CHARLES UNIVERSITY

CzechBIAS

PoL Physics of Life TU Dresden

CENTER FOR SYSTEMS BIOLOGY DRESDEN

Plotting Data

Marcelo Leomil Zoccoler and Martin Schätz

With material from

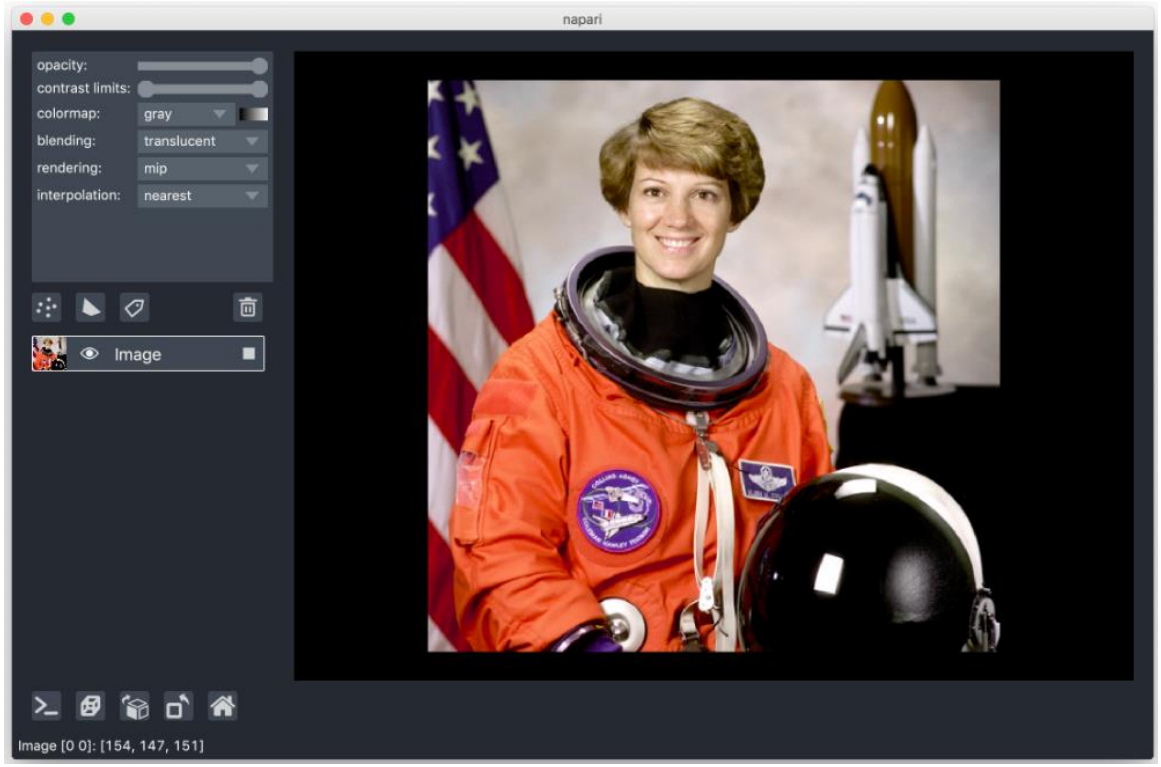
Till Korten, Robert Haase, BiAPoL, PoL TU Dresden

@zoccolermarcelo
@SchatzCz

August 2023

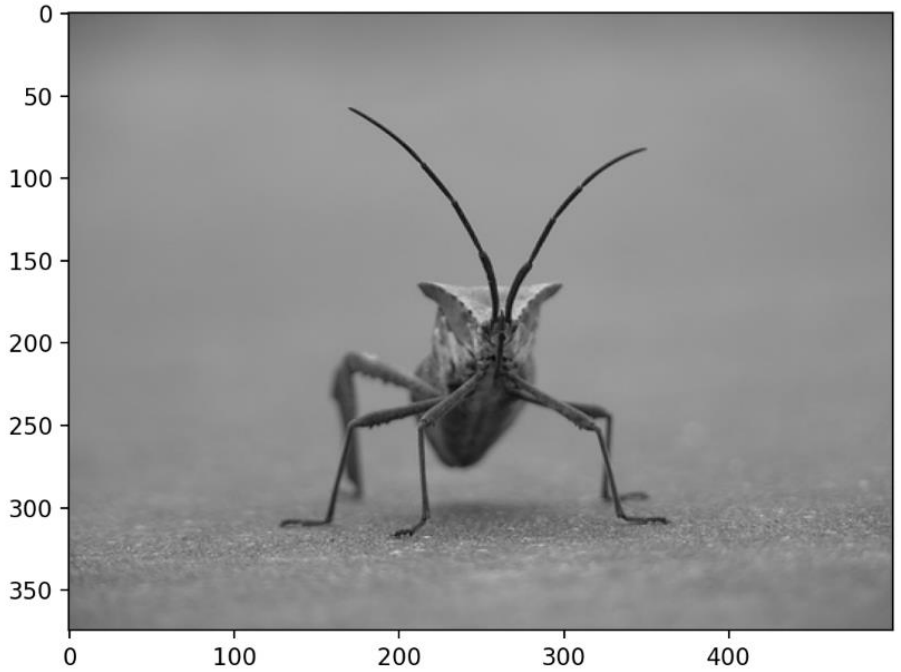
Displaying images

napari



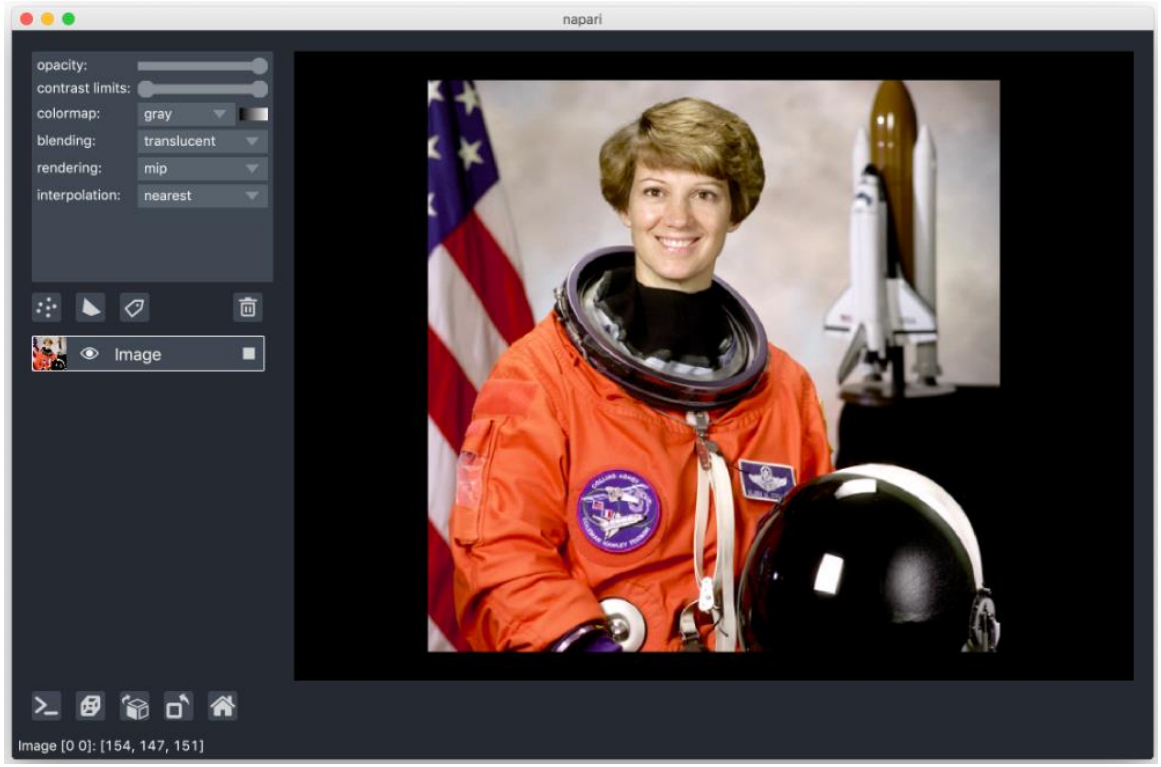
matplotlib

```
imgplot = plt.imshow(img)
```



