python-ex2

September 4, 2024

0.1 ex2.m

[ ]:
```
import numpy as np
import matplotlib.pyplot as plt
import cv2
from pathlib import Path
```

[ ]:
```
from PIL import Image
```

[ ]:
```
ASSETS_FOLDER_PATH = "../assets"
OUTPUT_FOLDER_PATH = "."
```

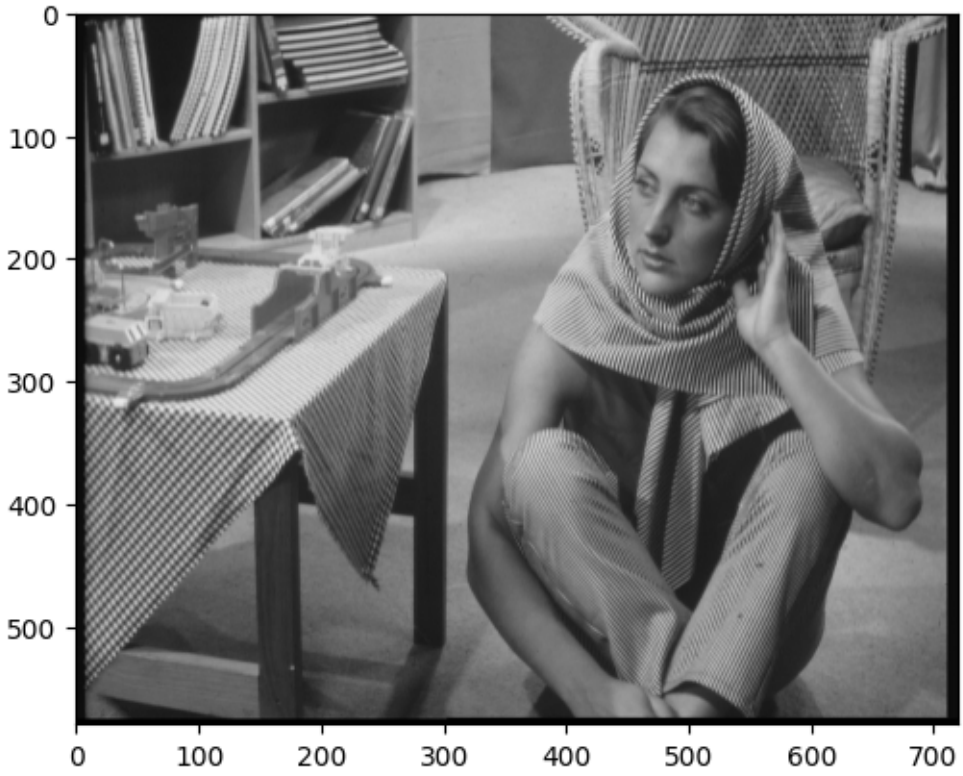
[ ]:
```
Path(OUTPUT_FOLDER_PATH).mkdir(parents=True, exist_ok=True)
```

Cargamos la imagen

[ ]:
```
b = Image.open(f"{ASSETS_FOLDER_PATH}/barbara.gif")
```

[ ]:
```
plt.imshow(b, cmap="gray", vmin=0, vmax=255)
```

[ ]:
```
<matplotlib.image.AxesImage at 0x77b4e854efb0>
```



[ ]:
```
b = np.array(b)
```

Definimos un filtro

[ ]:
```
h = np.array([
    [0, 1/6, 0],
    [1/6, 1/3, 1/6],
    [0, 1/6, 0]
])
```

[ ]:
```
h = h / np.sum(h[:])
```

Definimos los filtros de disk y unsharp tal cual los usa matlab

[ ]:
```
h_unsharp = np.array([
   [-1/6, -2/3, -1/6],
   [-2/3, 13/3, -2/3],
   [-1/6, -2/3, -1/6]]
)

h_disk = np.array([
```

