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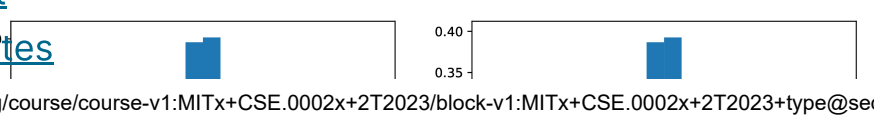
7.1.5 Histograms

MO2.1 MO2.3

Now let's take a look at how to construct one specific – and extremely useful – type of plot, a histogram. One place you may have seen is a histogram is in a distribution of say, exam or assignment grades, and they are typically used to approximately represent a distribution of numerical data. To construct a histogram, the first step is to “bin" the range of values, which means to divide our entire range of values into a series of intervals. We then simply count how many values fall into each of these intervals. Each bin must be adjacent and are generally built to be equal in size. Graphically, this is represented by a rectangle which spans each bin, with the width of the rectangle representing the range of values contained within the data set, and the height of the rectangle representing the frequency with which those values occur. While this process is not too complex, `matplotlib` has a great built-in histogram function, so we don't need to worry about doing all of those steps ourselves! All we need to do is specify a data set and a number of bins.

Let's begin with the `pyplot` method for creating a histogram.

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

N_points = 100000
n_bins = 20

# Generate a normal distribution centered at
x=0
rng = np.random.default_rng()
x = rng.normal(0., 1., N_points)

# plt.subplot("number of rows", "number of
columns", "subplot index")
plt.subplot(1,2,1)

# We can set the number of bins with the
`bins` kwarg
plt.hist(x, bins=n_bins)
plt.ylabel("Count")
plt.xlabel("Data")

plt.subplot(1,2,2)
plt.hist(x, density=True, bins=n_bins)
plt.ylabel("Density")
plt.xlabel("Data")
```



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same graphic using the Object-Oriented approach.

```
import matplotlib.pyplot as plt
```