Displaying graphs

napari

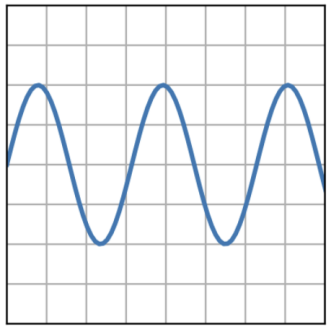


matplotlib

Matplotlib: Basic Plot Types

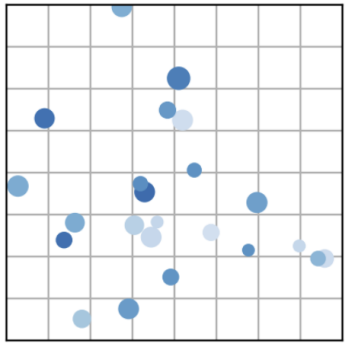
plot(x, y)

See `plot`.



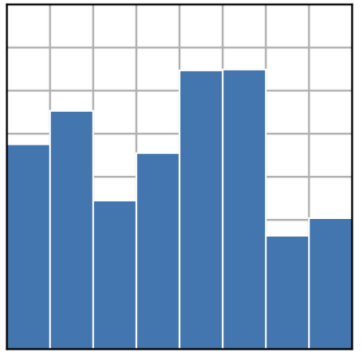
scatter(x, y)

See `scatter`.



bar(x, height)

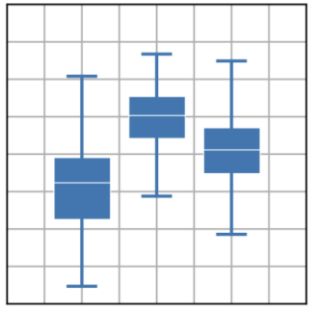
See `bar`.



Statistical Plots

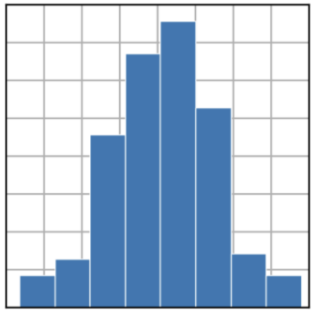
boxplot(X)

See `boxplot`.



hist(x)

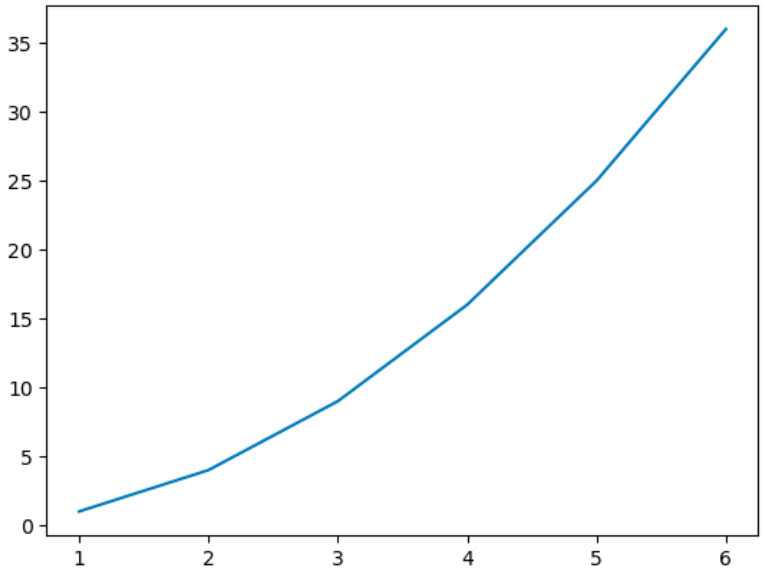
See `hist`.



Plotting Data with Matplotlib

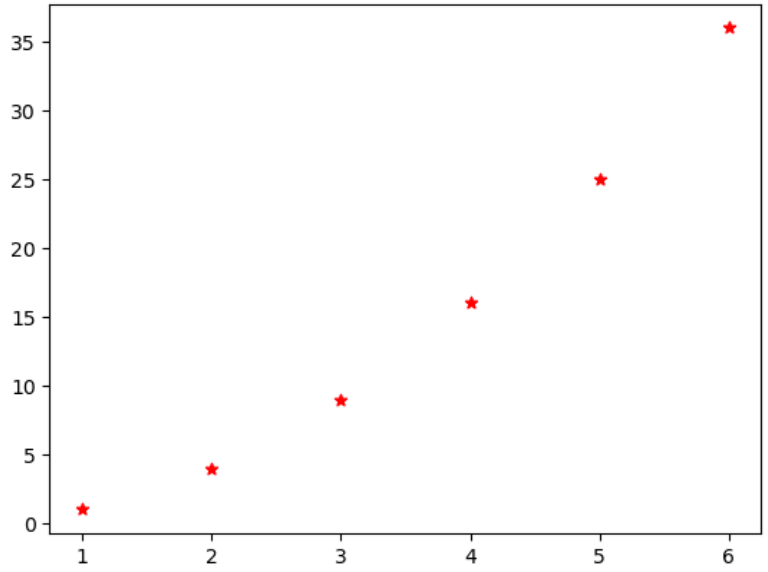
Line plot

```
import matplotlib.pyplot as plt
import numpy as np

x = np.array([1, 2, 3, 4, 5, 6])
y = x ** 2

line_plot = plt.plot(x, y)
```



