

Locations of Earthquakes off Fiji

The data set give the locations of 1000 seismic events of MB > 4.0. The events occurred in a cube near Fiji since 1964.

Details

There are two clear planes of seismic activity. One is a major plate junction; the other is the Tonga trench off New Zealand. These data constitute a subsample from a larger dataset of containing 5000 observations.

Format

A data frame with 1000 observations on 5 variables.

lat numeric Latitude of event

long numeric Longitude

depth numeric Depth (km)

mag numeric Richter Magnitude

```
In [1]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

import plotly.express as px

%matplotlib inline
```

```
In [2]: df = pd.read_csv("quakes.csv")
```

```
In [3]: df
```

```
Out[3]:   lat  long  depth  mag  stations
```

0	-20.42	181.62	562	4.8	41
1	-20.62	181.03	650	4.2	15
2	-26.00	184.10	42	5.4	43
3	-17.97	181.66	626	4.1	19
4	-20.42	181.96	649	4.0	11
...
995	-25.93	179.54	470	4.4	22
996	-12.28	167.06	248	4.7	35
997	-20.13	184.20	244	4.5	34
998	-17.40	187.80	40	4.5	14
999	-21.59	170.56	165	6.0	119

1000 rows × 5 columns

```
In [4]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 5 columns):
 #   Column   Non-Null Count  Dtype  
 --- 
 0   lat      1000 non-null   float64
 1   long     1000 non-null   float64
 2   depth    1000 non-null   int64  
 3   mag      1000 non-null   float64
 4   stations 1000 non-null   int64  
dtypes: float64(3), int64(2)
memory usage: 39.2 KB
```

```
In [5]: df.describe()
```

```
Out[5]:   lat      long      depth      mag      stations
count  1000.000000  1000.000000  1000.000000  1000.000000  1000.000000
mean   -20.642750  179.462020  311.371000  4.620400  33.418000
std    5.028791   6.069497  215.535498  0.402773  21.900386
min   -38.590000  165.670000  40.000000  4.000000  10.000000
25%   -23.470000  179.620000  99.000000  4.300000  18.000000
50%   -20.300000  181.410000  247.000000  4.600000  27.000000
75%   -17.637500  183.200000  543.000000  4.900000  42.000000
max   -10.720000  188.130000  680.000000  6.400000  132.000000
```

```
In [6]: df.stations.unique()
```

```
Out[6]: array([ 41,  15,  43,  19,  11,  12,  35,  13,  16,  10,  94,  83,  21,
 18,  17,  22,  57,  79,  25,  30,  42,  34,  32,  23,  26,  27,
 24,  73,  31,  61,  40,  45,  91,  14,  75,  60,  65,  38,  64,
 54,  33,  29,  76,  28,  39,  67,  52,  69,  59,  68,  46,  63,
 106, 122, 20, 37, 98, 90, 50, 47, 62, 71, 74, 36, 66,
 85, 48, 55, 72, 104, 56, 49, 80, 82, 53, 58, 105, 123,
 95, 89, 112, 93, 51, 44, 87, 100, 92, 81, 70, 86, 118,
 78, 99, 129, 88, 109, 119, 77, 132, 115, 121, 110], dtype=int64)
```

```
In [7]: statscount = df.groupby("stations").count()
statscount
```

```
Out[7]:   lat long depth mag
```

stations	10	20	20	20	20
10	28	28	28	28	28
11	25	25	25	25	25
12	21	21	21	21	21
13	39	39	39	39	39
...
121	1	1	1	1	1
122	1	1	1	1	1
123	1	1	1	1	1
129	1	1	1	1	1
132	1	1	1	1	1

102 rows × 4 columns

```
In [8]: statscount.reset_index(inplace=True)
statscount
```

```
Out[8]:   stations  lat  long  depth  mag
```

0	10	20	20	20	20
1	11	28	28	28	28
2	12	25	25	25	25
3	13	21	21	21	21
4	14	39	39	39	39
...
97	121	1	1	1	1
98	122	1	1	1	1
99	123	1	1	1	1
100	129	1	1	1	1
101	132	1	1	1	1

102 rows × 5 columns

```
In [9]: statscount2 = statscount.nlargest(10, columns="lat")
```

```
In [10]: statscount2
```

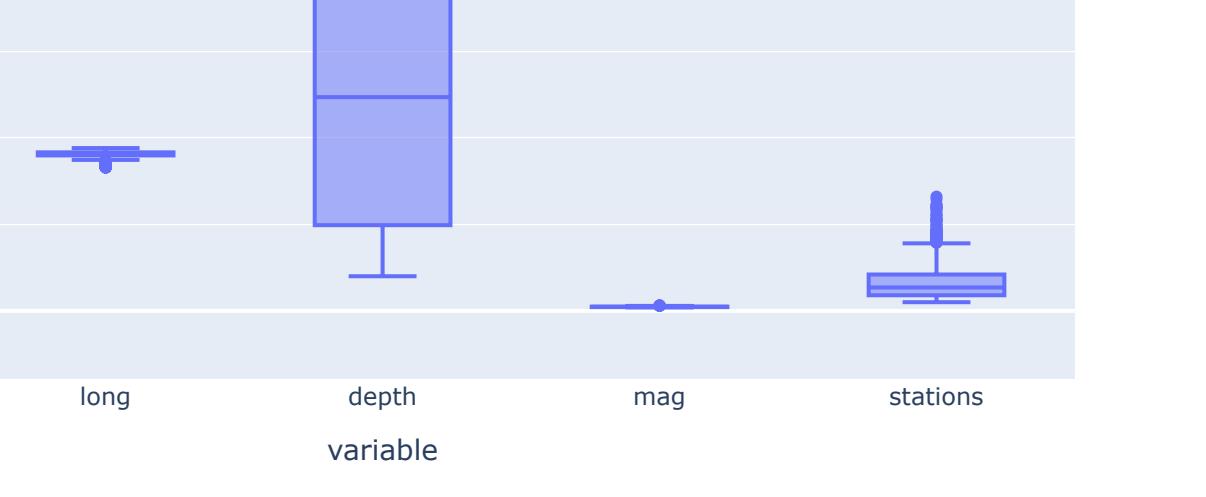
```
Out[10]:   stations  lat  long  depth  mag
```

4	14	39	39	39	39
7	17	38	38	38	38
11	21	37	37	37	37
6	16	35	35	35	35
12	22	35	35	35	35
13	23	35	35	35	35
5	15	34	34	34	34
8	18	33	33	33	33
17	27	33	33	33	33
9	19	29	29	29	29

Plotly Plots

```
In [11]: px.pie(data_frame=statscount2, labels=statscount2.stations, values=statscount2.lat, title="Top 10 Stations", names=statscount2.stations, hole=0.5)
```

Top 10 Stations



```
In [12]: meanquakes = df.groupby("stations").mean()
```

```
Out[12]:   lat      long      depth      mag
```

stations	10	20	20	20	20
10	-19.837500	182.446500	345.500000	4.230000	
11	-20.804286	182.007143	338.285714	4.228571	
12	-19.974000	179.639200	364.400000	4.196000	
13	-21.469524	181.207143	416.238095	4.333333	
14	-20.194103	179.340769	312.128205	4.276923	
...
121	-20.250000	184.750000	107.000000	5.600000	
122	-15.560000	167.620000	127.000000	6.400000	
123	-15.330000	186.750000	48.000000	5.700000	
129	-18.820000	182.210000	417.000000	5.600000	
132	-12.230000	167.020000	242.000000	6.000000	

102 rows × 4 columns

```
In [13]: px.bar(data_frame=meanquakes, x=meanquakes.index, y=meanquakes.mag, title="Mean Quakes detected per Station")
```

Mean Quakes detected per Station


```
In [14]: px.scatter(data_frame=meanquakes, x=meanquakes.depth, y=meanquakes.mag, color=meanquakes.index, hover_name=meanquakes.index, title="Scatterplot of Magnitude vs Depth by Stations")
```

Scatterplot of Magnitude vs Depth by Stations


```
In [15]: px.box(data_frame=df, title="Box Plots for each feature")
```

Box Plots for each feature


```
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```

