CartesianProduct_Demo_3080

January 25, 2022

0.1 1. Black and White Image

```python
[3]: import numpy as np
     import matplotlib.pyplot as plt
```
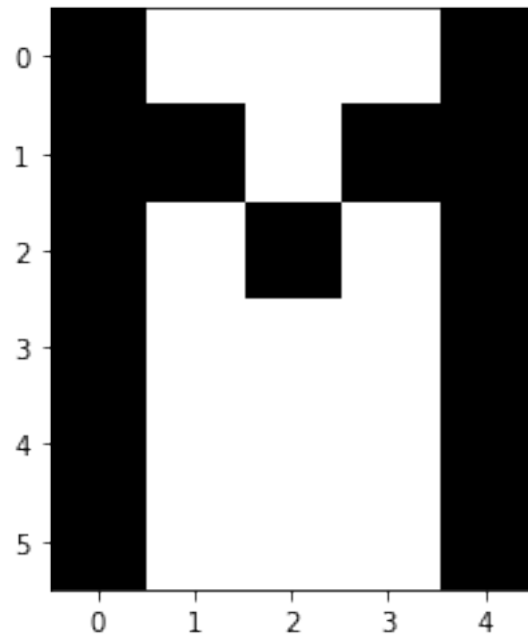
```python
[4]: M = np.
     ↪array([[0,1,1,1,0],[0,0,1,0,0],[0,1,0,1,0],[0,1,1,1,0],[0,1,1,1,0],[0,1,1,1,0]])
     T = np.
     ↪array([[0,0,0,0,0],[1,1,0,1,1],[1,1,0,1,1],[1,1,0,1,1],[1,1,0,1,1],[1,1,0,1,1]])
     S = np.array([[0,0,0,0],[0,1, 1,1], [1,0, 1,1],[1,1, 0,1], [1,1, 1,0], [0, 0,␣
     ↪0,0]])
     U = np.array([[0,1,1,1,0],[0,1,1,1,0],[0,1,1,1,0],[0,1, 1,1, 0], [0,1, 1,1, 0],␣
     ↪[0, 0, 0,0,0]])
```

```python
[5]: M
```

```python
[5]: array([[0, 1, 1, 1, 0],
            [0, 0, 1, 0, 0],
            [0, 1, 0, 1, 0],
            [0, 1, 1, 1, 0],
            [0, 1, 1, 1, 0],
            [0, 1, 1, 1, 0]])
```

```python
[6]: plt.imshow(M,cmap="gray")
```

```python
[6]: <matplotlib.image.AxesImage at 0x7f7f150116d0>
```
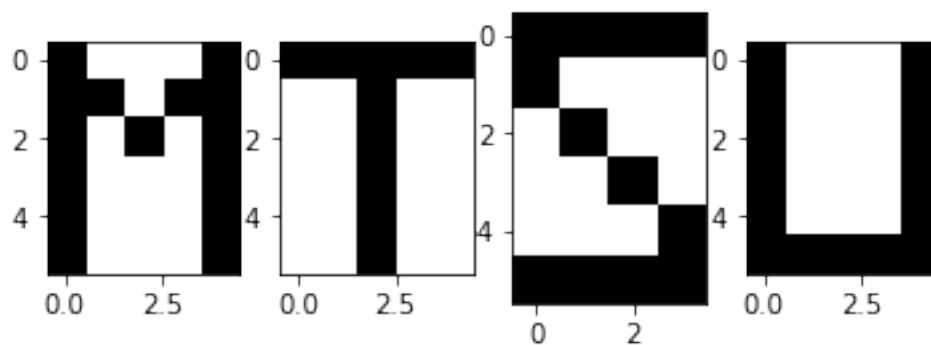
```python
[7]: import matplotlib.pyplot as plt

     ax1 = plt.subplot(141)
     ax1.imshow(M,cmap="gray")

     ax2 = plt.subplot(142)
     ax2.imshow(T,cmap="gray")

     ax3 = plt.subplot(143)
     ax3.imshow(S,cmap="gray")

     ax4 = plt.subplot(144)
     ax4.imshow(U,cmap="gray")
```
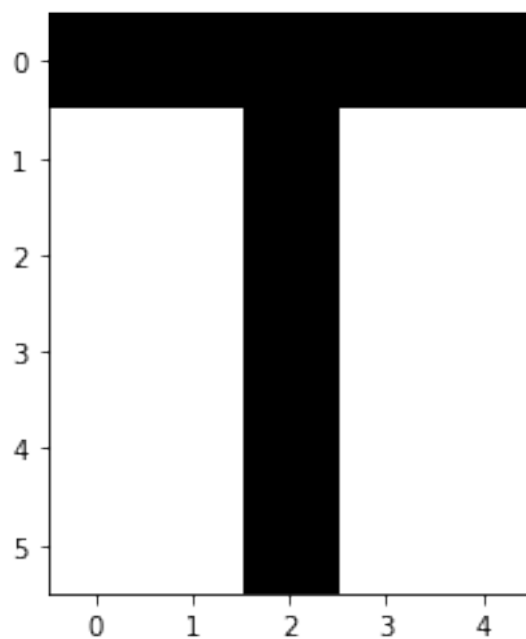
[7]: <matplotlib.image.AxesImage at 0x7f7f151b3640>

```
[8]: plt.imshow(T,cmap="gray")
```

```
[8]: <matplotlib.image.AxesImage at 0x7f7f15270e80>
```