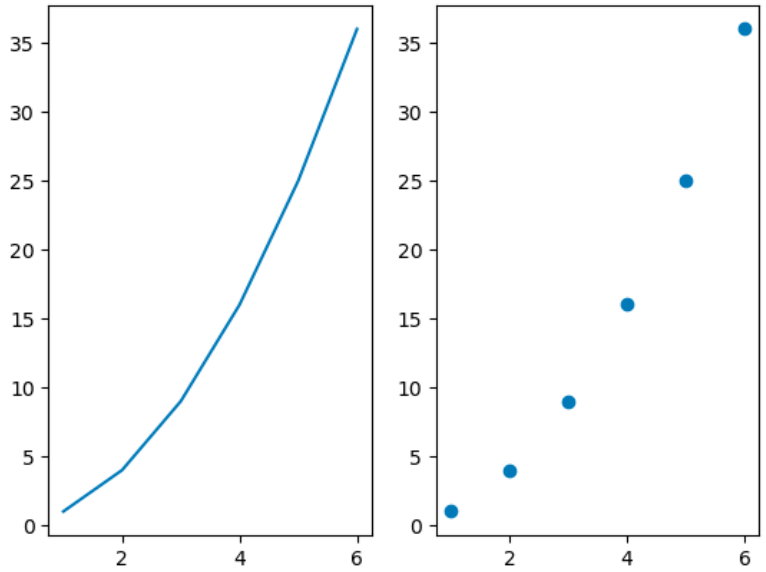
Scatter plot

```
plt.scatter(x, y, marker='*', color='red')
```



Multiple plots in one figure

```
fig, ax = plt.subplots(1,2)
ax[0].plot(x, y)
ax[1].scatter(x, y)
```



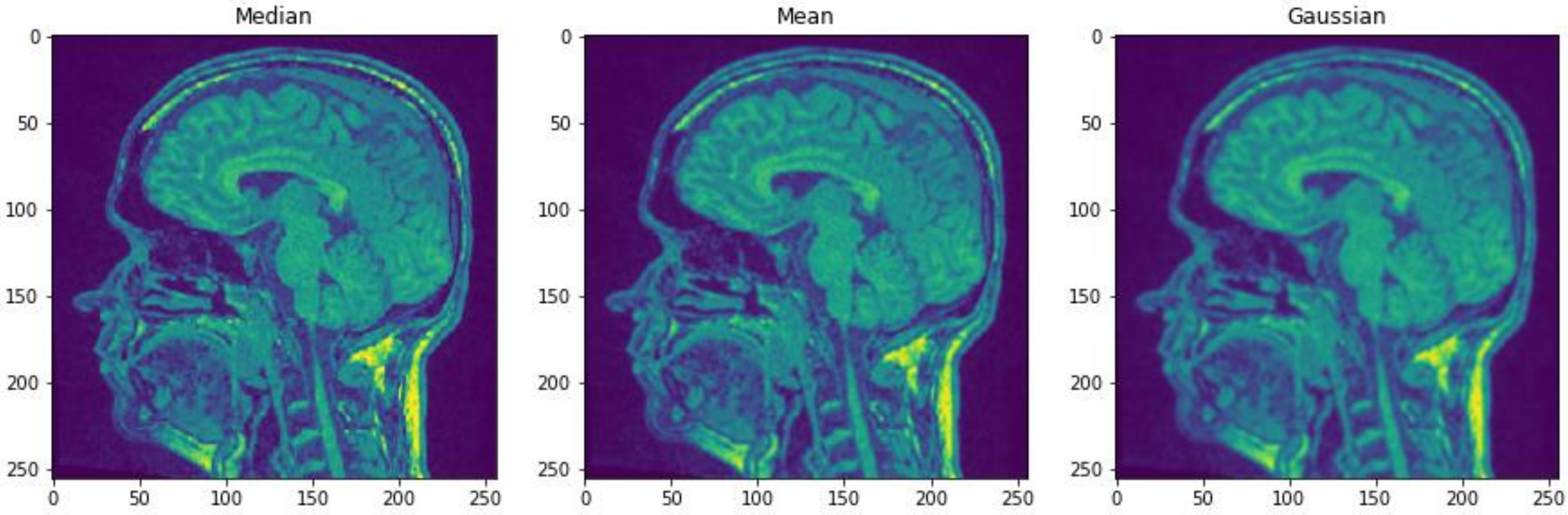
subplots: Create multi-panel figures

```
fig, axes = plt.subplots(1,3)
```

rows | columns

```
axes[0, 0].imshow(median)
axes[0, 1].imshow(mean)
axes[0, 2].imshow(gaussian)
```

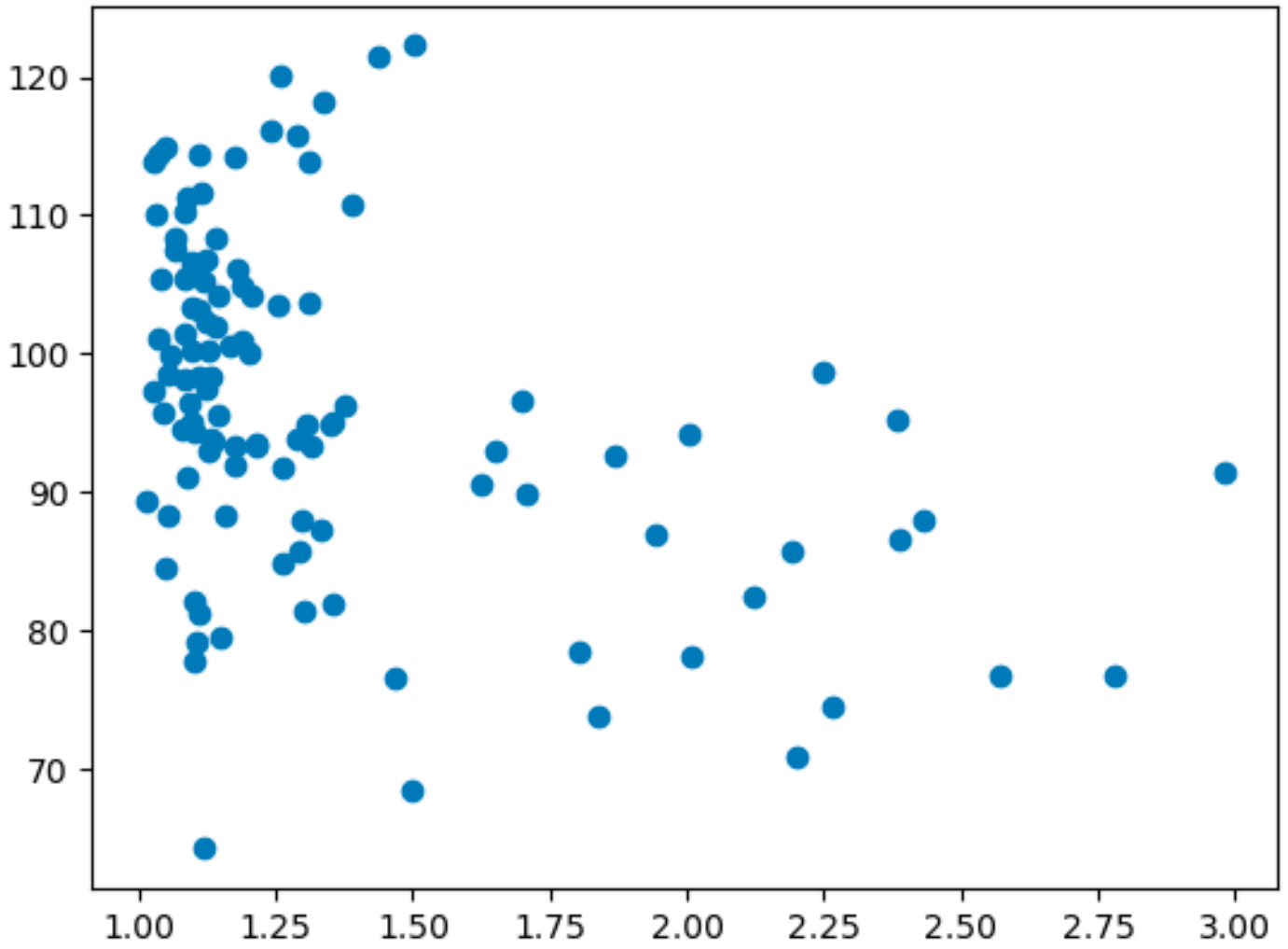
row | column



https://matplotlib.org/stable/api/_as_gen/matplotlib.pyplot.subplots.html

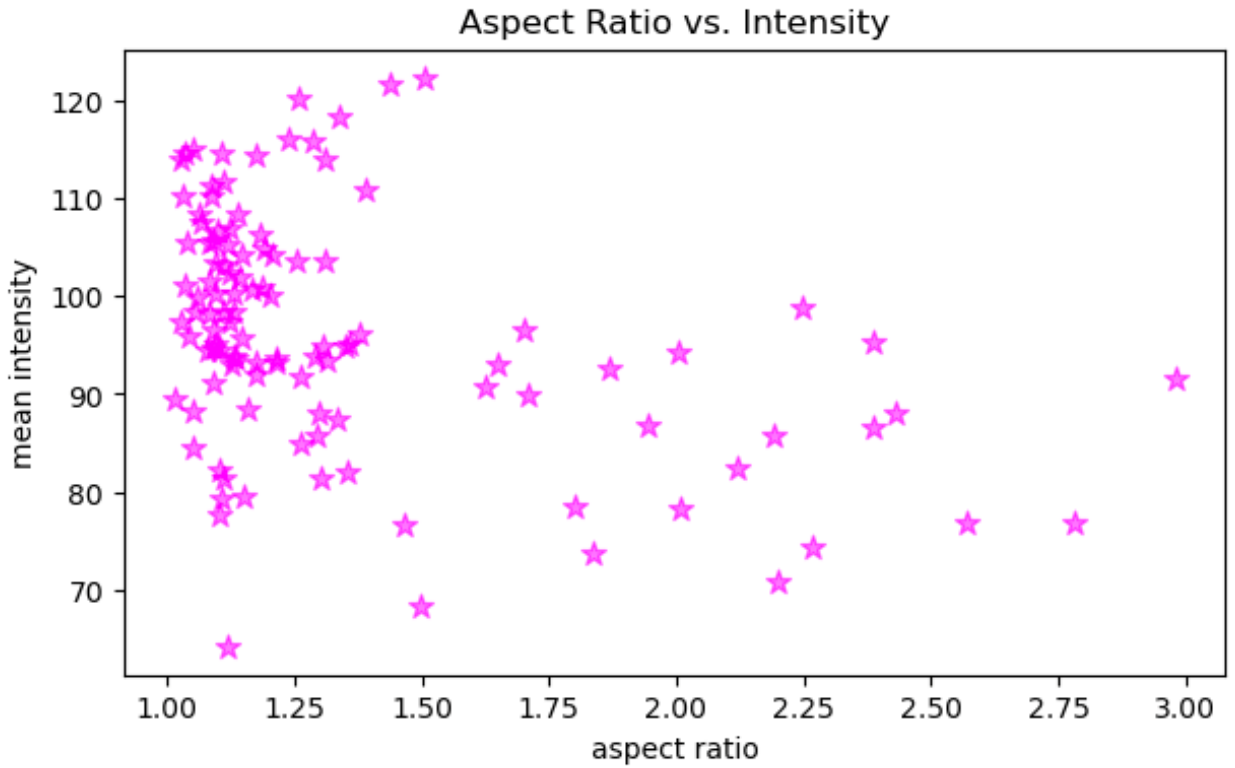
Plotting Tabular Data

```
x = df['aspect_ratio']
y = df['intensity_mean']

plt.scatter(x, y)
```



Customize your plot via the axis object

```
fig, axis = plt.subplots(figsize=(7,4))
axis.scatter(x, y, color='magenta',
marker='*', s=80, alpha=0.5)
axis.set_xlabel('aspect ratio')
axis.set_ylabel('mean intensity')
axis.set_title('Aspect Ratio vs.
Intensity')
```



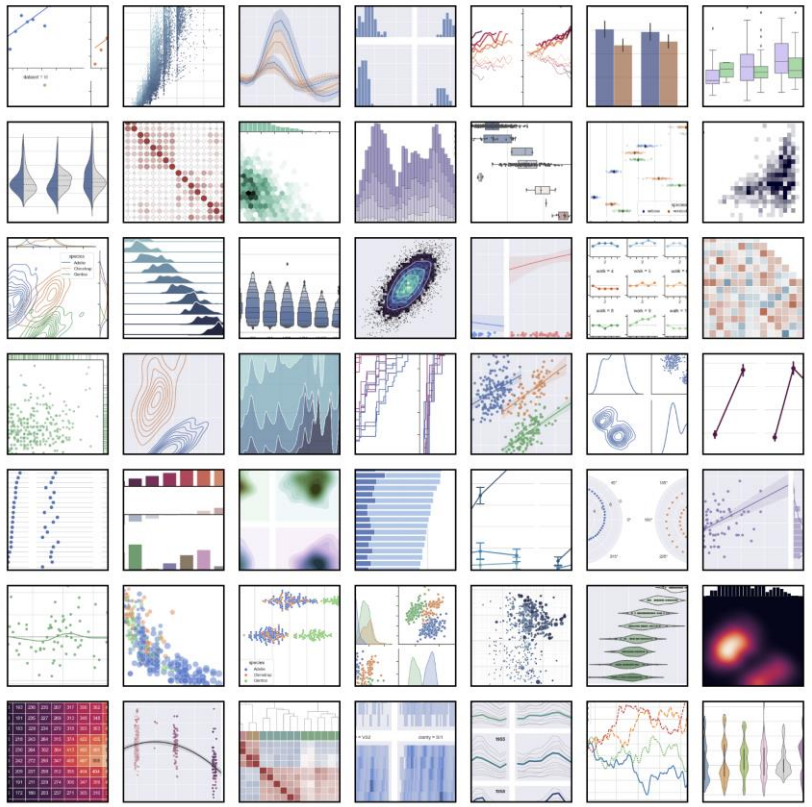
Plotting Data with Seaborn

https://seaborn.pydata.org/tutorial/introduction.html

An introduction to seaborn

Seaborn is a library for making statistical graphics in Python. It builds on top of matplotlib and integrates closely with pandas data structures.

