

Programming Project 07

This assignment is worth 45 points (4.5% of the course grade) and must be **completed and turned in before 11:59 on Monday, November 2, 2020.**

Assignment Overview

- List and Tuples
- File manipulation

Assignment Background

Earthquakes are the shaking of the ground caused by the release of energy stored in the Earth's crust. These natural disasters happen without warning and can be destructive. While we can't predict when they'll happen (yet), we can analyze earthquakes that have occurred in the past. Documenting their magnitude and damage is important to understand these phenomena by learning patterns useful to pinpoint possible locations of future earthquakes.

Your task is to build a program that visualizes the location, magnitude, and damage from past earthquakes. This program will show the damage caused by all earthquakes in a single year. Also, it will show the magnitude and location of each earthquake in a single year. Finally, it will compare the total damage caused by these natural disasters within a range of years.

Project Specifications

You must implement the following functions:

- 1. The first functions open the file and then read the file to put the specified data into a list of tuples that we use in the program.**
 - a) `open_file()`** This function repeatedly prompts the user for a filename until the file is opened successfully. An error message should be shown if the file cannot be opened. It returns a file pointer. Use try-except to determine if the file can be opened.
 - b) `read_file(fp)`** This function read a file pointer and returns a sorted list of tuples. The master list will have the following structure:
`[(year, month, magnitude, location, latitude, longitude, deaths, missing, injuries, damage),...]`

Each row of the file contains the date, magnitude, location, and the damages (i.e. deaths, missing, injured, and property damage) caused by each earthquake. For this project, we are only interested in the following columns:

```
year = int(line[2])
month = int(line[3])
magnitude = float(line[9])
```

```

location = line[19]
latitude = float(line[20])
longitude = float(line[21])
deaths = int(line[23])
missing = int(line[25])
injuries = int(line[27])
damages = float(line[29])

```

If the number of deaths, missing, injured, and damages columns are empty, replace it with a zero. If any other numerical data cannot be made into an int or float, skip that entire line of data (hint: try-except).

Create a tuple with items in this order:

```

tup = (year, month, magnitude, location, latitude, longitude, \
       deaths, missing, injuries, damages)

```

Sort the list of tuples returned using the default settings.

2. The next set of functions use the list of tuples that was gathered from the file and processes them to create new arrangements of data (which also happen to be lists, sometimes a list of lists, other times a list of lists of tuples).

- a) **get_damage_data(data, year):** This function iterates through the list of earthquake tuples and returns a list of the earthquakes that occurred in the given year. This function extracts the month, location (*truncated to the first 40 characters*), the number of deaths, missing, injuries, and damages from earthquakes in a single year into a tuple in that order:

```
tup = (month, location, deaths, missing, injuries, damages)
```

If no earthquake had occurred in the selected year, return an empty list.

Keep the items in the same order that they are in the data parameter, i.e. simply append as you read through data.

- b) **get_quake_data(data, year):** This function iterates through the list of earthquake tuples and returns a list of the month, magnitude, location and coordinates from each earthquake that occurred in the given year. The tuple is

```
tup = (month, magnitude, location, latitude, longitude)
```

If no earthquake had occurred in the selected year, return an empty list. Note that unlike the `get_damage_data` function, we will **not** truncate the location data. Keep the items in the same order that they are in the data parameter, i.e. simply append as you read through data.

- c) **summary_statistics(data, year_start, year_end):** This function returns a list of three lists: total number of earthquakes, the damage costs caused by an earthquake, and the

total casualties (deaths, missing, and injured) for each earthquake within a range of years—each item in `earthquake_count_by_year` and `total_damages_by_year` lists will be a tuple:

`(year, value)`

For the `casualties_by_year` list the tuple will be:

`(year, (total_deaths, total_missing, total_injured))`

The range of years is inclusive of the specified start and end years. Each list will have an entry for each of the specified years in year-order, and the first item in each tuple will be the year. This function returns a list

```
L = [[list_of_earthquake_count_by_year],
      [list_of_total_damage_by_year],
      [list_of_casualties_by_year]]
```

The `year_end` must be greater than or equal to the `year_start`. If not, a list of empty lists is returned. You may assume that years will be integers (no error checking for ints is necessary). Also, if there are no earthquakes in the specified years, a list of empty lists is returned. (We are using a list of empty lists as an indicator that we found something wrong in this function.) Keep the items in the same order that they are in the data parameter, i.e. simply append as you read through data.

Hint: you get the needed information using your `get_damage_data` function.

Note: I found list comprehension to be handy for collecting damage and casualty data—not necessary, but it resulted in terse code.

3. The last set of functions that you write display the data gathered by the previous functions.

- a) **display_damage_data(L, year)** The first parameter is a list of damage for a particular year; the second parameter is that year as an int. The L list is a list of tuples that originated in the `get_damage_data` function:

`(month, location, deaths, missing, injuries, damages)`

This function displays the damage costs of each earthquake in L. There is a centered title line of width 98 (use the “^” in the string formatting) followed by two header lines (one only has the word “millions” on it) followed by the data, and finally with the totals of the numerical data columns.

The two header rows contains the following strings:

`"Month", "Location", "Deaths", "Missing", "Injuries", "Damage"`

`"", "", "", "", "", "(Millions)"`

and rows use the following format:

`"{:8s}{:40s}{:>12s}{:>12s}{:>12s}{:>14s}"`.

The subsequent rows of data use the following formatting:

`"{:<8s}{:40s}{:12,d}{:12,d}{:12,d}{:14,.2f}"`.

Note that the data passed to this function as a parameter came from a call in main to the `get_damage_data` function.

You need to display the corresponding month name from the MONTHS list provided in the starter code.

- b) **display_quake_data(L, year):** This function prints the magnitude of each earthquake and is quite similar to the `display_damage_data` function except that here the L list of tuples originated in the `get_quake_data` function so each tuple is:

```
(month, magnitude, location, latitude, longitude)
```

There is one centered title line of width 58, followed by the header row which uses the following string format:

```
"{:8s}{:10s}{:40s}" .
```

The header line contains the following strings:

```
"Month", "Magnitude", "Location"
```

The subsequent data rows use this string

Unlike the previous function there is no final row of column totals.

```
"{:<8s}{:<10.2f}{:40s}" .
```

- c) **display_summary(quakes, costs, casualties):** This function first prints a table of damage by year for each year in the year range with a row of totals for the two data columns. Each row will have the year, the number of earthquakes, and the cost. The row will be the total number of earthquakes and the total cost for the range of years.

After that, the total casualty data is displayed with a line for deaths, a line for missing, and a line for injuries. Each casualty data line will have the total for the range of years and the percent that total is over the total casualties (deaths + missing + injured). Note that data used in this function originated in the `summary_statistics` function). The header row of the total number of earthquakes and damage costs uses the following string format:

```
"{:5s}{:>10s}{:>12s}" .
```

The subsequent data rows use this string format:

```
"{:<5d}{:10,d}{:12,.2f}" .
```

Followed by totals of the two data columns using that same data format.

The header row of the total casualties per type uses the following string format noting the 11 to account for the percent character in the data rows.:

```
"{:10s}{:>10s}{:>11s}"
```

The subsequent data rows use this string format:

```
"{:10s}{:10d}{:10,.2f}%" .
```

4. Then there are three plotting functions that we provide that will plot the data gathered above.

5. Finally, comes the “main” which prompts for user input and based on that input calls the appropriate functions. Then it prompts again.

- d) **main()** This function is the starting point of the program. The program starts by opening the file with the earthquake data. Then the program will display the menu, prompt for user input, and then repeatedly prompt the user to select an option from the following menu:
- i. **Option 1:** Display the damage costs caused by each earthquake in a single year. Call your `get_damage_data` function. Prompt for a year (validation is required!) and display the selected earthquake damage cost data. Prompt the user whether they want to plot the data. If "Y", call `plot_bar`.
 - ii. **Option 2:** Display the magnitude of each earthquake in a single year. Call your `get_quake_data` function. Prompt for a year (validation is required!) and display the selected earthquake magnitude data. Prompt the user whether they want to plot the data. If "Y", call `plot_intensity_map`.
 - iii. **Option 3:** Display the total number of earthquakes, damage costs, and damages caused by earthquakes within a range of years. Call `summary_statistics` to get the data. Prompt for the start year and end year. **Hint: Prompt for both values before converting to int.** Prompt the user whether they want to plot the data. If "Y", draw three plots, one for each list returned by your call to the `summary_statistics` function: `plot_line` for the first list, `plot_line` for the second list, and `plot_pie` for the third list.
 - iv. **Option 4:** Stop the program.

If the user does not enter any of these options, the program needs to display an error message and prompt again until a valid option is selected.

2. Hints and Notes

- a) Need to print a header line? Using multiple string inside a format method, use the "*" operator to unpack the list. Unpacking is used with iterable items (e.g. lists, strings, and tuples) to take each individual value of the iterable and assign it to various argument positions. In other words, each element from the iterable becomes an individual value. For example:

```
lst = ["I", "Love", "Python!"]
print("{} {} {}".format(*lst)) # It prints: I love Python!
```

- b) We provide a constant `MONTHS` to assist with printing month names in the display functions.
- c) Provided functions:
- a. **`plot_intensity_map(year, quake_data)`:** This function creates a map showing the magnitude of each earthquake in the selected year. Note: this function requires the world background which is in the file `"world-map.jpg"`

so make sure that file (which we provide) is in the same directory as your program.

- b. **plot_bar(L, title, x_label, y_label):** This function creates a plot of the total number of earthquakes per month in a single year. It receives the list of earthquakes in a year, a title string, the x-axis label string, and the y-axis label string. Hint: build the title string with the appropriate year before calling the function.
- c. **plot_line(L,title,x_label,y_label):** This function creates a plot a line of the total values across a range of years. This function is used to show the total number of earthquakes and the total damage costs for each year. It receives a list of total values within a range of years, a title string, the x-axis label string, and the y-axis label string.
- d. **plot_pie(L,title):** This function creates a plot of the total percentages of damage per type (i.e. deaths, missing, injured). It receives a list of lists, where each list contains the string with the damage type and the total count. It also receives a title string.

Deliverables

The deliverable for this assignment is the following file:

proj07.py – the source code for your Python program

Be sure to use the specified file name and to submit it for grading via Mimir before the project deadline.

(See Mimir for function tests details)

Test Case 1:

```
Enter filename: earth_data.csv
```

```
File is not found! Please Try Again!
```

```
Enter filename: earthquake_data_tiny.csv
```

```
Earthquake data software
```

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

```
Enter a command: abc
```

```
Option 'abc' is invalid! Please Try Again!
```

```
Earthquake data software
```

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years

4) Exit the program

Enter a command: 8

Option '8' is invalid! Please Try Again!

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 1

Enter a year: xxxx

Year input 'xxxx' is incorrect!

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 1

Enter a year: 2000

Year input '2000' is incorrect!

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 2

Enter year: year

Year input 'year' is incorrect!

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 2

Enter year: 1650

Year input '1650' is incorrect!

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 3

Enter start year: abc

Enter end year: 2019

Year range [abc,2019] is invalid!

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 3

Enter start year: 2019

Enter end year: 2019

Year range [2019,2019] is invalid!

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: n

Option 'n' is invalid! Please Try Again!

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 4

Thank you for using this program!

