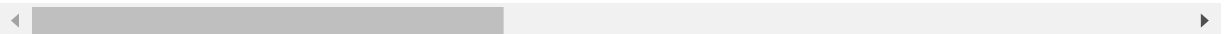
In [2]:
```python
import pandas as pd
data = pd.read_csv("C:/Users/Harsh Patel/Desktop/Mini Project/dataset/dataset.csv")
data
```

Out[2]:

	Date	Time	Latitude	Longitude	Type	Depth	Depth Error	Depth Seismic Stations	Magnitude
0	02/01/1965	13:44:18	19.2460	145.6160	Earthquake	131.60	NaN	NaN	6.0
1	04/01/1965	11:29:49	1.8630	127.3520	Earthquake	80.00	NaN	NaN	5.8
2	05/01/1965	18:05:58	-20.5790	-173.9720	Earthquake	20.00	NaN	NaN	6.2
3	08/01/1965	18:49:43	-59.0760	-23.5570	Earthquake	15.00	NaN	NaN	5.8
4	09/01/1965	13:32:50	11.9380	126.4270	Earthquake	15.00	NaN	NaN	5.8
5	10/01/1965	13:36:32	-13.4050	166.6290	Earthquake	35.00	NaN	NaN	6.7
6	12/01/1965	13:32:25	27.3570	87.8670	Earthquake	20.00	NaN	NaN	5.9
7	01/15/1965	23:17:42	-13.3090	166.2120	Earthquake	35.00	NaN	NaN	6.0
8	01/16/1965	11:32:37	-56.4520	-27.0430	Earthquake	95.00	NaN	NaN	6.0
9	01/17/1965	10:43:17	-24.5630	178.4870	Earthquake	565.00	NaN	NaN	5.8
10	01/17/1965	20:57:41	-6.8070	108.9880	Earthquake	227.90	NaN	NaN	5.9
11	01/24/1965	0:11:17	-2.6080	125.9520	Earthquake	20.00	NaN	NaN	8.2
12	01/29/1965	9:35:30	54.6360	161.7030	Earthquake	55.00	NaN	NaN	5.5
13	01/02/1965	5:27:06	-18.6970	-177.8640	Earthquake	482.90	NaN	NaN	5.6
14	02/02/1965	15:56:51	37.5230	73.2510	Earthquake	15.00	NaN	NaN	6.0
15	04/02/1965	3:25:00	-51.8400	139.7410	Earthquake	10.00	NaN	NaN	6.1
16	04/02/1965	5:01:22	51.2510	178.7150	Earthquake	30.30	NaN	NaN	8.7
17	04/02/1965	6:04:59	51.6390	175.0550	Earthquake	30.00	NaN	NaN	6.0
18	04/02/1965	6:37:06	52.5280	172.0070	Earthquake	25.00	NaN	NaN	5.7
19	04/02/1965	6:39:32	51.6260	175.7460	Earthquake	25.00	NaN	NaN	5.8
20	04/02/1965	7:11:23	51.0370	177.8480	Earthquake	25.00	NaN	NaN	5.9
21	04/02/1965	7:14:59	51.7300	173.9750	Earthquake	20.00	NaN	NaN	5.9
22	04/02/1965	7:23:12	51.7750	173.0580	Earthquake	10.00	NaN	NaN	5.7
23	04/02/1965	7:43:43	52.6110	172.5880	Earthquake	24.00	NaN	NaN	5.7
24	04/02/1965	8:06:17	51.8310	174.3680	Earthquake	31.80	NaN	NaN	5.7
25	04/02/1965	8:33:41	51.9480	173.9690	Earthquake	20.00	NaN	NaN	5.6
26	04/02/1965	8:40:44	51.4430	179.6050	Earthquake	30.00	NaN	NaN	7.3
27	04/02/1965	12:06:08	52.7730	171.9740	Earthquake	30.00	NaN	NaN	6.5
28	04/02/1965	12:50:59	51.7720	174.6960	Earthquake	20.00	NaN	NaN	5.6
29	04/02/1965	14:18:29	52.9750	171.0910	Earthquake	25.00	NaN	NaN	6.4
...	...	...	...	...	...	...	...	...	...
23382	11/12/2016	17:26:10	-10.9640	161.5723	Earthquake	10.00	1.8	NaN	5.5
23383	12/14/2016	2:01:23	21.2897	144.4037	Earthquake	22.37	1.8	NaN	6.0
23384	12/14/2016	21:14:56	21.3697	144.2175	Earthquake	10.00	1.7	NaN	5.5