Example gallery



https://seaborn.pydata.org/examples/index.html

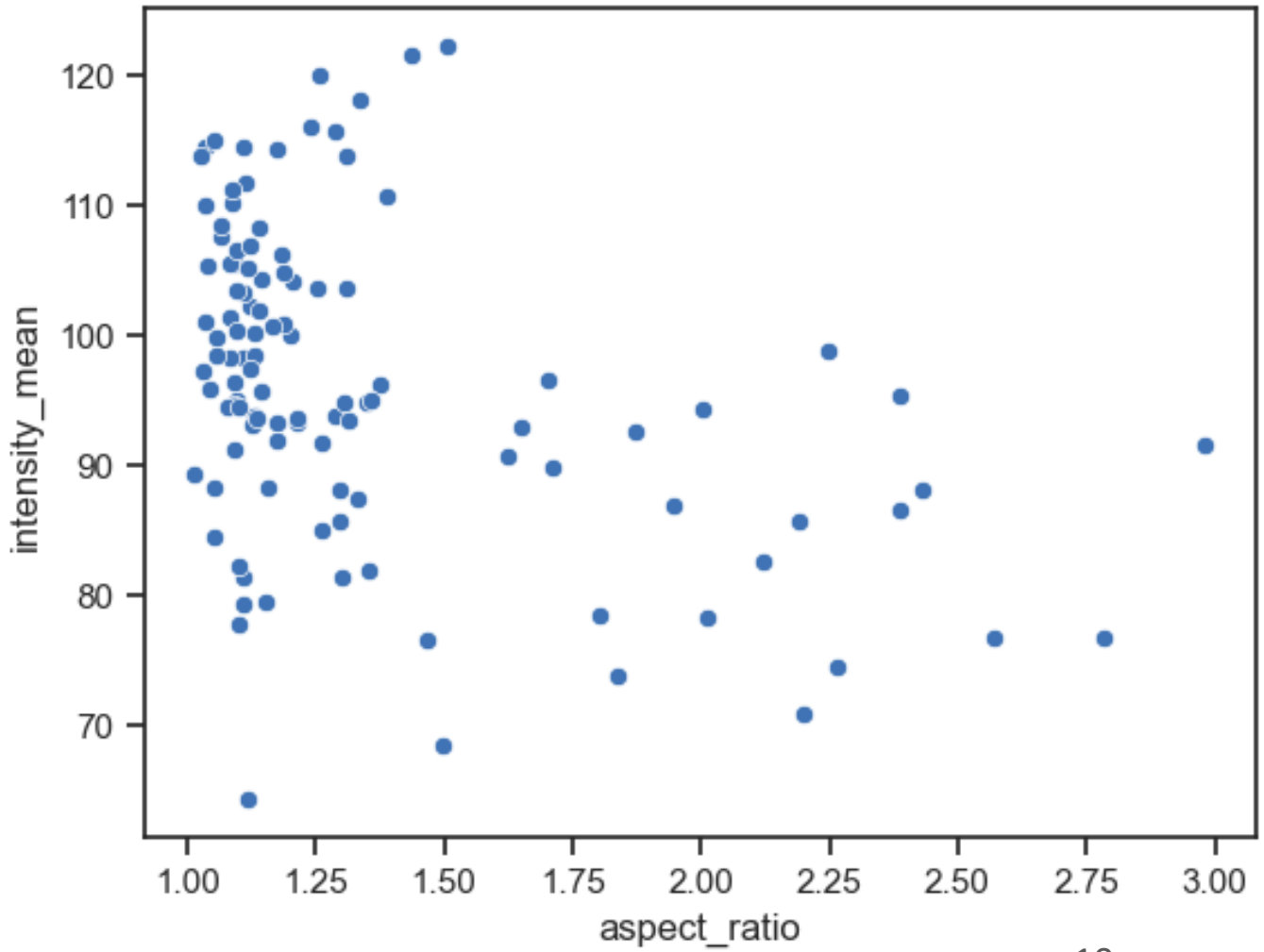
@zoccolermarcelo
@SchatzCz

Plotting A Scatter Plot from Tabular Data with Seaborn

```
df = pd.read_csv("../../data/BBBC007_analysis.csv")
df.head()
```

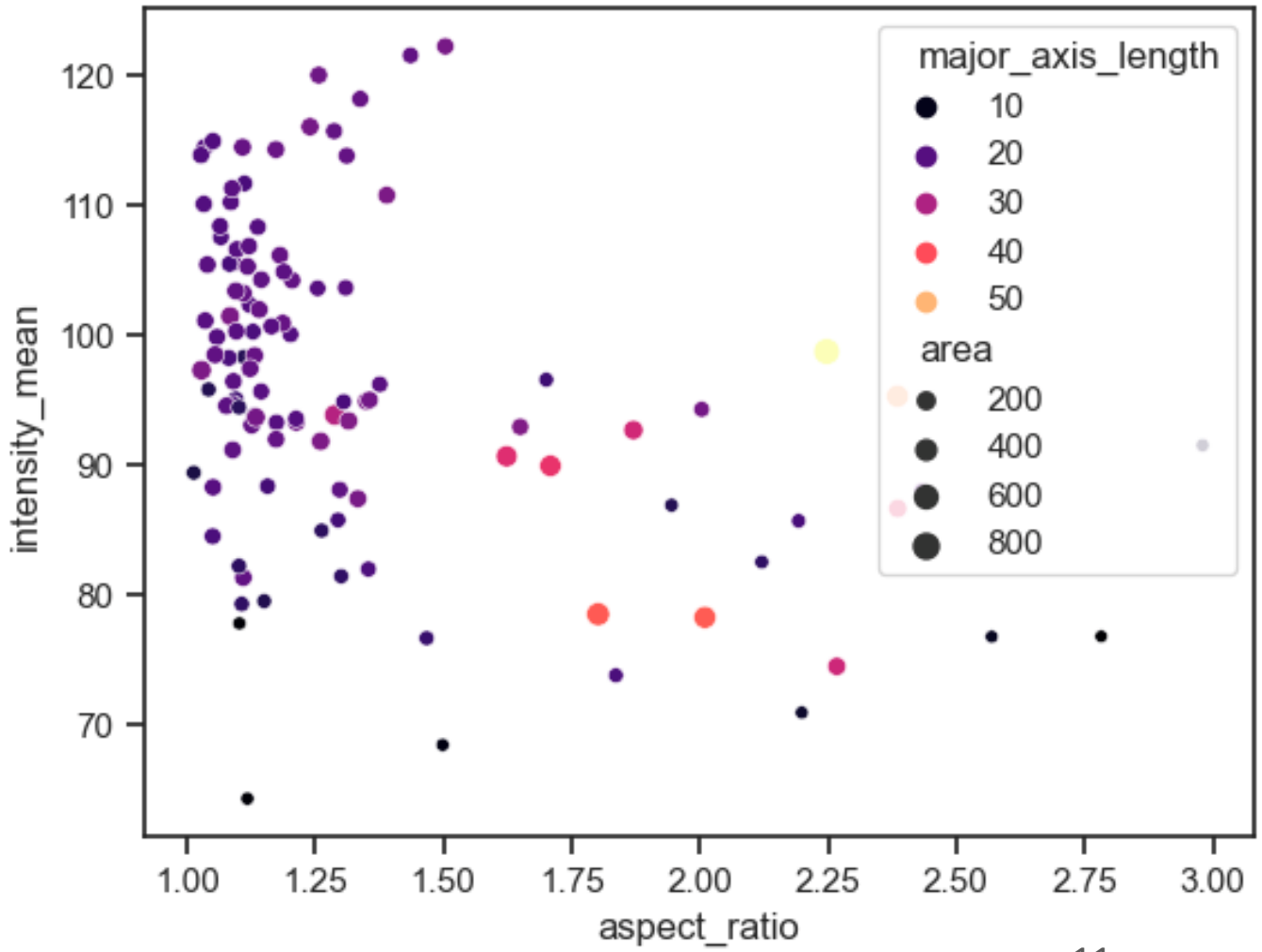
	area	intensity_mean	major_axis_length	minor_axis_length	aspect_ratio	file_name
0	139	96.546763	17.504104	10.292		
1	360	86.613889	35.746808	14.983		
2	43	91.488372	12.967884	4.351		
3	140	73.742857	18.940508	10.314		
4	144	89.375000	13.639308	13.458		

```
sns.scatterplot(data=df,
x="aspect_ratio",
y="intensity_mean")
```



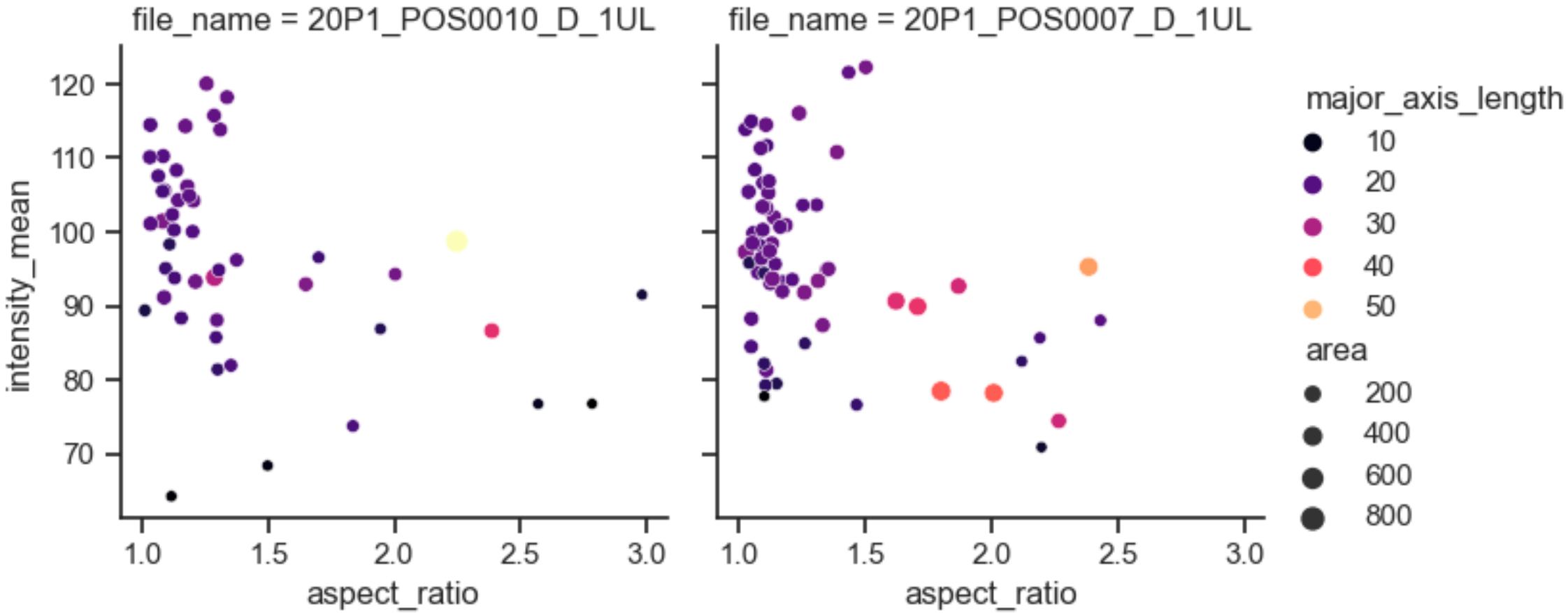
Symbol Size and Color can be Defined by Data

```
sns.scatterplot(data=df,
x="aspect_ratio",
y="intensity_mean",
size="area",
hue="major_axis_length",
palette='magma')
```



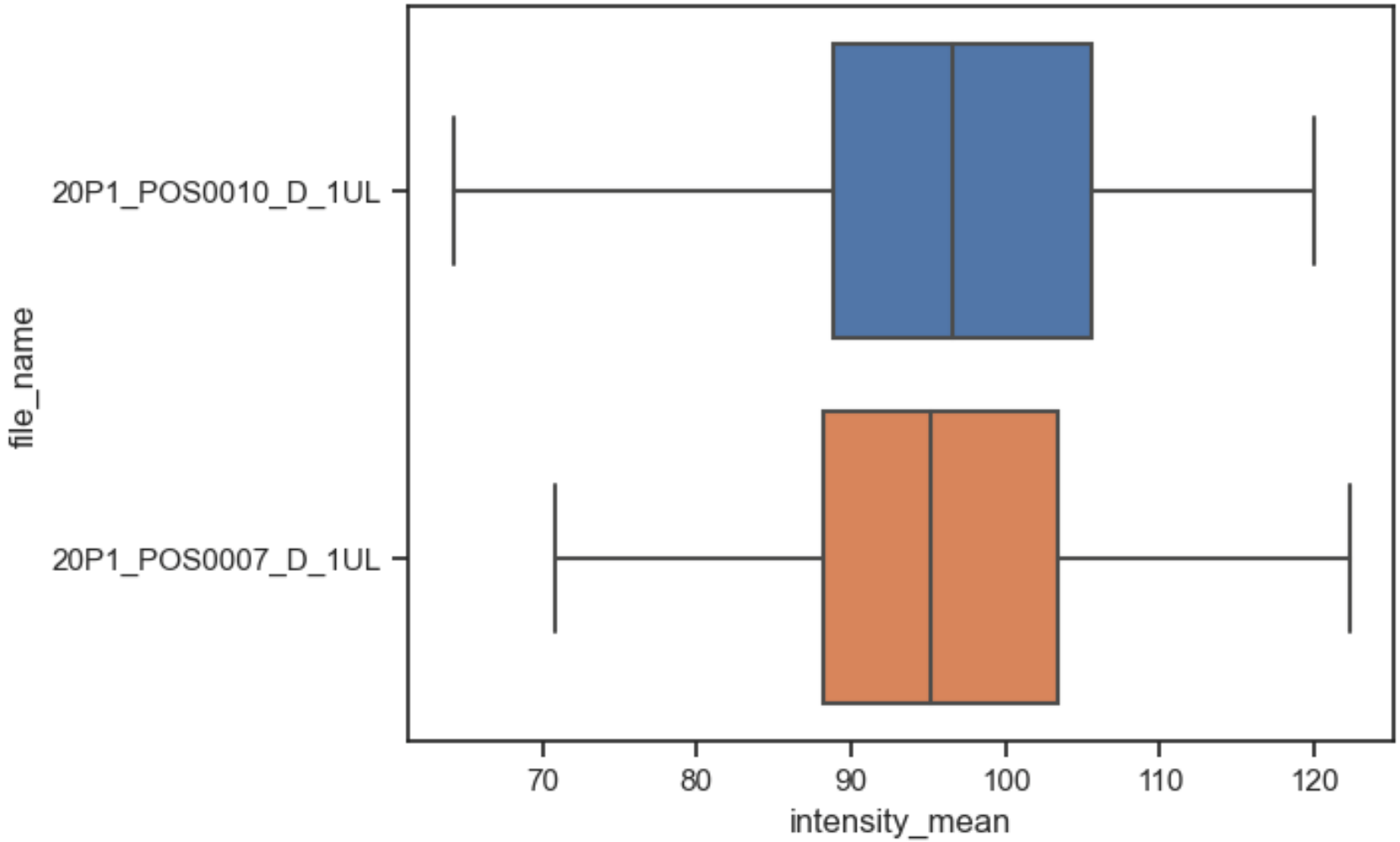
relplot: Split Plot by Categorical Variable

```
sns.relplot(data=df, x="aspect_ratio", y="intensity_mean", size="area",
hue="major_axis_length", col="file_name", palette='magma')
```



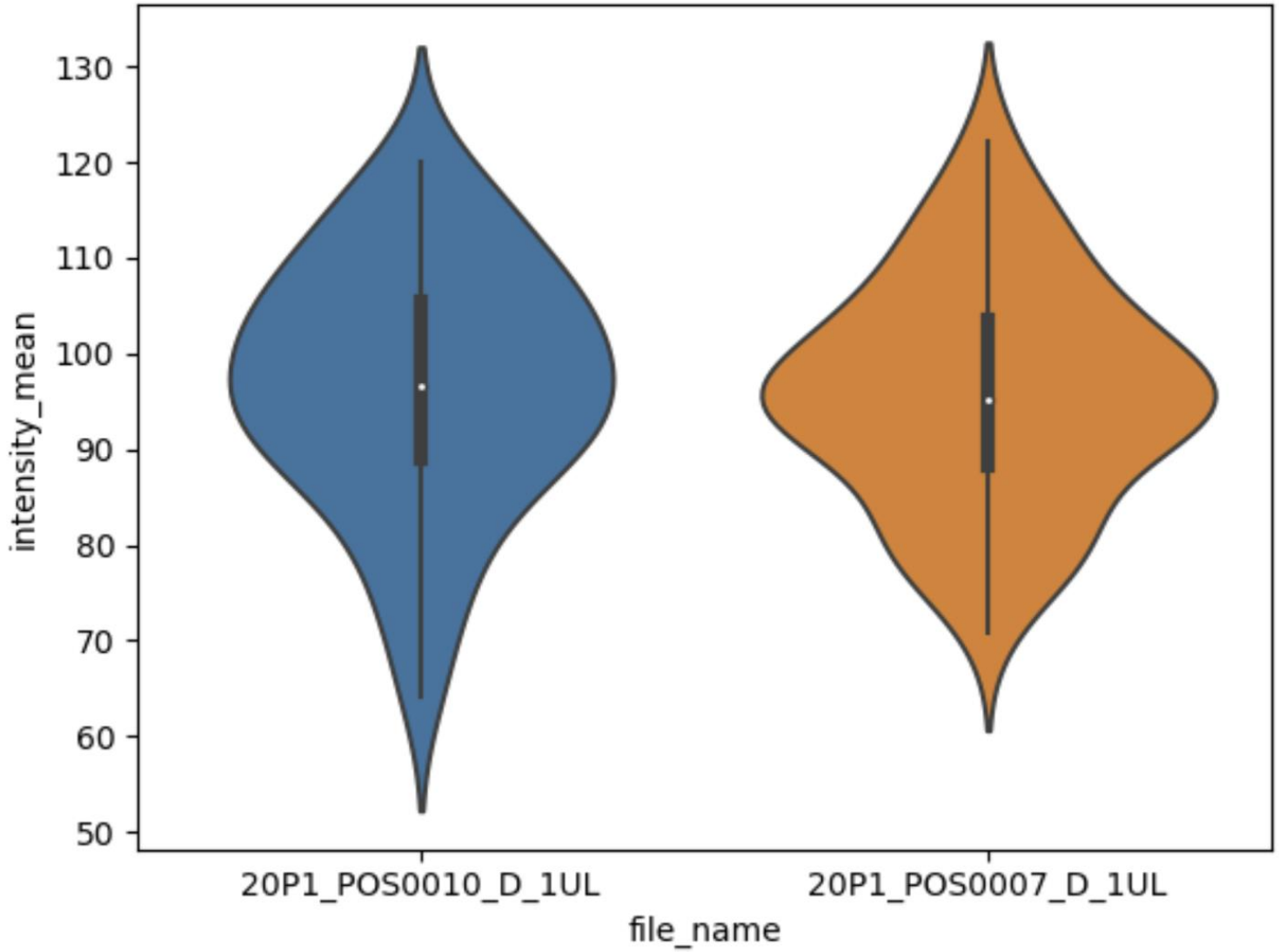
boxplot

```
sns.boxplot(data=df,
x="intensity_mean",
y="file_name")
```



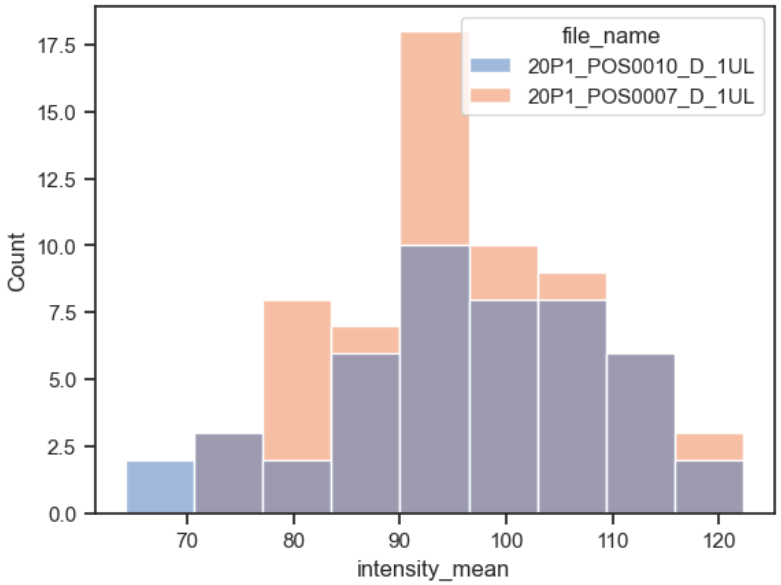
violinplot

```
sns.violinplot(data=df,
x="intensity_mean",
y="file_name")
```