Test Case 2:

Enter filename: earthquake_data_small.csv

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 1

Enter a year: 2016

Earthquake damage costs in 2016						
Month	Location	Deaths	Missing	Injuries	Damage (Millions)	
JAN	MOROCCO: MELILLA	1	0	26	0.00	
JAN	INDIA: IMPAHL	13	0	100	75.00	
JAN	USA: ALASKA: KENAI	0	0	0	0.00	
FEB	TAIWAN: TAINAN	117	0	525	700.00	
MAR	INDONESIA: SUMATRA:	0	0	0	0.00	
APR	AFGHANISTAN: KHYBER PAKHTUNKHWA	6	0	5	0.00	
APR	INDIA: ASSAM; BANGLADESH	2	0	170	0.00	
APR	VANUATU ISLANDS	0	0	0	0.00	

MAY	CHINA: TIBET (XIZANG PROVINCE)	0	0	60	0.00
MAY	ALGERIA: MEDEA: MIHOUB	0	0	28	0.00
MAY	ECUADOR: MANABI PROVINCE	1	0	162	0.00
JUN	INDONESIA: MALUKU: TERNATE ISLAND	0	0	0	0.00
JUN	INDONESIA: SUMATRA: PESISIR SELATAN	1	0	30	0.00
JUL	CHINA: GUANGXI PROVINCE	0	0	0	0.00
JUL	TAJIKISTAN: RASHT	0	0	0	0.00
JUL	INDONESIA: SUMBAWA ISLAND: WEST NUSA T	0	0	4	0.00
JUL	NORTHERN MARIANA ISLANDS	0	0	0	0.00
AUG	PERU: AREQUIPA	9	0	68	0.00
AUG	JAPAN: OFF EAST COAST HONSHU	0	0	0	0.00
AUG	MYANMAR (BURMA): CHAUK	4	0	20	10.00
AUG	NEW CALEDONIA: LOYALTY ISLANDS	0	0	0	0.00
AUG	SOUTH SANDWICH ISLANDS	0	0	0	0.00
SEP	RWANDA: RISUZI; CONGO: UKAVU	8	0	0	0.00
SEP	BALKANS NW: MACEDONIA	0	0	30	10.00
SEP	SOUTH KOREA: GYEONGJU	1	0	14	21.00
SEP	NICARAGUA: LEON	1	0	5	0.00
SEP	TANZANIA: LAKE VICTORIA; UGANDA: RAKAI	23	0	252	458.00
SEP	NEW ZEALAND: GISBORNE	0	0	0	0.00
OCT	JAPAN: KURAYOSHI	0	0	7	100.00
OCT	ITALY: NORCIA	2	0	20	200.00
NOV	POLAND: RUDNA	8	0	9	0.00
NOV	USA: OKLAHOMA: CUSHING	0	0	0	20.00
NOV	CHINA: XINJIANG PROVINCE: KASHGAR	1	0	0	5.50
NOV	JAPAN: NEAR E COAST HONSHU	0	0	15	0.00
NOV	NICARAGUA	0	0	0	0.00
NOV	NEW ZEALAND: AMBERLEY	2	0	0	0.00
DEC	ECUADOR: ESMERALDAS	3	0	47	0.00
DEC	CHINA: N. XINJIANG: URUMQI	1	0	0	135.00
DEC	INDONESIA: SUMATRA: ACEH: PIDIE JAYA	104	0	857	100.00
DEC	SOLOMON ISLANDS	0	0	0	0.00
DEC	CHILE	0	0	0	0.00
DEC	SOLOMON ISLANDS	1	0	0	0.00
DEC	PAPUA NEW GUINEA: NEW BRITAIN NEW IRELA	0	0	0	0.00
Total		309	0	2,454	1,834.50

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 1

Enter a year: 2020

Earthquake damage costs in 2020					
Month	Location	Deaths	Missing	Injuries	Damage (Millions)
JAN	CHINA: XINJIANG PROVINCE	1	0	2	0.00
JAN	TURKEY: ELAZIG AND MALATYA PROVINCES	41	0	1,600	0.00
JAN	CUBA: GRANMA; CAYMAN IS; JAMAICA	0	0	0	0.00
FEB	TURKEY: VAN; IRAN	10	0	60	0.00
MAR	BALKANS NW: CROATIA: ZAGREB	1	0	27	6,000.00
MAR	USA: UTAH	0	0	0	48.50
MAR	RUSSIA: KURIL ISLANDS	0	0	0	0.00
APR	CHINA: QINGHAI PROVINCE	0	0	0	11.28
MAY	CHINA: YUNNAN PROVINCE: QIAOJIA	4	0	24	0.00
MAY	GREECE: CRETE	0	0	0	0.00
JUN	PERU: COAST: CHIMBOTE	1	0	0	0.00
JUN	TURKEY: VAN	0	0	5	0.00
JUN	TURKEY: BINGOL	1	0	17	0.00
JUN	INDONESIA: NORTH MALUKU: MOROTAI	0	0	0	0.00
JUN	MEXICO: OAXACA	10	0	0	0.00

JUL	VIETNAM: SON LA PROVINCE	0	0	0	0.00
JUL	USA: ALASKA	0	0	0	0.00
AUG	USA: NORTH CAROLINA: SPARTA	0	0	0	0.00
AUG	PHILIPPINES: MASBATE	1	0	48	0.00
Total		70	0	1,783	6,059.78

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 4

Thank you for using this program!

