

code

August 13, 2022

```
[ ]: import os
import numpy as np
from astropy.cosmology import FlatLambdaCDM
from astropy.coordinates import SkyCoord
from astropy import units as u
from astropy.table import QTable

[ ]: cosmo = FlatLambdaCDM(H0 = 70, Om0 = 0.27, Tcmb0 = 2.725)

# importing void and galaxy data

data_gal = np.loadtxt('maglim_void_galaxies.txt')
data_void = np.loadtxt('public_void_catalog.txt')

[ ]: # stripping the data
rdshift_gal = data_gal[:, 2] #redshift of void galaxies
#cmvdist_gal = data_gal[:, 3] #comoving distance of void galaxies

x_void = data_void[:, 2]
y_void = data_void[:, 3]
z_void = data_void[:, 4]
void_radius = data_void[:, 5]*0.7

x_gal = data_gal[:, 6]
y_gal = data_gal[:, 7]
z_gal = data_gal[:, 8]

#print(cmvdist_gal)

#following code to check if comoving distances are same as given in catalog
cmvdist_gal = np.sqrt(x_gal**2+y_gal**2+z_gal**2)*0.7
cmvdist_void = np.sqrt(x_void**2+y_void**2+z_void**2)*0.7

[ ]: #following part does calculation of galactic coordinates but I ended up not
↳using them

ra_void = data_void[:, 0]
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dec_void = data_void[:, 1]
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[ ]: coord_void = []  
for i in range(len(x_void)):  
    coord1 = []  
    coord_void.append(cmvdist_void[i])
```

```
[ ]: ra_gal = data_gal[:, 0]  
dec_gal = data_gal[:, 1]  
  
c_icrs1 = SkyCoord(ra=ra_gal*u.degree, dec=dec_gal*u.degree, frame='icrs')  
  
galcoord_gal = c_icrs1.galactic  
  
t = QTable([galcoord_gal], names=["skycoord"])  
#t.write('galcoord_gal.ecsv')
```

```
[ ]: voidGalxies = []  
#col_format = "{:<25}" * 2 + "\n"  
  
for i in range(len(coord_void)):#range(len(coord_void)):  
    c2 = SkyCoord(ra=ra_gal*u.degree, dec=dec_gal*u.degree,␣  
↪distance=cmvdist_gal*u.Mpc)  
    c1 = SkyCoord(ra=ra_void[i]*u.degree, dec=dec_void[i]*u.degree,␣  
↪distance=cmvdist_void[i]*u.Mpc)  
    dist = c1.separation_3d(c2)  
    frac_dist = dist.value/void_radius[i]  
    a = np.where(frac_dist <= 0.5)  
    print("For void number #",i+1, a[0]+1)
```

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