

STEVENS INSTITUTE OF TECHNOLOGY

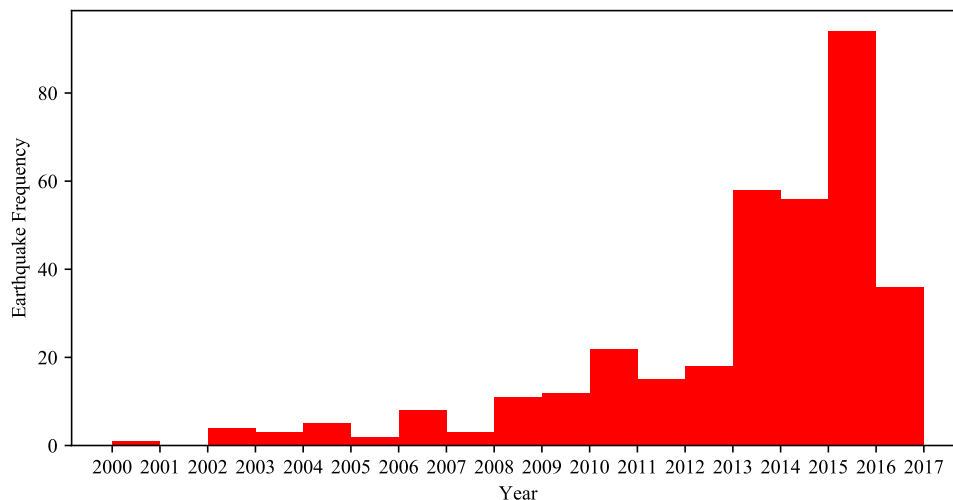
SYS-601 Homework #1 Solution

Submit the following using the online submission system: 1) Cover sheet with name, date, and collaborators, 2) Written responses in PDF format, 3) All work (e.g. .xlsx or .py files).

1.1 Plotting an Earthquake Dataset [20 points]

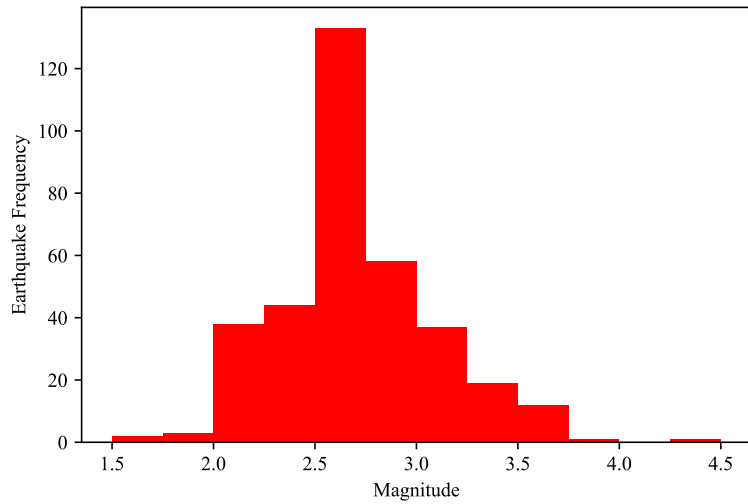
This problem works with a dataset for earthquakes observed between Jan. 1 2000 and Dec. 31 2016 within a 200 km radius of Wichita Falls, Texas and saved in the file `earthquakes.csv`.¹

- (a) 3 PTS Using the USGS API documentation for CSV files (<https://earthquake.usgs.gov/earthquakes/feed/v1.0/csv.php>), identify one of the columns conforming to each data type:
- (i) Nominal **Examples:** `magtype`, `id`, `type`, `status`
 - (ii) Interval **Examples:** `time`, `latitude`, `longitude`
 - (iii) Ratio **Examples:** `depth`, `mag`, `horizontalError`, `depthError`
- (b) 4 PTS Create a bar chart to show the frequency of earthquakes for each year 2000–2016. Label both axes.

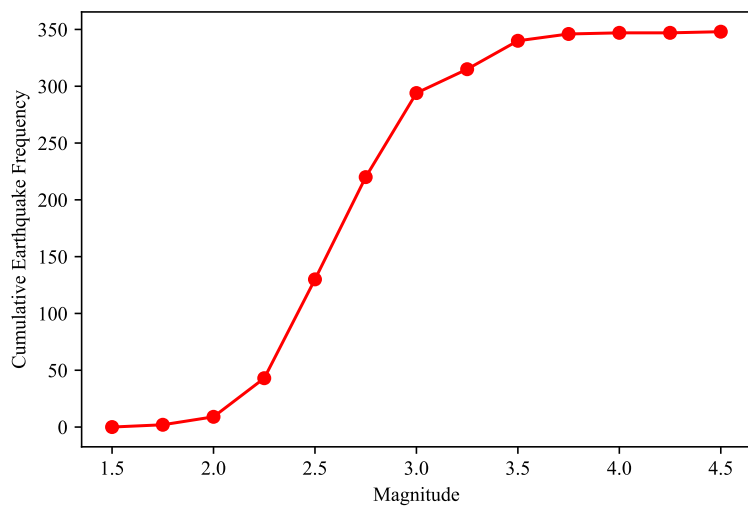


- (c) 4 PTS Create a histogram to show the number of earthquakes categorized by magnitude using an appropriate bin size. Label both axes.

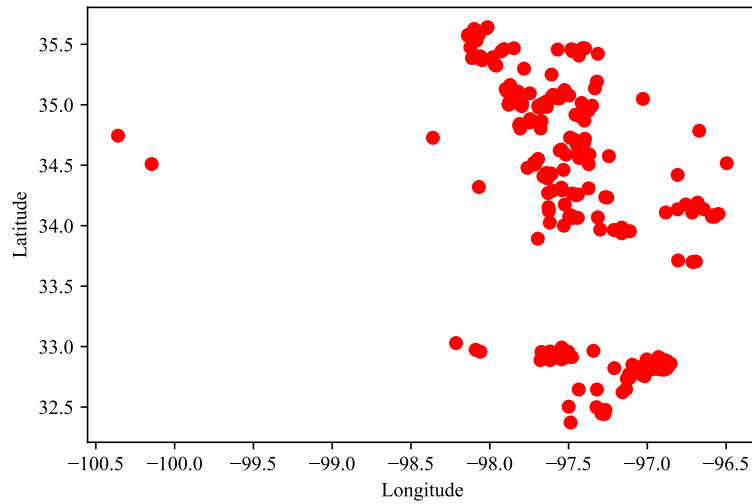
¹This data was gathered from the U.S. Geological Survey (USGS) using the following query: <http://earthquake.usgs.gov/fdsnws/event/1/query?format=csv&starttime=2000-01-01&endtime=2016-12-31&latitude=33.913392&longitude=-98.495779&maxradiuskm=200>



- (d) 4 PTS Create a plot to show the cumulative frequency of earthquakes by magnitude (i.e. number of earthquakes with magnitude below x). Label both axes.



- (e) 4 PTS Create a scatter plot to show the longitude (x-axis) and latitude (y-axis) location of each earthquake. Label both axes.



(f) 1 PT Briefly describe any interesting or troubling trends you observe in this data set.

There appear to be many recent earthquakes clustered around a few spatial regions. This phenomenon has been attributed to hydraulic fracture (“fracking”) methods to extract petroleum resources.