	Date	Time	Latitude	Longitude	Type	Depth	Depth Error	Depth Seismic Stations	Magnitude
23385	12/16/2016	11:34:58	14.0882	-90.8691	Earthquake	71.26	3.7	NaN	5.5
23386	12/17/2016	10:51:10	-4.5049	153.5216	Earthquake	94.54	3.8	NaN	7.9
23387	12/17/2016	11:22:40	-4.4244	153.5419	Earthquake	83.36	5.1	NaN	5.6
23388	12/17/2016	11:27:39	-5.6497	153.9975	Earthquake	26.50	3.6	NaN	6.3
23389	12/18/2016	5:46:25	-10.2137	161.2177	Earthquake	37.39	3.4	NaN	5.9
23390	12/18/2016	6:15:46	-34.9886	-107.8694	Earthquake	10.00	1.6	NaN	5.5
23391	12/18/2016	6:39:42	-6.3046	154.3530	Earthquake	10.00	1.6	NaN	5.9
23392	12/18/2016	9:47:05	8.3489	137.6672	Earthquake	12.43	2.9	NaN	6.2
23393	12/18/2016	11:35:48	-10.1904	161.2187	Earthquake	57.52	5.2	NaN	5.5
23394	12/18/2016	13:30:11	-9.9640	-70.9714	Earthquake	622.54	3.1	NaN	6.4
23395	12/20/2016	4:21:29	-10.1773	161.2236	Earthquake	16.65	2.8	NaN	6.4
23396	12/20/2016	10:04:39	37.1442	84.9583	Earthquake	10.00	1.7	NaN	5.6
23397	12/20/2016	12:33:14	-10.1785	160.9149	Earthquake	10.00	1.6	NaN	6.0
23398	12/20/2016	20:07:53	-10.1549	160.7816	Earthquake	10.38	3.2	NaN	5.5
23399	12/21/2016	0:17:15	-7.5082	127.9206	Earthquake	152.00	1.8	NaN	6.7
23400	12/21/2016	16:43:57	21.5036	145.4172	Earthquake	12.05	2.9	NaN	5.9
23401	12/24/2016	1:32:16	-5.2453	153.5754	Earthquake	35.00	1.9	NaN	6.0
23402	12/24/2016	3:58:55	-5.1460	153.5166	Earthquake	30.00	1.8	NaN	5.8
23403	12/25/2016	14:22:27	-43.4029	-73.9395	Earthquake	38.00	1.9	NaN	7.6
23404	12/25/2016	14:32:13	-43.4810	-74.4771	Earthquake	14.93	3.3	NaN	5.6
23405	12/27/2016	23:20:56	45.7192	26.5230	Earthquake	97.00	1.8	NaN	5.6
23406	12/28/2016	8:18:01	38.3754	-118.8977	Earthquake	10.80	1.3	34.0	5.6
23407	12/28/2016	8:22:12	38.3917	-118.8941	Earthquake	12.30	1.2	40.0	5.6
23408	12/28/2016	9:13:47	38.3777	-118.8957	Earthquake	8.80	2.0	33.0	5.5
23409	12/28/2016	12:38:51	36.9179	140.4262	Earthquake	10.00	1.8	NaN	5.9
23410	12/29/2016	22:30:19	-9.0283	118.6639	Earthquake	79.00	1.8	NaN	6.3
23411	12/30/2016	20:08:28	37.3973	141.4103	Earthquake	11.94	2.2	NaN	5.5

23412 rows × 22 columns

```
In [3]: len(data)
```

Out[3]: 23412

```
In [4]: data.shape
```

Out[4]: (23412, 22)

In [5]: `data.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 23412 entries, 0 to 23411
Data columns (total 22 columns):
Date                        23412 non-null object
Time                        23412 non-null object
Latitude                    23412 non-null float64
Longitude                   23412 non-null float64
Type                        23412 non-null object
Depth                       23412 non-null float64
Depth Error                 4461 non-null float64
Depth Seismic Stations      7097 non-null float64
Magnitude                   23412 non-null float64
Magnitude Type              23409 non-null object
Magnitude Error             327 non-null float64
Magnitude Seismic Stations  2564 non-null float64
Azimuthal Gap               7299 non-null float64
Horizontal Distance         1604 non-null float64
Horizontal Error            1156 non-null float64
Root Mean Square            17352 non-null float64
ID                          23412 non-null object
Source                      23412 non-null object
Location Source             23412 non-null object
Magnitude Source            23412 non-null object
Unnamed: 20                 23412 non-null object
Status                      0 non-null float64
dtypes: float64(13), object(9)
memory usage: 3.9+ MB
```

In [6]: `data.count()`

Out[6]:
```
Date                        23412
Time                        23412
Latitude                    23412
Longitude                   23412
Type                        23412
Depth                       23412
Depth Error                  4461
Depth Seismic Stations       7097
Magnitude                   23412
Magnitude Type              23409
Magnitude Error               327
Magnitude Seismic Stations   2564
Azimuthal Gap                7299
Horizontal Distance          1604
Horizontal Error             1156
Root Mean Square            17352
ID                          23412
Source                      23412
Location Source             23412
Magnitude Source            23412
Unnamed: 20                 23412
Status                          0
dtype: int64
```

In [7]:
```python
# Replacing Null Values