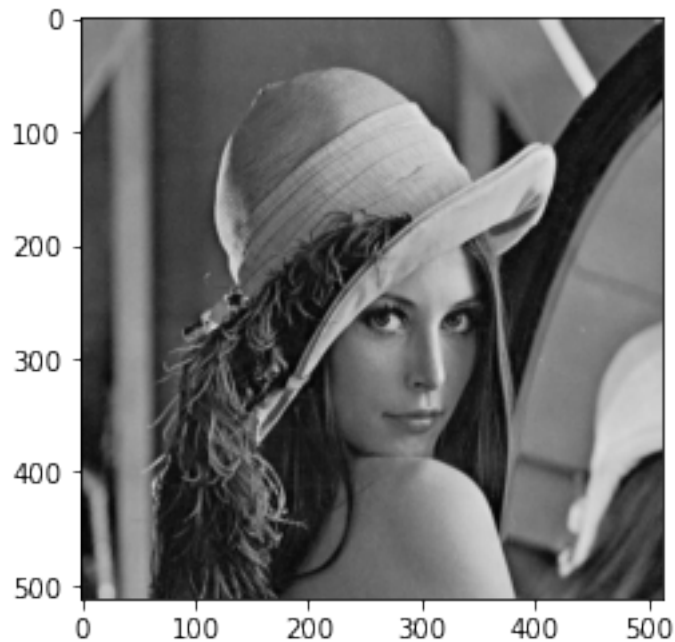

```
[32]: T[0,0]
```

```
[32]: 0
```

```
[33]: T[1,3]
```

```
[33]: 1
```

0.2 2. Gray Scale Image

```
[19]: import matplotlib.pyplot as plt
      import matplotlib.image as img

      image = img.imread('lena.jpeg')

      plt.imshow(image, cmap='gray', vmin = 0, vmax = 255)
      plt.show()
```



```
[20]: image.shape
```

```
[20]: (512, 512)
```

```
[21]: image
```

```
[21]: array([[135, 137, 138, …, 148, 131,  92],
             [136, 137, 138, …, 149, 134,  96],
             [137, 138, 138, …, 149, 135,  96],
             …,
             [ 20,  21,  24, …,  71,  71,  70],
             [ 21,  22,  26, …,  68,  70,  73],
             [ 23,  24,  28, …,  67,  69,  75]], dtype=uint8)
```
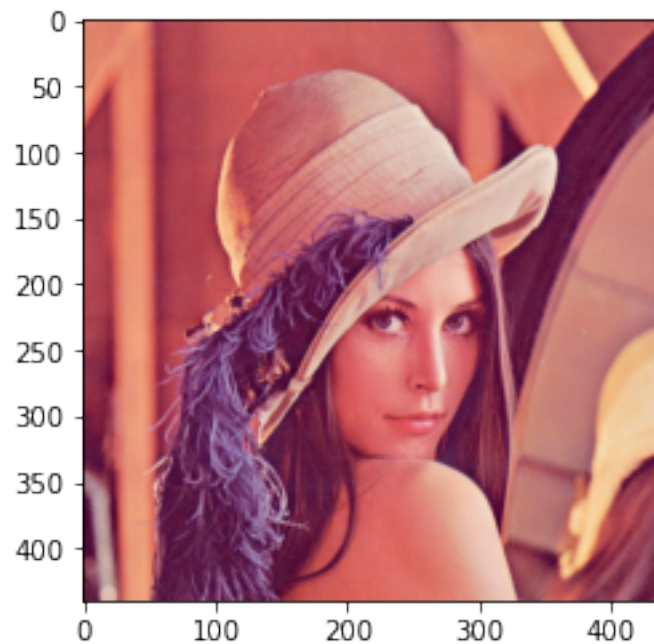
0.3 3. Color Image

```
[22]: import matplotlib.pyplot as plt
      import matplotlib.image as img
      image_color = img.imread('lena.png')
```

```
[23]: image_color.shape
```

```
[23]: (440, 440, 3)
```

```
[24]: plt.imshow(image_color, vmin = 0, vmax = 255)
      plt.show()
```



```
[25]: R = image_color[:,:,0]
      R.shape
```

```
[25]: (440, 440)
```

```
[26]: G = image_color[:,:,1]
      G.shape
```

```
[26]: (440, 440)
```

```
[27]: B = image_color[:,:,2]
      B.shape
```

```
[27]: (440, 440)
```

