Day5_Homework_Answer

September 6, 2022

0.1 5. Homework: Slicing and Dicing

1. load in `'GBM_sensitivity.csv'`, located under `loaddir` and save it as a numpy array. This dataset contains the sensitivity of a satellite to the brightness of faraway stars exploding as a function of the distance to those explosions
2. print last 10 items (slice the array)
3. This dataset just has the sensitivities, but these sensitivites are a function of distance to the explosion. Pretend you know that each sensitivity measurement was taken at evenly spaced intervals between 50 Mpc and 47800 Mpc (Megaparcecs are confusing measurements of distance that astrophysicists use a lot - you dont need to know what a Mpc is to do this problem). Make a 1d numpy array called `distances` that is the same length as your dataset and contains evenly spaced numbers between 50 and 47800.
4. print the elements of the your dataset with distances between `1e4` and `1e5` using Boolean indexing
5. find the mean distance of points with sensitivity greater than `5e50` with Boolean indexing and `np.mean()`

Remember - if you can't think of the numpy function for something, just google it!

[1]:
```
import numpy as np

# 1. load in 'GBM_sensitivity.csv', located under loaddir and save it as a␣
 ↪numpy array
loaddir = '../data/' #Make sure the paths end in '/'
sens_curve  = np.loadtxt(loaddir+'GBM_sensitivity.csv',delimiter=',')
print(sens_curve)

# 2. print last 10 items
#'\n will create a new blank line- so I am adding this to separate the output␣
 ↪from the print commands'
print('last 10 elements: \n')
print(sens_curve[-10:])
print ('\n')

# 3. create distances
distances = np.linspace(50,47800,num=len(sens_curve))
print('distances: ',distances)
print('\n')
```

```
# 4. print the elements of the your dataset with distances between 1e4 and 1e5␣
 ↪using Boolean indexing
print('distance between 1e4 and 1e5: ')
print(sens_curve[np.logical_and(distances>1e4,distances<1e5)])
print ('\n')

#5. find the mean distance of points with sensitivity greater than 5e50 with␣
 ↪Boolean indexing and np.mean()
print('mean distance of points with sensitivity greater than 5e50: ')
print(np.mean(distances[sens_curve>5e50],axis=0), " Mpc")
```

```
[1.08322750e+47 1.65510738e+47 2.52912654e+47 3.60148034e+47
 4.94981922e+47 7.83606507e+47 9.68699713e+47 1.37930964e+48
 1.89586736e+48 2.34358194e+48 3.33711894e+48 5.09980959e+48
 7.13496370e+48 1.14977017e+49 1.75724049e+49 2.68566207e+49
 3.82488771e+49 5.64327714e+49 8.62635494e+49 1.27285198e+50
 1.74999880e+50 2.49297971e+50 3.81145212e+50 5.62541694e+50
 8.60430685e+50 1.22605669e+51 1.74750684e+51 2.32038851e+51
 3.30784246e+51 4.09292510e+51 5.43517471e+51 6.49224669e+51
 8.03451699e+51 9.94402994e+51 1.23062911e+52 1.47074042e+52
 1.75693390e+52 2.02595339e+52 2.42018656e+52 2.79198013e+52
 3.21948460e+52 3.71406782e+52 3.99055341e+52 4.76832877e+52
 5.30802238e+52 5.70316641e+52 6.57700183e+52 6.82425654e+52]
last 10 elements:

[2.42018656e+52 2.79198013e+52 3.21948460e+52 3.71406782e+52
 3.99055341e+52 4.76832877e+52 5.30802238e+52 5.70316641e+52
 6.57700183e+52 6.82425654e+52]


distances:  [   50.          1065.95744681  2081.91489362  3097.87234043
  4113.82978723  5129.78723404  6145.74468085  7161.70212766
  8177.65957447  9193.61702128 10209.57446809 11225.53191489
 12241.4893617  13257.44680851 14273.40425532 15289.36170213
 16305.31914894 17321.27659574 18337.23404255 19353.19148936
 20369.14893617 21385.10638298 22401.06382979 23417.0212766
 24432.9787234  25448.93617021 26464.89361702 27480.85106383
 28496.80851064 29512.76595745 30528.72340426 31544.68085106
 32560.63829787 33576.59574468 34592.55319149 35608.5106383
 36624.46808511 37640.42553191 38656.38297872 39672.34042553
 40688.29787234 41704.25531915 42720.21276596 43736.17021277
 44752.12765957 45768.08510638 46784.04255319 47800.        ]


distance between 1e4 and 1e5:
[3.33711894e+48 5.09980959e+48 7.13496370e+48 1.14977017e+49
 1.75724049e+49 2.68566207e+49 3.82488771e+49 5.64327714e+49
```

```
 8.62635494e+49 1.27285198e+50 1.74999880e+50 2.49297971e+50
 3.81145212e+50 5.62541694e+50 8.60430685e+50 1.22605669e+51
 1.74750684e+51 2.32038851e+51 3.30784246e+51 4.09292510e+51
 5.43517471e+51 6.49224669e+51 8.03451699e+51 9.94402994e+51
 1.23062911e+52 1.47074042e+52 1.75693390e+52 2.02595339e+52
 2.42018656e+52 2.79198013e+52 3.21948460e+52 3.71406782e+52
 3.99055341e+52 4.76832877e+52 5.30802238e+52 5.70316641e+52
 6.57700183e+52 6.82425654e+52]


mean distance of points with sensitivity greater than 5e50:
35608.51063829787  Mpc
```

[ ]: