

Problem Statement

Problem outline

Write a program the analyzes the NASA Meteorite Landings dataset available at <https://data.nasa.gov/widgets/gh4g-9sfh>. The program runs from the Terminal/CLI. The program will have two primary capabilities. The first is to display all meteorites discovered in a given year. The second is to display the meteorite geographically closest to a provided latitude and longitude.

The program must run from the CLI as `python meteoric.py <command> <argument>`. See the input format and sample inputs for examples of running the program.

Input format

The program must understand the following commands:

- `year <integer>`: Print out the meteorite name, latitude, and longitude for all meteorites discovered in the `<integer>` year. It is possible that no meteorites were discovered in a given year. Example usage: `python meteoric.py year 1999`
- `geopoint <latitude,longitude>`: Print out the meteorite name, latitude, and longitude for the meteorite with the closest [great-circle distance](#) to the coordinates. Latitude is a float in the range `[-90.0, 90.0]`. Longitude is a float in the range `[-180.0, 180.0]`. Example usage: `python meteoric.py geopoint 34.2257,-77.9447`

The data in `meteorite_landings.csv` looks like this:

```
name,id,year,reclat,reclong
Aachen,1,1880,50.775,6.08333
Aarhus,2,1951,56.18333,10.23333
Abee,6,1952,54.21667,-113
Acapulco,10,1976,16.88333,-99.9
...
```

Field	Description
name	A name for the specific meteorite.
id	A unique integer identifier for the meteorite.
year	The year the meteorite was found or observed. Years are positive 4-digit integers.
reclat	The latitude at which the meteorite was found. Latitudes are floats in the range <code>[-90.0,90.0]</code> .
reclong	The longitude at which the meteorite was found. Longitudes are floats in the range <code>[-180.0,180.0]</code> .

Important: a `load_data()` function is provided in `meteoric.py` that loads the data from `meteorite_landings.csv` into a list of lists. You do not need to validate the data in the CSV file, however, some fields may be blank if the information is missing.

Output format

- Print meteorite data to the console in a human-friendly format.
- When searching for all meteorites that were discovered in a given year the program will either: (a) display a list of meteorites discovered, or (b) display a message stating no meteorites were found for the given year.
- When searching for the closest meteorite landing from a specific location, the program will display the name (or names if two or more meteorites have an equal distance from the specified location) of the meteorite closest to the location given by the user.
- If the user fails to provide a valid command or valid arguments, the console displays an error message indicating what the user did incorrectly.

Exceptional conditions

Do not assume the `<command>` or `<argument>` are present or valid. The program must print an error message, not an exception or stack trace, if given bad arguments.

- user can put in an invalid command keyword
- user does not give an argument
- user gives an invalid data type with the year keyword
- user enters a year with no meteorite
- user inputs latitude and longitude incorrectly
- user enters multiple arguments
- user gives an out of range latitude or longitude

Sample input

1. `python meteoric.py test`: invalid command
2. `python meteoric.py year`: missing argument
3. `python meteoric.py geoint`: missing argument
4. `python meteoric.py year s`: invalid argument
5. `python meteoric.py geoint abcdef`: invalid argument
6. `python meteoric.py year 1999 2001 asd`: invalid arguments
7. `python meteoric.py geoint 120.884,300.475`: invalid latitude and longitude
8. `python meteoric.py geoint 32.558,78.854`: valid search by geoint
9. `python meteoric.py year 1818`: valid search by year
10. `python meteoric.py year 55`: valid search by year, no meteorites match that year

Sample output

You may change these to be more precise if you like, but not less precise.

1. Invalid command and argument. Correct format is `python meteoric.py <command> <argument>`.
2. Invalid command and argument. Correct format is `python meteoric.py <command> <argument>`.
3. Invalid command and argument. Correct format is `python meteoric.py <command> <argument>`.

4. Invalid argument. year argument must be an integer.
5. Invalid argument. geopoint argument must be latitude,longitude.
6. Invalid command and argument. Correct format is python meteoric.py <command> <argument>.
7. Invalid argument. geopoint latitude or longitude out of range.

8. Meteorite(s) discovered closest to 32.4, 103.92:
Guangyuan, latitude: 32.4, longitude: 105.9

9. Meteorite(s) discovered in 1818:
Seres, latitude: 41.05, longitude: 23.56667
Slobodka, latitude: 55, longitude: 35
Zaborzika, latitude: 50.28333, longitude: 27.68333
Cambria, latitude: 43.2, longitude: -78.8
Cape York, latitude: 76.13333, longitude: -64.93333

10. No meteorites found for the year 55.