0.4 4. Cartesin product Example

```
[28]: models = ["Toyota Corolla", "Honda CRV", "Chevy Cruze"]
      colors = ["White", "Grey", "Red"]
      capacities = ["1.4L", "1.6L", "1.8L"]
```

```
[29]: ## List Comprehension offers the shortest syntax for looping through lists:
      products = [[model, color, capacity] for model in models for color in colors␣
       ↪for capacity in capacities]
```

```
[30]: products
```

```
[30]: [['Toyota Corolla', 'White', '1.4L'],
       ['Toyota Corolla', 'White', '1.6L'],
       ['Toyota Corolla', 'White', '1.8L'],
       ['Toyota Corolla', 'Grey', '1.4L'],
       ['Toyota Corolla', 'Grey', '1.6L'],
       ['Toyota Corolla', 'Grey', '1.8L'],
       ['Toyota Corolla', 'Red', '1.4L'],
       ['Toyota Corolla', 'Red', '1.6L'],
       ['Toyota Corolla', 'Red', '1.8L'],
       ['Honda CRV', 'White', '1.4L'],
       ['Honda CRV', 'White', '1.6L'],
       ['Honda CRV', 'White', '1.8L'],
       ['Honda CRV', 'Grey', '1.4L'],
       ['Honda CRV', 'Grey', '1.6L'],
       ['Honda CRV', 'Grey', '1.8L'],
       ['Honda CRV', 'Red', '1.4L'],
       ['Honda CRV', 'Red', '1.6L'],
       ['Honda CRV', 'Red', '1.8L'],
       ['Chevy Cruze', 'White', '1.4L'],
       ['Chevy Cruze', 'White', '1.6L'],
       ['Chevy Cruze', 'White', '1.8L'],
       ['Chevy Cruze', 'Grey', '1.4L'],
       ['Chevy Cruze', 'Grey', '1.6L'],
       ['Chevy Cruze', 'Grey', '1.8L'],
       ['Chevy Cruze', 'Red', '1.4L'],
       ['Chevy Cruze', 'Red', '1.6L'],
       ['Chevy Cruze', 'Red', '1.8L']]
```

```
[31]: for model in models:
          for color in colors:
              for capacity in capacities:
                  print(model,color,capacity)
```

```
Toyota Corolla White 1.4L
```

```
Toyota Corolla White 1.6L
Toyota Corolla White 1.8L
Toyota Corolla Grey 1.4L
Toyota Corolla Grey 1.6L
Toyota Corolla Grey 1.8L
Toyota Corolla Red 1.4L
Toyota Corolla Red 1.6L
Toyota Corolla Red 1.8L
Honda CRV White 1.4L
Honda CRV White 1.6L
Honda CRV White 1.8L
Honda CRV Grey 1.4L
Honda CRV Grey 1.6L
Honda CRV Grey 1.8L
Honda CRV Red 1.4L
Honda CRV Red 1.6L
Honda CRV Red 1.8L
Chevy Cruze White 1.4L
Chevy Cruze White 1.6L
Chevy Cruze White 1.8L
Chevy Cruze Grey 1.4L
Chevy Cruze Grey 1.6L
Chevy Cruze Grey 1.8L
Chevy Cruze Red 1.4L
Chevy Cruze Red 1.6L
Chevy Cruze Red 1.8L
```

[ ]: