

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.

This presentation is to present plots from data analysis performed on this dataset

Field	Description
lat	Latitude of event
long	Longitude
depth	Depth (km)
mag	Richter Magnitude
stations	Detector stations

Import Libraries

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

import plotly.express as px
```

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

Dataset at a glance

```
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 x 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)
```

Using Groupby function to prepare data

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

```
Out[7]:   lat      long      depth      mag  stations
count 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
```

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

```
Out[8]:   stations  lat  long  depth  mag
  10      20      20      20      20
  11      28      28      28      28
  12      25      25      25      25
  13      21      21      21      21
  14      39      39      39      39
 ...
121      1       1       1       1
122      1       1       1       1
123      1       1       1       1
129      1       1       1       1
132      1       1       1       1
```

102 rows x 4 columns

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

```
statscount
```

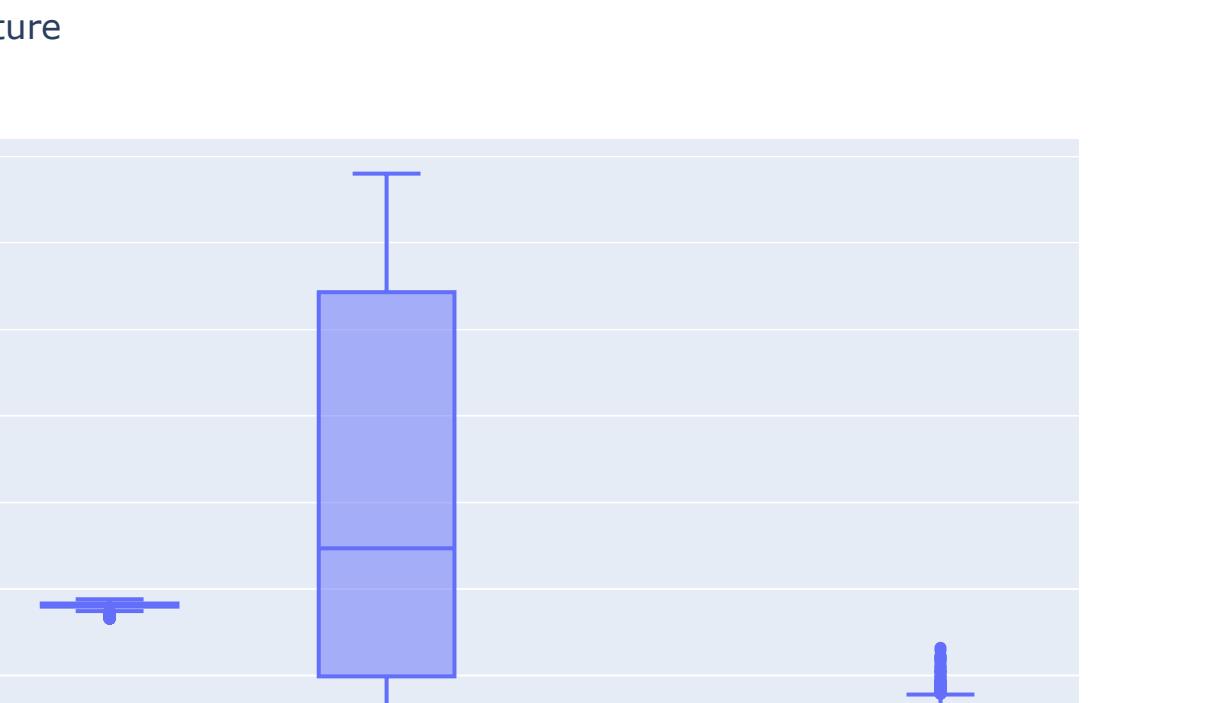
```
Out[8]:   stations  lat  long  depth  mag
```

```
Out[8]:   stations  lat  long  depth  mag
  4      14      39      39      39
  7      17      38      38      38
 11      21      37      37      37
  6      16      35      35      35
 12      22      35      35      35
 13      23      35      35      35
  5      15      34      34      34
  8      18      33      33      33
 17      27      33      33      33
  9      19      29      29      29
```

Pie Chart

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

Top 10 Stations



Bar chart

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

```
Out[12]:   lat      long      depth      mag
  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 x 4 columns

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

Mean Quakes detected per Station

Scatterplot

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

Scatterplot of Magnitude vs Depth by Stations

Box Plot

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

Box Plots for each feature

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