Test Case 3:

Enter filename: earthquake_data_small.csv

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 2

Enter year: 2018

Earthquake magnitudes and locations in 2018

Month	Magnitude	Location
JAN	3.40	THE NETHERLANDS: GRONINGEN
JAN	4.90	BALKANS NW: MONTENEGRO: BERANE
JAN	5.00	IRAN: KERMANSHAH
JAN	5.20	ECUADOR: PASTAZA
JAN	5.50	IRAN: KERMANSHAH
JAN	6.00	INDONESIA: JAVA: BANTEN
JAN	6.10	AFGHANISTAN; PAKISTAN: BALUCHISTAN
JAN	7.10	PERU: YAUCA
JAN	7.50	HONDURAS
JAN	7.90	USA: ALASKA: KODIAK ISLAND
FEB	6.10	PAPUA NEW GUINEA: S HIGHLANDS
FEB	6.40	TAIWAN: HUALIEN
FEB	7.20	MEXICO: OAXACA
MAR	6.00	PAPUA NEW GUINEA: S HIGHLANDS
APR	4.40	INDONESIA: JAVA: BANJARNEGARA
APR	4.70	ITALY: MUCCIA
APR	4.90	VENEZUELA: MERIDA
APR	5.20	TURKEY: ADIYAMAN
APR	5.30	IRAN: KERMANSHAH
APR	5.60	JAPAN: SHIMANE PREFECTURE
APR	6.30	PAPUA NEW GUINEA: HELA
MAY	2.10	SOUTH AFRICA: WEST RAND
MAY	4.10	POLAND: SILESIA: JASTRZEBIE-ZDROJ
MAY	5.10	CHINA: JILIN PROVINCE: NINGJIANG
MAY	5.30	IRAN: KOHGILUYEH AND BOYER-AHMAD: SISAKHT
MAY	5.80	COMOROS: MAYOTTE
MAY	6.20	AFGHANISTAN: TAKHAR; PAKISTAN
MAY	6.90	USA: HAWAIIAN ISLANDS: PUNA DISTRICT
JUN	4.90	COLOMBIA: PASTO
JUN	5.30	AZERBAIJAN: SHAKI-ZAQATALA

JUN	5.50	JAPAN: OSAKA
JUL	5.20	INDONESIA: SUMATRA: SOLOK
JUL	5.90	IRAN: KERMANSHAH
JUL	6.40	INDONESIA: LOMBOK ISLAND
AUG	5.00	CHINA: YUNNAN PROVINCE: YUXI
AUG	5.90	INDONESIA: LOMBOK ISLAND
AUG	6.00	IRAN: KERMANSHAH
AUG	6.30	INDONESIA: LOMBOK ISLAND
AUG	6.90	INDONESIA: LOMBOK ISLAND
AUG	6.90	INDONESIA: LOMBOK ISLAND
AUG	7.10	NEW CALEDONIA: LOYALTY ISLANDS
AUG	7.30	VENEZUELA: SUCRE; TRINIDAD
AUG	8.20	FIJI ISLANDS
SEP	5.30	INDIA: WEST BENGAL
SEP	5.50	IRAN: KERMAN
SEP	5.60	CHINA: YUNNAN PROVINCE: MOJIANG HANI
SEP	6.60	JAPAN: HOKKAIDO
SEP	7.50	INDONESIA: SULAWESI
SEP	7.80	FIJI ISLANDS
OCT	5.90	HAITI: PORT-DEX-PAIX
OCT	6.50	NEW CALEDONIA: LOYALTY ISLANDS
NOV	4.90	AFGHANISTAN: HINDU KUSH: BAGHLAN
NOV	5.60	INDONESIA: SULAWESI: MAMASA
NOV	6.30	IRAN: KERMANSHAH; IRAQ: KURDISTAN
NOV	7.00	USA: ALASKA: ANCHORAGE
DEC	5.10	ITALY: SICILY: CATANIA
DEC	5.40	CHINA: SICHUAN: YIBIN
DEC	5.50	MOZAMBIQUE
DEC	5.60	VANUATU ISLANDS: AMBRYM ISLAND
DEC	7.50	NEW CALEDONIA: LOYALTY ISLANDS

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 2

Enter year: 2015

Earthquake magnitudes and locations in 2015		
Month	Magnitude	Location
JAN	5.30	CHINA: SICHUAN PROVINCE: LESHAN
FEB	3.60	BALKANS NW: BOSNIA-HERZEGOVINA:
FEB	4.50	CHINA: YUNNAN PROVINCE
FEB	4.50	PERU: AREQUIPA: CAYLLOMA: CABANACONDE
FEB	5.10	CHINA: XINJIANG PROVINCE: SHAWAN
FEB	5.40	PAKISTAN: BATTAGRAM
FEB	6.40	VANUATU ISLANDS
FEB	6.70	JAPAN: HONSHU
MAR	4.40	BALKANS NW: SERBIA: KOSJERIC
MAR	4.60	CHINA: ANHUI PROVINCE: FUYANG
MAR	7.50	PAPUA NEW GUINEA
APR	6.40	TAIWAN: TAIPEI
APR	7.80	NEPAL: KATHMANDU; INDIA; CHINA; BANGLADESH
MAY	5.70	JAPAN: HONSHU: S. OF
MAY	7.30	NEPAL: DOLAKHA
MAY	7.50	PAPUA NEW GUINEA
MAY	7.80	JAPAN: BONIN ISLANDS [CHICHIJIMA ISLAND]
JUN	5.30	INDIA: KOKRAJHAR
JUL	5.10	PAKISTAN: ABBOTTABAD
JUL	5.90	COLOMBIA-PANAMA: COLOMBIA: UNGUIA
JUL	6.10	PHILIPPINES: MINDANAO
JUL	6.40	CHINA: S. XINJIANG: HOTAN
JUL	6.70	SOLOMON ISLANDS

```

JUL    6.90    USA: ALASKA
JUL    7.00    INDONESIA: PAPUA
JUL    7.00    SOLOMON ISLANDS
AUG    4.50    EL SALVADOR: ALEGRIA
AUG    5.80    RWANDA: BUKAVU
SEP    6.60    INDONESIA: SORONG
SEP    8.30    CHILE: CENTRAL
OCT    5.80    ARGENTINA: GALPON
OCT    7.50    AFGHANISTAN: HINDU KUSH
NOV    5.10    VENEZUELA: MERIDA
NOV    5.30    VENEZUELA: MERIDA
NOV    5.60    KYRGYZSTAN: OSH
NOV    6.50    INDONESIA: EAST NUSA TENGGARA: ALOR
NOV    6.70    JAPAN: KYUSYU ISLAND
NOV    6.80    SOLOMON ISLANDS
NOV    6.90    CHILE: LA SERENA
NOV    7.60    PERU-BRAZIL
NOV    7.60    PERU-BRAZIL
DEC    6.30    AFGHANISTAN; PAKISTAN
DEC    6.60    MEXICO: COCOTITLAN
DEC    7.20    TAJIKISTAN

```

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 4

Thank you for using this program!

Test Case 4:

Enter filename: earthquake_data.csv

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 3

Enter start year: 1940

Enter end year: 1950

Number of earthquakes and costs per year

Year	Quakes	Cost
1940	13	43.00
1941	17	0.00
1942	12	2.50
1943	21	0.00
1944	14	102.00
1945	6	25.00
1946	17	0.00
1947	15	0.00
1948	18	1,028.50
1949	19	32.50
1950	22	20.00
Total	174	1,253.50

```

Total Casualties
Casualties      Total      Percent
Deaths          162483      85.63%
Missing          0          0.00%
Injured          27259      14.37%

```

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 3

Enter start year: 2010

Enter end year: 2020

Number of earthquakes and costs per year

Year	Quakes	Cost
2010	62	47,173.30
2011	60	23,938.11
2012	49	16,883.30
2013	53	2,140.43
2014	55	1,505.16
2015	48	10,737.65
2016	52	30,134.50
2017	64	13,524.50
2018	65	11,571.25
2019	60	7,796.64
2020	24	6,059.78

Total 592 171,464.62

```

Total Casualties
Casualties      Total      Percent
Deaths          341073      64.73%
Missing          1343       0.25%
Injured          184491      35.01%

```

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 4

Thank you for using this program!

Test Case 5:

Enter filename: earthquake_data.csv

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 1

Enter a year: 1918

Earthquake damage costs in 1918					
Month	Location	Deaths	Missing	Injuries	Damage (Millions)
JAN	RUSSIA: E COAST OF	0	0	0	0.00
FEB	CHINA: GUANGDONG PROVINCE	2,000	0	0	0.00
FEB	PHILIPPINES: MINDANAO	0	0	0	0.00
APR	USA: CALIFORNIA	0	0	0	0.20
MAY	CHILE: NORTHERN	0	0	0	0.00
JUL	PAPUA NEW GUINEA: N COAST	0	0	0	0.00
JUL	BANGLADESH: SRIMANGAL	0	0	0	0.00
AUG	CHINA: YUNNAN PROVINCE	0	0	0	0.00
AUG	PHILIPPINES: MINDANAO: COTABATO	46	0	0	0.00
SEP	RUSSIA: KURIL ISLANDS	0	0	0	0.00
OCT	PUERTO RICO: MONA PASSAGE	0	0	0	4.00
NOV	RUSSIA: KURIL ISLANDS	0	0	0	0.00
NOV	INDONESIA: BANDA SEA	0	0	0	0.00
DEC	CHILE: COPIAPO	0	0	0	0.00
Total		2,046	0	0	4.20

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 2

Enter year: 1944

Earthquake magnitudes and locations in 1944		
Month	Magnitude	Location
JAN	7.80	ARGENTINA: SAN JUAN PROVINCE
FEB	7.40	TURKEY
MAR	7.20	CHINA: XINJIANG PROVINCE
MAR	7.50	INDONESIA: FLORES
APR	4.80	IRAN: GORGAN
MAY	7.50	PAPUA NEW GUINEA: NEW IRELAND
JUN	6.00	TURKEY: USAK
JUL	5.70	GREECE: KAMPOS (LACONIA)
SEP	5.60	USA: NEW YORK: MASSENA
SEP	7.00	CHINA: XINJIANG
OCT	6.80	TURKEY: AYVALIK
OCT	7.50	NEW CALEDONIA: LOYALTY ISLANDS
NOV	7.50	VANUATU ISLANDS
DEC	8.10	JAPAN: OFF SOUTHEAST COAST KII PENINSULA

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 1

Enter a year: 2000

Earthquake damage costs in 2000					
Month	Location	Deaths	Missing	Injuries	Damage (Millions)

JAN	INDIA-BANGLADESH BORDER: MAHESHKHALI	0	0	0	0.00
JAN	CHINA: LIAONING PROVINCE	0	0	30	0.00
JAN	CHINA: YUNNAN PROVINCE: YAOAN COUNTY	5	0	2,528	73.50
FEB	SOUTH AFRICA; SWAZILAND: MBABANE-MANZIN	0	0	1	0.00
FEB	IRAN: BARDASKAN	1	0	15	0.00
MAR	JAPAN: VOLCANO ISLANDS	0	0	0	0.00
APR	GREECE: CRETE	0	0	0	0.00
MAY	TURKEY: DOGANYOL	0	0	0	0.00
MAY	TAIWAN: TAI-CHUNG COUNTY	3	0	13	0.00
JUN	TURKEY: CERKES	2	0	80	0.00
JUN	CHINA: YUNNAN PROVINCE: LIUKU; MYANMAR	0	0	0	0.00
JUN	TAIWAN: NAN-TOU	2	0	36	0.00
JUN	ICELAND: GRIMSNES	0	0	0	12.00
JUN	ICELAND: VESTMANNAEYJAR	0	0	1	20.00
JUN	INDONESIA: SOUTHERN SUMATERA: LAHAT	1	0	0	0.00
JUN	AUSTRALIA: S	0	0	0	0.00
JUN	INDONESIA: SUMATRA: BENGKULU	103	0	2,174	6.00
JUL	INDONESIA: JAWA: BANDUNG	0	0	6	0.00
JUL	NICARAGUA: MASAYA	7	0	42	0.00
JUL	JAPAN: NEAR S COAST HONSHU: KOZU-SHIMA	1	0	0	0.00
JUL	JAPAN: NEAR S COAST HONSHU: NII-JIMA	0	0	10	0.00
JUL	PHILIPPINES: BASCO	0	0	6	0.00
JUL	JAPAN: HONSHU: S	0	0	1	0.00
AUG	CHINA: YUNNAN PROVINCE: WUDING	1	0	406	43.00
AUG	RUSSIA: SAKHALIN ISLAND	0	0	8	0.92
SEP	USA: CALIFORNIA: NAPA	0	0	41	50.00
OCT	AFGHANISTAN-TAJIKISTAN: RAKHOR	0	0	0	0.00
OCT	TANZANIA: NKANSI	0	0	6	0.00
OCT	JAPAN: HONSHU: W: OKAYAMA	0	0	130	150.00
NOV	PANAMA-COLOMBIA: JURADO	0	0	2	0.00
NOV	AZERBAIJAN: BAKU	31	0	430	0.00
NOV	PAPUA NEW GUINEA: NEW BRITAIN	0	0	0	0.00
NOV	PAPUA NEW GUINEA: NEW IRELAND	0	0	0	0.00
NOV	PAPUA NEW GUINEA: NEW IRELAND	2	0	0	0.00
DEC	TURKEY: AFYON-BOLVADIN	6	0	41	0.00
DEC	TURKMENISTAN: NEBITDAG-TURKMENBASHI	11	0	0	0.00
Total		176	0	6,007	355.42

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 2

Enter year: 2020

Earthquake magnitudes and locations in 2020		
Month	Magnitude	Location
JAN	6.00	CHINA: XINJIANG PROVINCE
JAN	6.40	PUERTO RICO: PONCE
JAN	6.70	TURKEY: ELAZIG AND MALATYA PROVINCES
JAN	7.70	CUBA: GRANMA; CAYMAN IS; JAMAICA
FEB	6.00	TURKEY: VAN; IRAN
MAR	5.00	INDONESIA: JAVA: SUKABUMI
MAR	5.40	BALKANS NW: CROATIA: ZAGREB
MAR	5.70	USA: UTAH
MAR	7.50	RUSSIA: KURIL ISLANDS
APR	5.30	CHINA: QINGHAI PROVINCE
MAY	4.60	IRAN: TEHRAN
MAY	5.20	CHINA: YUNNAN PROVINCE: QIAOJIA
MAY	6.60	GREECE: CRETE
JUN	4.50	PERU: COAST: CHIMBOTE
JUN	5.40	TURKEY: VAN

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JUN    5.90    TURKEY: BINGOL
JUN    6.40    INDONESIA: NORTH MALUKU: MOROTAI
JUN    7.40    KERMADEC ISLANDS: S OF
JUN    7.40    MEXICO: OAXACA
JUL    4.80    VIETNAM: SON LA PROVINCE
JUL    7.00    PAPUA NEW GUINEA: MOROBE
JUL    7.80    USA: ALASKA
AUG    5.10    USA: NORTH CAROLINA: SPARTA
AUG    6.60    PHILIPPINES: MASBATE

```

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 3

Enter start year: 2019

Enter end year: 2020

Number of earthquakes and costs per year

Year	Quakes	Cost
2019	60	7,796.64
2020	24	6,059.78

Total	84	13,856.42
-------	----	-----------

Total Casualties

Casualties	Total	Percent
Deaths	331	4.14%
Missing	4	0.05%
Injured	7655	95.81%

Do you want to plot (y/n)? n

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 4

Thank you for using this program!

Test 6: Plotting

Enter filename: earthquake_data.csv

Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

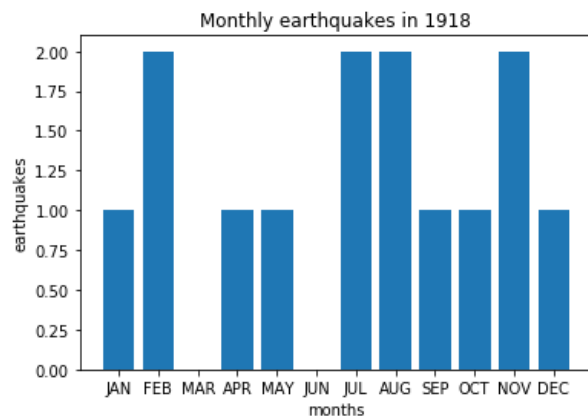
Enter a command: 1

Enter a year: 1918

Earthquake damage costs in 1918

Month	Location	Deaths	Missing	Injuries	Damage (Millions)
JAN	RUSSIA: E COAST OF	0	0	0	0.00
FEB	CHINA: GUANGDONG PROVINCE	2,000	0	0	0.00
FEB	PHILIPPINES: MINDANAO	0	0	0	0.00
APR	USA: CALIFORNIA	0	0	0	0.20
MAY	CHILE: NORTHERN	0	0	0	0.00
JUL	PAPUA NEW GUINEA: N COAST	0	0	0	0.00
JUL	BANGLADESH: SRIMANGAL	0	0	0	0.00
AUG	CHINA: YUNNAN PROVINCE	0	0	0	0.00
AUG	PHILIPPINES: MINDANAO: COTABATO	46	0	0	0.00
SEP	RUSSIA: KURIL ISLANDS	0	0	0	0.00
OCT	PUERTO RICO: MONA PASSAGE	0	0	0	4.00
NOV	RUSSIA: KURIL ISLANDS	0	0	0	0.00
NOV	INDONESIA: BANDA SEA	0	0	0	0.00
DEC	CHILE: COPIAPO	0	0	0	0.00
Total		2,046	0	0	4.20

Do you want to plot (y/n)? y



Earthquake data software

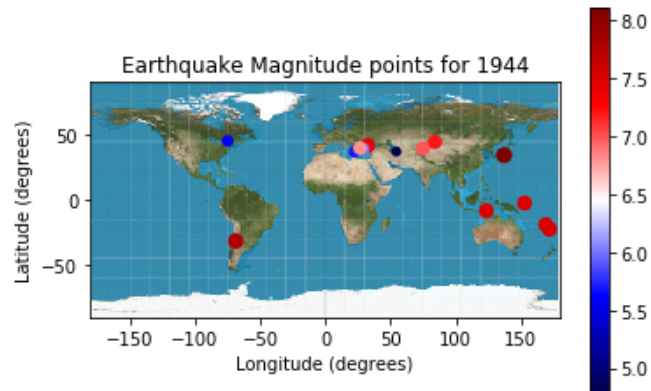
- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 2

Enter year: 1944

Earthquake magnitudes and locations in 1944		
Month	Magnitude	Location
JAN	7.80	ARGENTINA: SAN JUAN PROVINCE
FEB	7.40	TURKEY
MAR	7.20	CHINA: XINJIANG PROVINCE
MAR	7.50	INDONESIA: FLORES
APR	4.80	IRAN: GORGAN
MAY	7.50	PAPUA NEW GUINEA: NEW IRELAND
JUN	6.00	TURKEY: USAK
JUL	5.70	GREECE: KAMPOS (LACONIA)
SEP	5.60	USA: NEW YORK: MASSENA
SEP	7.00	CHINA: XINJIANG
OCT	6.80	TURKEY: AYVALIK
OCT	7.50	NEW CALEDONIA: LOYALTY ISLANDS
NOV	7.50	VANUATU ISLANDS
DEC	8.10	JAPAN: OFF SOUTHEAST COAST KII PENINSULA

Do you want to plot (y/n)? y



Earthquake data software

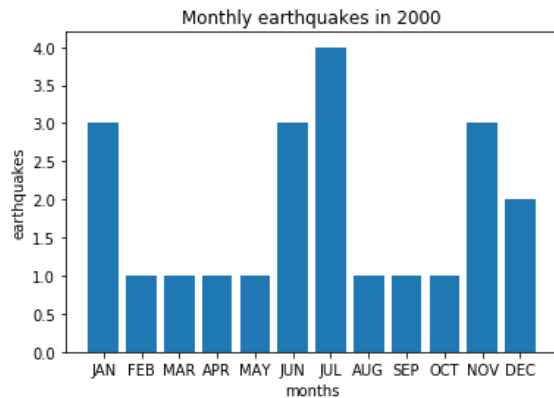
- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 1

Enter a year: 2000

Earthquake damage costs in 2000					
Month	Location	Deaths	Missing	Injuries	Damage (Millions)
JAN	INDIA-BANGLADESH BORDER: MAHESHKHALI	0	0	0	0.00
JAN	CHINA: LIAONING PROVINCE	0	0	30	0.00
JAN	CHINA: YUNNAN PROVINCE: YAOAN COUNTY	5	0	2,528	73.50
FEB	SOUTH AFRICA; SWAZILAND: MBABANE-MANZIN	0	0	1	0.00
FEB	IRAN: BARDASKAN	1	0	15	0.00
MAR	JAPAN: VOLCANO ISLANDS	0	0	0	0.00
APR	GREECE: CRETE	0	0	0	0.00
MAY	TURKEY: DOGANYOL	0	0	0	0.00
MAY	TAIWAN: TAI-CHUNG COUNTY	3	0	13	0.00
JUN	TURKEY: CERKES	2	0	80	0.00
JUN	CHINA: YUNNAN PROVINCE: LIUKU; MYANMAR	0	0	0	0.00
JUN	TAIWAN: NAN-TOU	2	0	36	0.00
JUN	ICELAND: GRIMSNES	0	0	0	12.00
JUN	ICELAND: VESTMANNAEYJAR	0	0	1	20.00
JUN	INDONESIA: SOUTHERN SUMATERA: LAHAT	1	0	0	0.00
JUN	AUSTRALIA: S	0	0	0	0.00
JUN	INDONESIA: SUMATRA: BENGKULU	103	0	2,174	6.00
JUL	INDONESIA: JAWA: BANDUNG	0	0	6	0.00
JUL	NICARAGUA: MASAYA	7	0	42	0.00
JUL	JAPAN: NEAR S COAST HONSHU: KOZU-SHIMA	1	0	0	0.00
JUL	JAPAN: NEAR S COAST HONSHU: NII-JIMA	0	0	10	0.00
JUL	PHILIPPINES: BASCO	0	0	6	0.00
JUL	JAPAN: HONSHU: S	0	0	1	0.00
AUG	CHINA: YUNNAN PROVINCE: WUDING	1	0	406	43.00
AUG	RUSSIA: SAKHALIN ISLAND	0	0	8	0.92
SEP	USA: CALIFORNIA: NAPA	0	0	41	50.00
OCT	AFGHANISTAN-TAJIKISTAN: RAKHOR	0	0	0	0.00
OCT	TANZANIA: NKANSI	0	0	6	0.00
OCT	JAPAN: HONSHU: W: OKAYAMA	0	0	130	150.00
NOV	PANAMA-COLOMBIA: JURADO	0	0	2	0.00
NOV	AZERBAIJAN: BAKU	31	0	430	0.00
NOV	PAPUA NEW GUINEA: NEW BRITAIN	0	0	0	0.00
NOV	PAPUA NEW GUINEA: NEW IRELAND	0	0	0	0.00
NOV	PAPUA NEW GUINEA: NEW IRELAND	2	0	0	0.00
DEC	TURKEY: AFYON-BOLVADIN	6	0	41	0.00
DEC	TURKMENISTAN: NEBITDAG-TURKMENBASHI	11	0	0	0.00
Total		176	0	6,007	355.42

Do you want to plot (y/n)? y

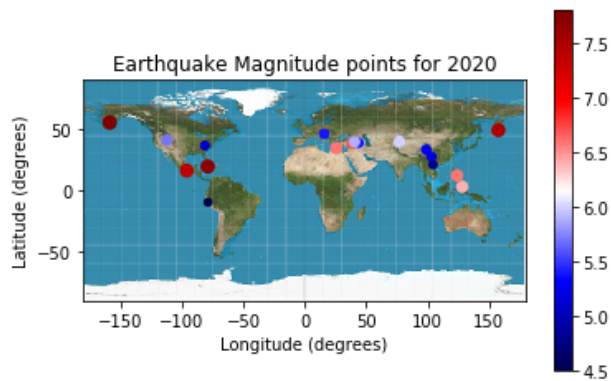


Enter year: 2020

Earthquake magnitudes and locations in 2020

Month	Magnitude	Location
JAN	6.00	CHINA: XINJIANG PROVINCE
JAN	6.40	PUERTO RICO: PONCE
JAN	6.70	TURKEY: ELAZIG AND MALATYA PROVINCES
JAN	7.70	CUBA: GRANMA; CAYMAN IS; JAMAICA
FEB	6.00	TURKEY: VAN; IRAN
MAR	5.00	INDONESIA: JAVA: SUKABUMI
MAR	5.40	BALKANS NW: CROATIA: ZAGREB
MAR	5.70	USA: UTAH
MAR	7.50	RUSSIA: KURIL ISLANDS
APR	5.30	CHINA: QINGHAI PROVINCE
MAY	4.60	IRAN: TEHRAN
MAY	5.20	CHINA: YUNNAN PROVINCE: QIAOJIA
MAY	6.60	GREECE: CRETE
JUN	4.50	PERU: COAST: CHIMBOTE
JUN	5.40	TURKEY: VAN
JUN	5.90	TURKEY: BINGOL
JUN	6.40	INDONESIA: NORTH MALUKU: MOROTAI
JUN	7.40	KERMADEC ISLANDS: S OF
JUN	7.40	MEXICO: OAXACA
JUL	4.80	VIETNAM: SON LA PROVINCE
JUL	7.00	PAPUA NEW GUINEA: MOROBE
JUL	7.80	USA: ALASKA
AUG	5.10	USA: NORTH CAROLINA: SPARTA
AUG	6.60	PHILIPPINES: MASBATE

Do you want to plot (y/n)? y



Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 3

Enter start year: 2019

Enter end year: 2020

Number of earthquakes and costs per year

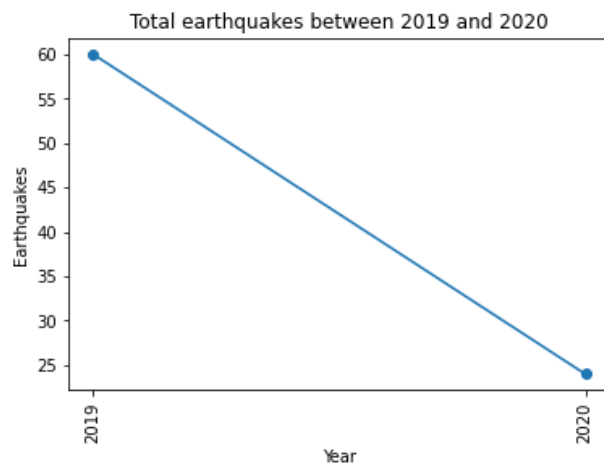
Year	Quakes	Cost
2019	60	7,796.64
2020	24	6,059.78

Total 84 13,856.42

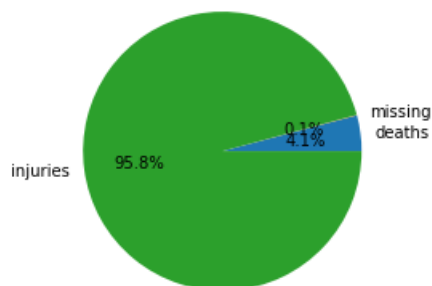
Total Casualties

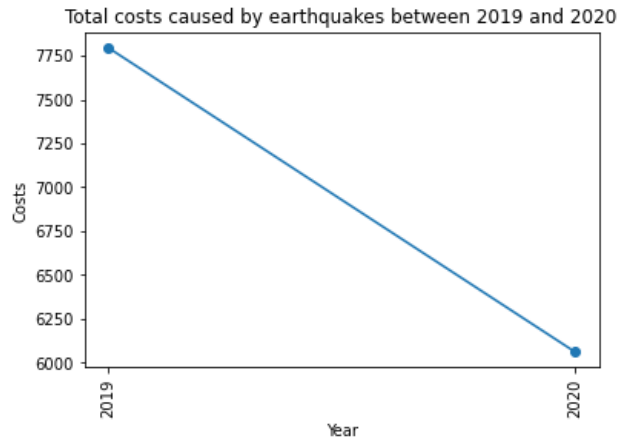
Casualties	Total	Percent
Deaths	331	4.14%
Missing	4	0.05%
Injured	7655	95.81%

Do you want to plot (y/n)? y



Total casualties by earthquakes between 2019 and 2020





Earthquake data software

- 1) Visualize damage data for a single year
- 2) Visualize earthquakes magnitudes for a single year
- 3) Visualize number of earthquake and their damages within a range of years
- 4) Exit the program

Enter a command: 4

Thank you for using this program!

Grading Rubrics

Computer Project #07

Scoring Summary

General Requirements:

(5 pts) Coding Standard 1-9 (descriptive comments, function headers, etc...)

Implementation:

(2 pts) open_file (No Mimir Test)

-1 point No try/except

-1 point No while loop

(4 pts) read_file function test

(3 pts) get_damage_data function test

(3 pts) get_quake_data function test

(5 pts) summary_statistics function test

(5 pts) Pass Test1

(4 pts) Pass Test2

(4 pts) Pass Test3

(4 pts) Pass Test4

(4 pts) Pass Test5

(2 pts) Pass Plotting Test

Note: hard coding an answer earns zero points for the whole project
-10 points for not using main()