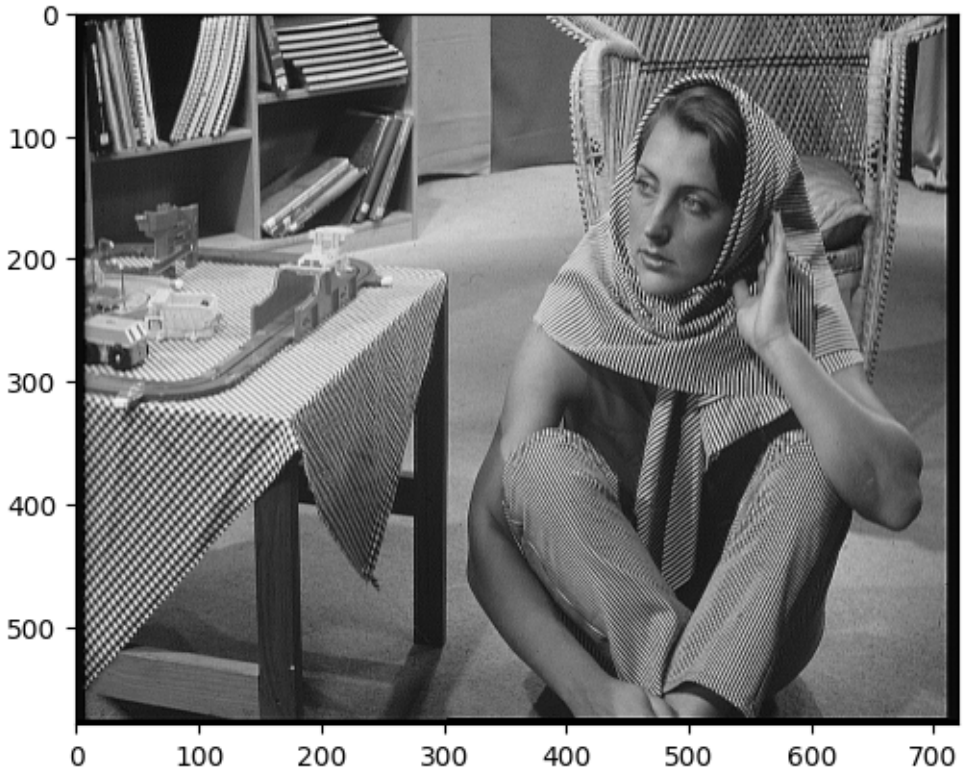
```
  [       0,         0,        0, 67/53617,    3/604, 63/10064,    3/604, 67/
↪53617,        0,        0,        0],
  [       0,  4/124819, 94/15267,  61/4921, 113/8875, 113/8875, 113/8875,  61/
↪4921, 94/15267, 4/124819,        0],
  [       0,  94/15267, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/
↪8875, 113/8875, 94/15267,        0],
  [ 67/53617,  61/4921, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/
↪8875, 113/8875,  61/4921, 67/53617],
  [    3/604, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/
↪8875, 113/8875, 113/8875,    3/604],
  [ 63/10064, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/
↪8875, 113/8875, 113/8875, 63/10064],
  [    3/604, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/
↪8875, 113/8875, 113/8875,    3/604],
  [ 67/53617,  61/4921, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/
↪8875, 113/8875,  61/4921, 67/53617],
  [       0, 94/15267, 113/8875, 113/8875, 113/8875, 113/8875, 113/8875, 113/
↪8875, 113/8875, 94/15267,        0],
  [       0, 4/124819, 94/15267,  61/4921, 113/8875, 113/8875, 113/8875,  61/
↪4921, 94/15267, 4/124819,        0],
  [       0,         0,        0, 67/53617,    3/604, 63/10064,    3/604, 67/
↪53617,        0,        0,        0]
])
```

Aplicamos el filtro

[ ]:
```
h1 = cv2.filter2D(src=b, ddepth=-1, kernel=h_unsharp)
h2 = cv2.filter2D(src=b, ddepth=-1, kernel=h_disk)
h3 = cv2.filter2D(src=b, ddepth=-1, kernel=h)
```

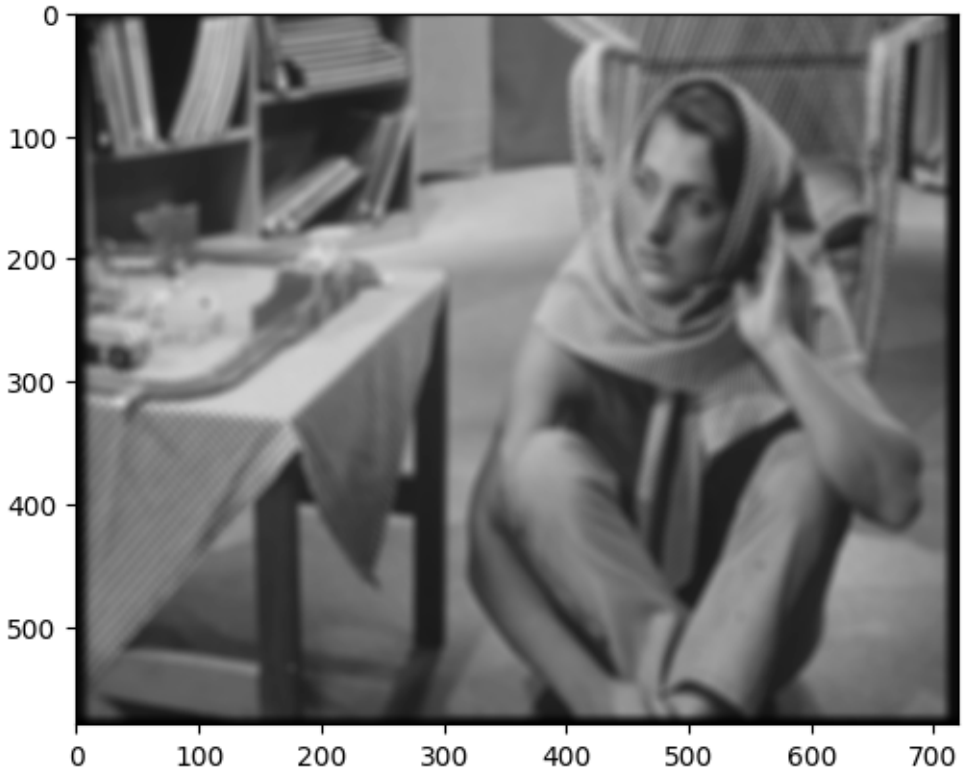
[ ]:
```
plt.imshow(h1, cmap="gray", vmin=0, vmax=255)
```