data['Depth Error'].mean()
data.fillna(0,inplace=True)

data['Magnitude Error'].mean()
data.fillna(0,inplace=True)

data['Horizontal Error'].mean()
data.fillna(0,inplace=True)

data.head(10)
```
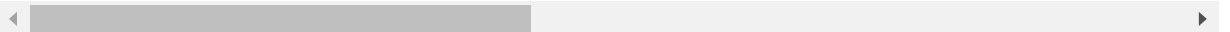
Out[7]:

	Date	Time	Latitude	Longitude	Type	Depth	Depth Error	Depth Seismic Stations	Magnitude	Mag
0	02/01/1965	13:44:18	19.246	145.616	Earthquake	131.6	0.0	0.0	6.0	
1	04/01/1965	11:29:49	1.863	127.352	Earthquake	80.0	0.0	0.0	5.8	
2	05/01/1965	18:05:58	-20.579	-173.972	Earthquake	20.0	0.0	0.0	6.2	
3	08/01/1965	18:49:43	-59.076	-23.557	Earthquake	15.0	0.0	0.0	5.8	
4	09/01/1965	13:32:50	11.938	126.427	Earthquake	15.0	0.0	0.0	5.8	
5	10/01/1965	13:36:32	-13.405	166.629	Earthquake	35.0	0.0	0.0	6.7	
6	12/01/1965	13:32:25	27.357	87.867	Earthquake	20.0	0.0	0.0	5.9	
7	01/15/1965	23:17:42	-13.309	166.212	Earthquake	35.0	0.0	0.0	6.0	
8	01/16/1965	11:32:37	-56.452	-27.043	Earthquake	95.0	0.0	0.0	6.0	
9	01/17/1965	10:43:17	-24.563	178.487	Earthquake	565.0	0.0	0.0	5.8	

10 rows × 22 columns

In [8]: `data.isnull().sum()`

Out[8]:
```
Date                          0
Time                          0
Latitude                      0
Longitude                     0
Type                          0
Depth                         0
Depth Error                   0
Depth Seismic Stations        0
Magnitude                     0
Magnitude Type                0
Magnitude Error               0
Magnitude Seismic Stations    0
Azimuthal Gap                 0
Horizontal Distance           0
Horizontal Error              0
Root Mean Square              0
ID                            0
Source                        0
Location Source               0
Magnitude Source              0
Unnamed: 20                   0
Status                        0
dtype: int64
```

In [9]: `new_data=data[['Date','Latitude','Longitude','Type','Depth','Depth Error','Magnitude','Magnitude Error','Root Mean Square']]`
`new_data.head(10)`

Out[9]:

	Date	Latitude	Longitude	Type	Depth	Depth Error	Magnitude	Magnitude Error	Root Mean Square
0	02/01/1965	19.246	145.616	Earthquake	131.6	0.0	6.0	0.0	0.0
1	04/01/1965	1.863	127.352	Earthquake	80.0	0.0	5.8	0.0	0.0
2	05/01/1965	-20.579	-173.972	Earthquake	20.0	0.0	6.2	0.0	0.0
3	08/01/1965	-59.076	-23.557	Earthquake	15.0	0.0	5.8	0.0	0.0
4	09/01/1965	11.938	126.427	Earthquake	15.0	0.0	5.8	0.0	0.0
5	10/01/1965	-13.405	166.629	Earthquake	35.0	0.0	6.7	0.0	0.0
6	12/01/1965	27.357	87.867	Earthquake	20.0	0.0	5.9	0.0	0.0
7	01/15/1965	-13.309	166.212	Earthquake	35.0	0.0	6.0	0.0	0.0
8	01/16/1965	-56.452	-27.043	Earthquake	95.0	0.0	6.0	0.0	0.0
9	01/17/1965	-24.563	178.487	Earthquake	565.0	0.0	5.8	0.0	0.0

In [ ]: `new_data['Magnitude'].min(),new_data['Magnitude'].max()`

In [ ]: `new_data['Magnitude'].mean()`

In [ ]:
```python
new_data[new_data.Magnitude<=6.0]
```

In [ ]:
```python
#Total statistics of earthquake data.
new_data.describe()
```

In [ ]:

In [ ]:

In [ ]: