

```
# plot covariance matrix with seaborn heatmap function
sns.heatmap(pd.DataFrame(data).corr(), vmin=-1, vmax=1)
plt.show()
```

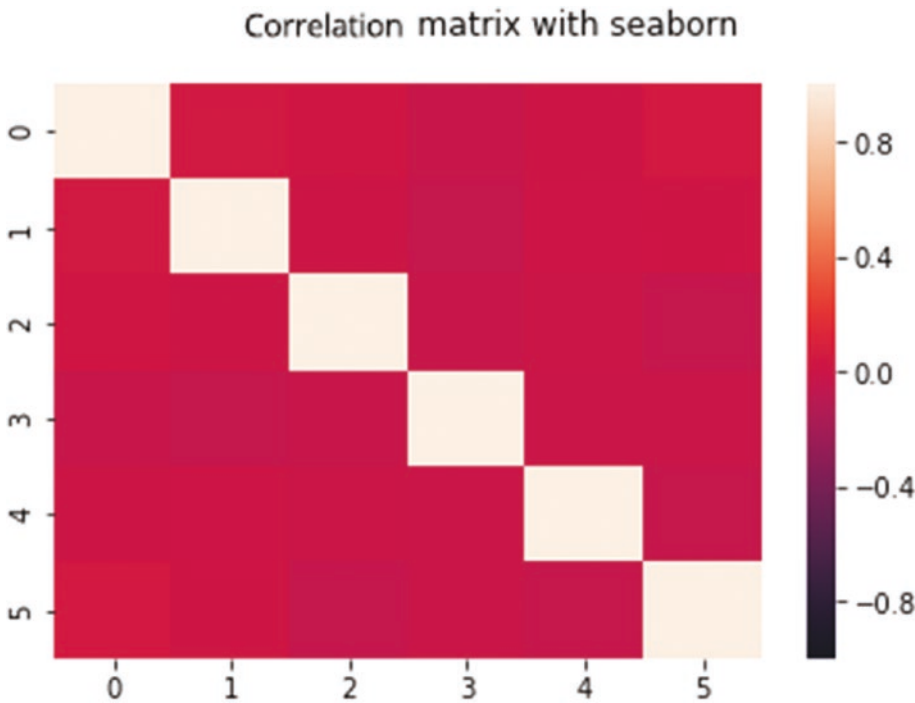


Figure 12-14. *Correlation matrix with seaborn*

Images

Matplotlib is also used to visualize images. This process is utilized when visualizing a dataset of image pixels. You will observe that image data is stored in the computer as an array of pixel intensity values ranging from 0 to 255 across three bands for colored images.

```
img = plt.imread('nigeria-coat-of-arms.png')
# check image dimension
img.shape
'Output': (232, 240, 3)
```

Note that the image contains 232 rows and 240 columns of pixel values across three channels (i.e., red, green, and blue).

Let's print the first row of the columns in the first channel of our image data. Remember that each pixel is an intensity value from 0 to 255. Values closer to 0 are black, while those closer to 255 are white. The output is shown in Figure 12-15.

```
img[0,:,0]
'Output':
array([0., 0., 0., ..., 0., 0., 0.], dtype=float32)
```

Now let's plot the image.

```
# plot image
plt.imshow(img)
plt.show()
```

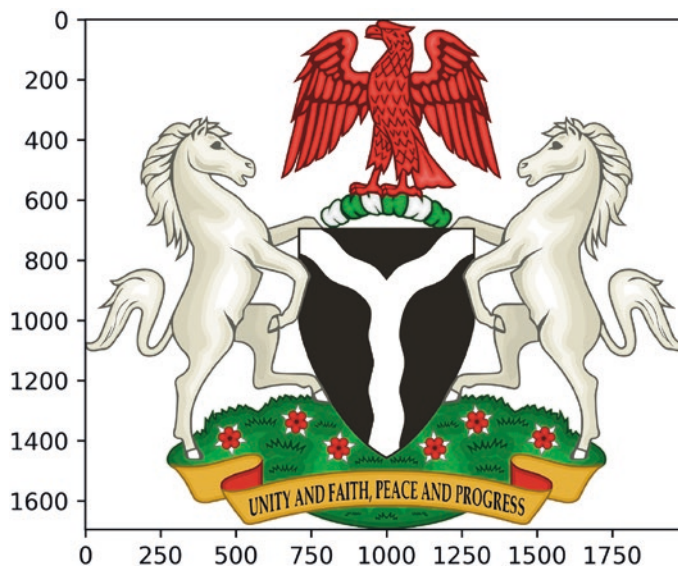


Figure 12-15. Nigeria Coat of Arms

This chapter completes Part 2 of this book, which provides the foundation to programming for data science using the Python data science stack. In the next segment, Part 3, containing Chapters 13–17, we will provide an introduction to the field of machine learning.

PART III

Introducing Machine Learning