[ ]:
```
<matplotlib.image.AxesImage at 0x77b4dffef490>
```



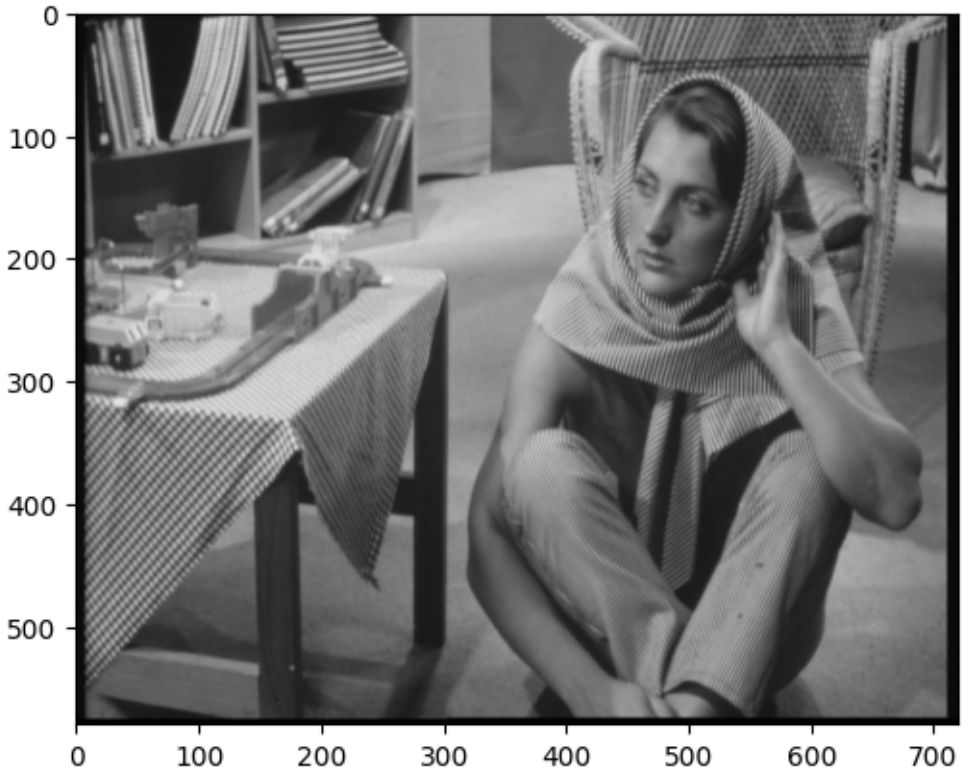
[ ]:
```
plt.imshow(h2, cmap="gray", vmin=0, vmax=255)
```

[ ]:
```
<matplotlib.image.AxesImage at 0x77b4ddd86350>
```



[ ]:
```
plt.imshow(h3, cmap="gray", vmin=0, vmax=255)
```

[ ]: <matplotlib.image.AxesImage at 0x77b4dd3124d0>



[ ]:
```
h1_image = Image.fromarray(h1)
h1_image.save(f"{OUTPUT_FOLDER_PATH}/python-ex2-unsharp.gif")
```

[ ]:
```
h2_image = Image.fromarray(h2, mode="L")
h2_image.save(f"{OUTPUT_FOLDER_PATH}/python-ex2-disk.gif")
```

[ ]:
```
h3_image = Image.fromarray(h3, mode="L")
h3_image.save(f"{OUTPUT_FOLDER_PATH}/python-ex2-other.gif")
```

Observamos que el disk vuelve más borrosa la imagen mientras que el unsharp acentua los cambios de intensidad. El último filtro, acentua las lineas verticales y horizontales pero pierden distinguibilidad las diagonales