

Ex1

March 27, 2025

1. Loading FITS data

What we did in this section:

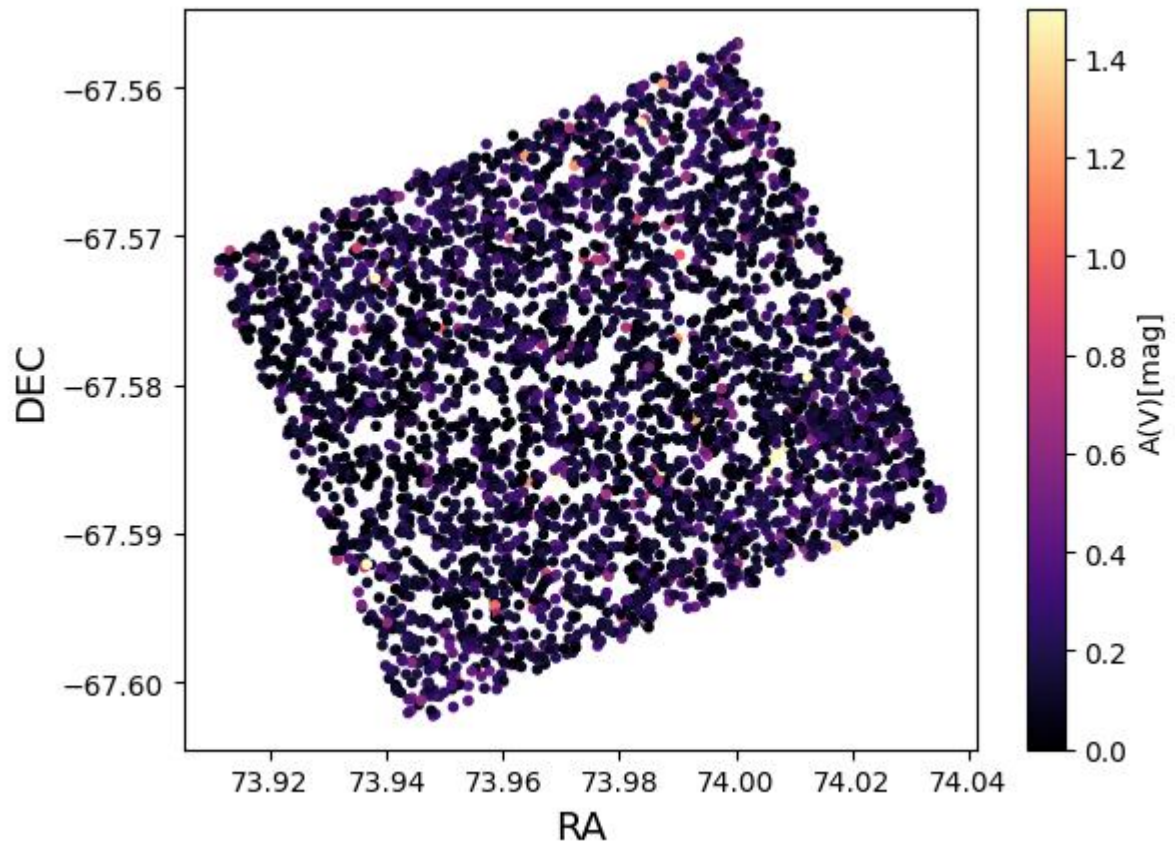
- Import libraries for data analysis.
- Load data from a FITS file (`hst_results_nd.fits`).
- Visualize all stars from the table using colors indicating their extinction value.

```
import numpy as np
import matplotlib.pyplot as plt
from astropy.io import fits
from astropy.table import Table
plt.ion()
import os
```

```
fits.open('hst_results_nd.fits')
```

```
t = Table.read("yoanna/python_su/hst_results_nd.fits")
ra = t["RA"]
dec = t["DEC"]
av = t["Av_p50"]
```