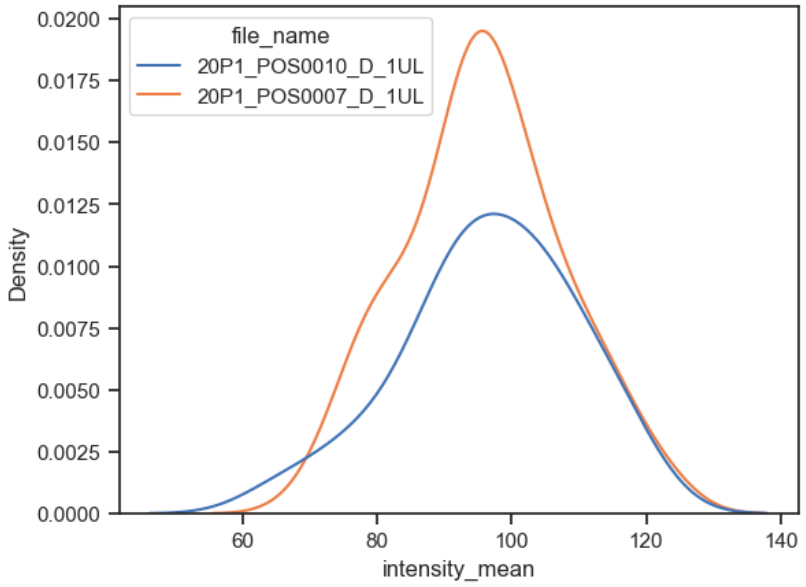


Histograms

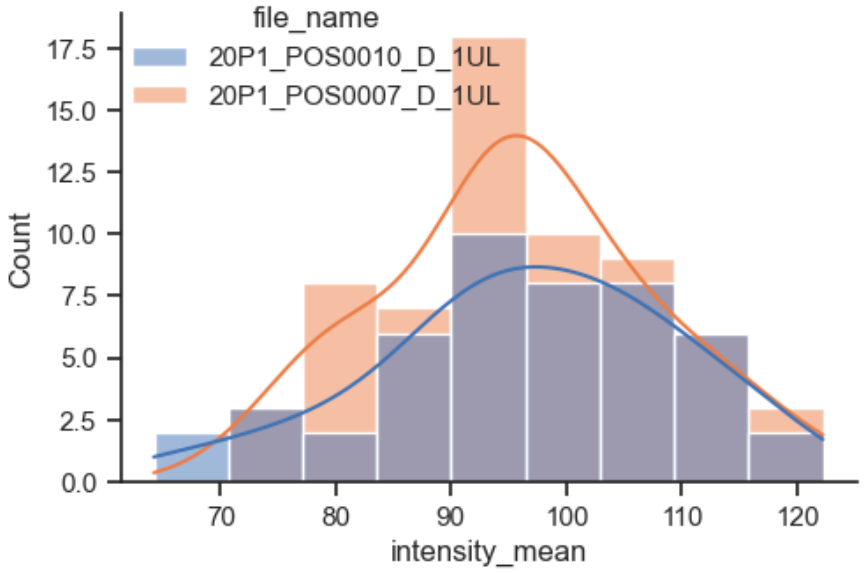
```
sns.histplot(data=df,
x="intensity_mean",
hue="file_name")
```




```
sns.kdeplot(data=df,
x="intensity_mean",
hue="file_name")
```

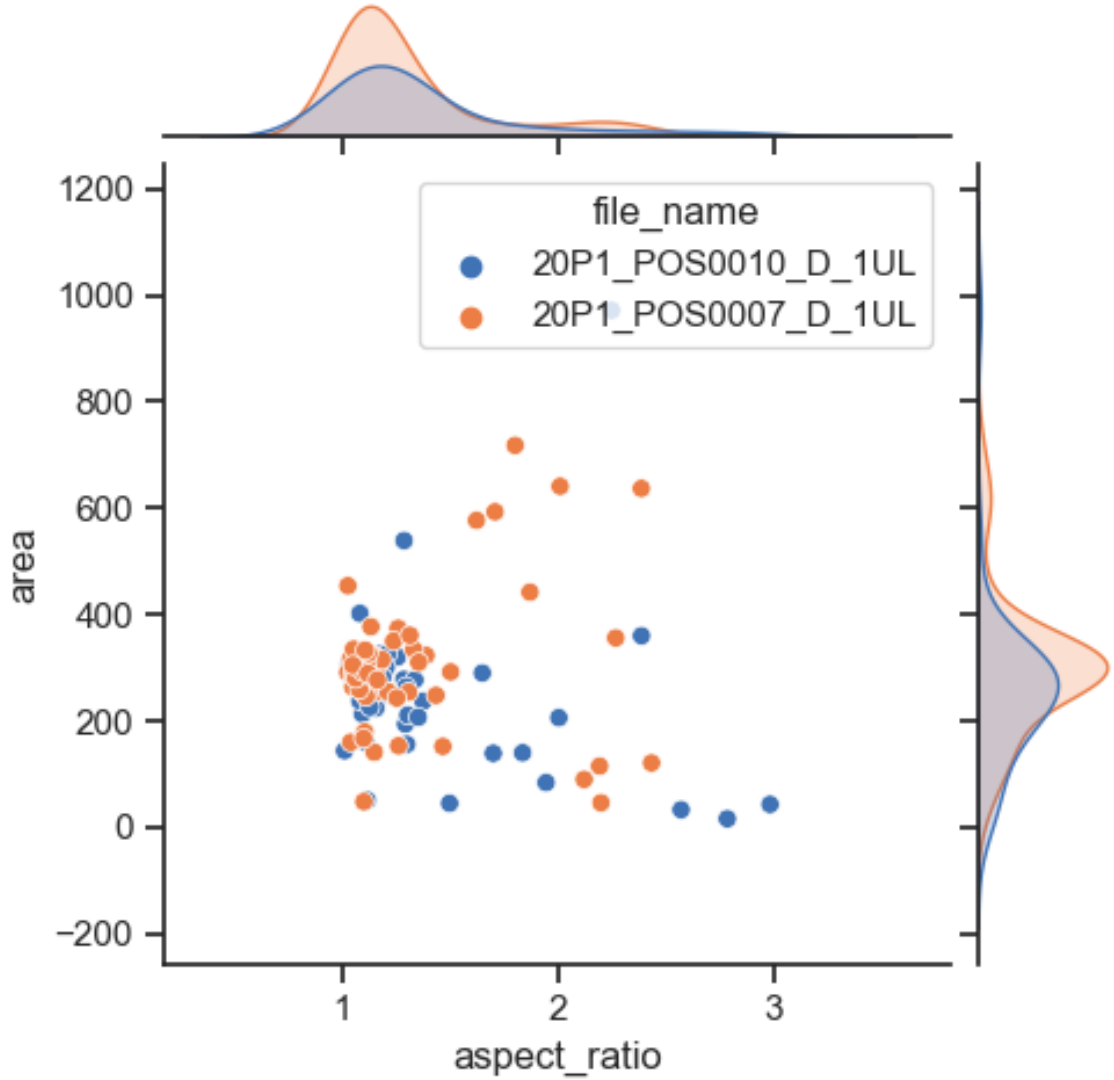



```
sns.displot(data=df,
x="intensity_mean",
hue="file_name",
kde=True)
```



jointplot: Visualizing Distributions of a Scatter plot

```
sns.jointplot(data=df,
x="aspect_ratio",
y="area",
hue='file_name')
```



pairplot: Comparing Many Properties

```
sns.pairplot(data=df,
hue="file_name")
```