es21btech11025-assign8

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EP4130: Data Science Analysis

Assignment: 8

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[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from astroML.correlation import bootstrap_two_point_angular
```

Question 1

Calculate the angular two-point correlation function of galaxies (including errors obtained by 10 bootstrap resamples) using subset of data from the Blanco Cosmology Survey with r-band magnitude between 17 and 20, and using 16 logarithmic-spaced angular bins from $1/60^\circ$ to 1° . Use a linear scale for Y-axis. Galaxies in Blanco Cosmology Survey have spread model$>$ 0.002. This data can be downloaded from http://www.iith.ac.in/~shantanud/BCS05hr_reduced.txt (30 points)(Hint : Look at the astroML source code for Figure 6.17)

[2]:
```
#Data read
file_data = pd.read_csv("q1.csv" , sep = ' ')
file_data
```

[2]:

	#RA	DEC	r-mag	spread_model	spread_model_err
0	76.709724	-56.091484	22.2622	0.113884	0.002812
1	77.430664	-56.090149	23.8355	0.186889	0.003559
2	76.937309	-56.092442	17.7021	0.000614	0.000120
3	77.344833	-56.089947	23.7293	0.117396	0.000751
4	77.416412	-56.089119	23.4456	0.192760	0.004764
…	…	…	…	…	…
49995	77.138313	-53.850994	16.4224	0.000928	0.004025
49996	76.861160	-53.846672	22.1385	0.076647	0.018807
49997	76.892189	-53.855347	20.5829	0.013071	-0.001716
49998	77.500732	-53.853760	20.7490	0.017413	-0.000761
49999	77.139778	-53.854607	21.6471	0.038710	0.059438

```
[50000 rows x 5 columns]
```

[3]:
```
#Filter applied
condition1 = file_data['spread_model']>0.002
condition2 = (file_data['r-mag'] > 17) & (file_data['r-mag'] < 20)

blanco = file_data[condition1 & condition2]
blanco
```

[3]:

	#RA	DEC	r-mag	spread_model	spread_model_err
16	77.039696	-56.084904	19.9448	0.008856	0.000064
38	77.119270	-56.108150	19.6127	0.006623	-0.000183
43	76.676086	-56.106075	18.8138	0.002451	0.000430
151	77.118393	-56.084389	19.7339	0.009028	0.020733
153	76.823029	-56.082844	19.8468	1.937630	0.019814
…	…	…	…	…	…
49924	77.387482	-53.855377	19.8971	0.010697	-0.000017
49935	76.962509	-53.848270	19.8635	0.003855	-0.001900
49962	77.199036	-53.847679	19.6593	4.073760	0.017146
49969	77.251816	-53.856327	18.7764	0.435740	0.023601
49994	77.518555	-53.847065	18.8786	0.008526	0.022541

```
[2707 rows x 5 columns]
```

[4]:
```
#Define angular bin
bins = 10 ** np.linspace(np.log10(1.0/60) , np.log10(1) , 16)
results = [bins]
```

[5]:
```
#compute correlation function
results += bootstrap_two_point_angular(blanco["#RA"] , blanco["DEC"] , bins =␣
 ↪bins \
, method = "landy-szalay" , Nbootstraps = 10)
```

[6]:
```
#Extract bin centers, correlation function, correlation functions error, and␣
 ↪bootstrap results
bins , corr ,  corr_err , bootstrap = results
bin_centers = (bins[:-1] + bins[1:]) / 2
```

[7]:
```
#ploting
plt.figure(figsize = (8,8))
plt.xscale('log')
plt.yscale('linear')
plt.grid(True)
plt.errorbar(bin_centers , corr , yerr = corr_err , fmt = 'o' , color = 'g')
plt.title("Two-point Angular Correlation Function of Galaxies")
plt.xlabel("RA")
```

```
plt.ylabel("DEC")
plt.show()
```