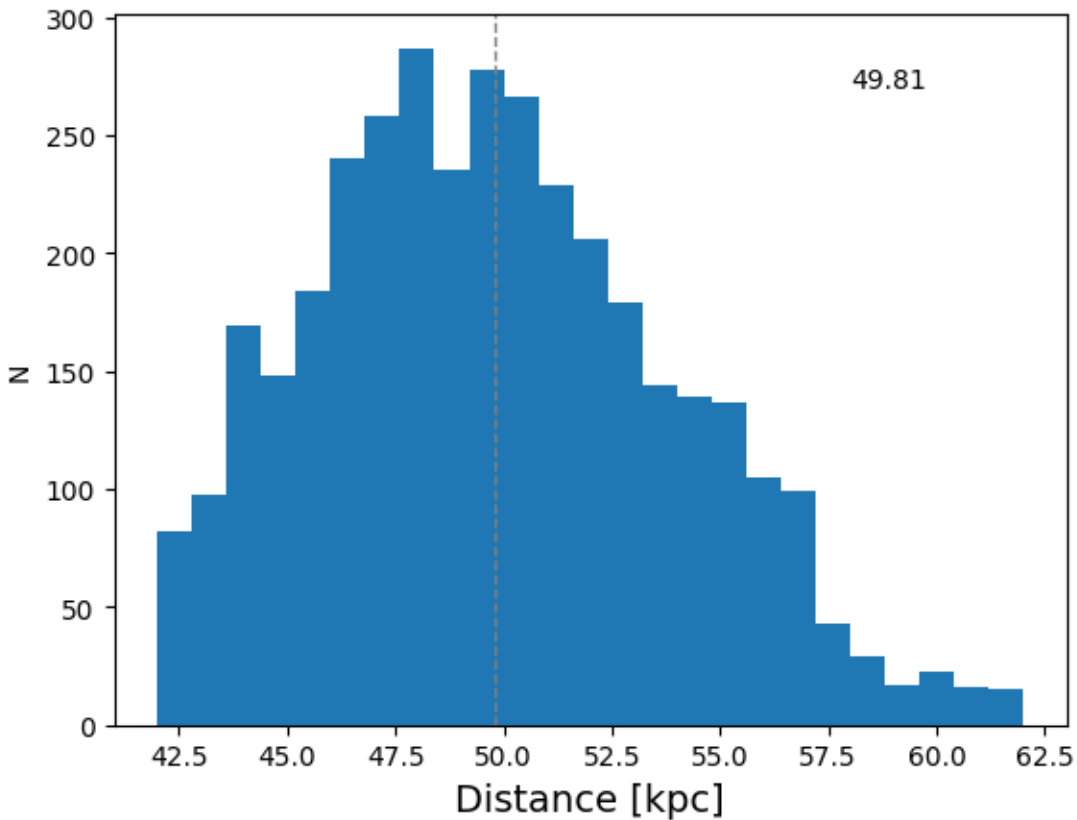
```
plt.figure()
cb = plt.scatter(ra, dec, c=av, marker='.', cmap='magma', vmin=0,
vmax=1.5)
plt.colorbar(cb, label='A(V) [mag]')
plt.xlabel("RA", fontsize=14)
plt.ylabel("DEC",  fontsize=14)
plt.savefig("lmc_av_spatial.png")
```



2. Distance Distribution of Stars

Here, we made a histogram showing how stars are distributed by distance.

```
dist = t['distance_p50']
plt.figure()
plt.hist(dist/1000, bins=25)
plt.xlabel("Distance [kpc]", fontsize=14)
plt.ylabel("N")
d_mean = np.mean(dist) print(d_mean)
plt.axvline(d_mean, color='grey', ls='--', lw=1)
plt.text(58, 270, '%s' % np.around(d_mean, decimals=2))
plt.savefig("lmc_dist_hist.png")
```



3. Color-Magnitude Diagram from External Catalog

- Load an external catalog
- CMD using F475W and F814W magnitudes

```
f = "./yoanna/python_su/hlsp_scylla_hst_wfc3_lmc-04_multi_v1_st.fits"
cat = Table.read(f)
```

```
t[0].colnames
f475 = cat["F475W_VEGA"]
f814 = cat["F814W_VEGA"]
```

```
col = f475 - f814
mag = f475
n = len(f475)
plt.figure()
plt.plot(col, mag, 'b', ls='', label='N = %s' % n)
plt.legend()
plt.xlim(-1, 5)
plt.ylim(30, 17)
plt.xlabel('F475W - F814W')
plt.ylabel('F475W')
plt.title('%s' % f)
plt.savefig("cmd_lmc04.png")
```

./yoanna/python_su/hlsp_scylla_hst_wfc3_lmc-04_multi_v1_st.fits

