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Processamento Digital de Imagens(PDI)

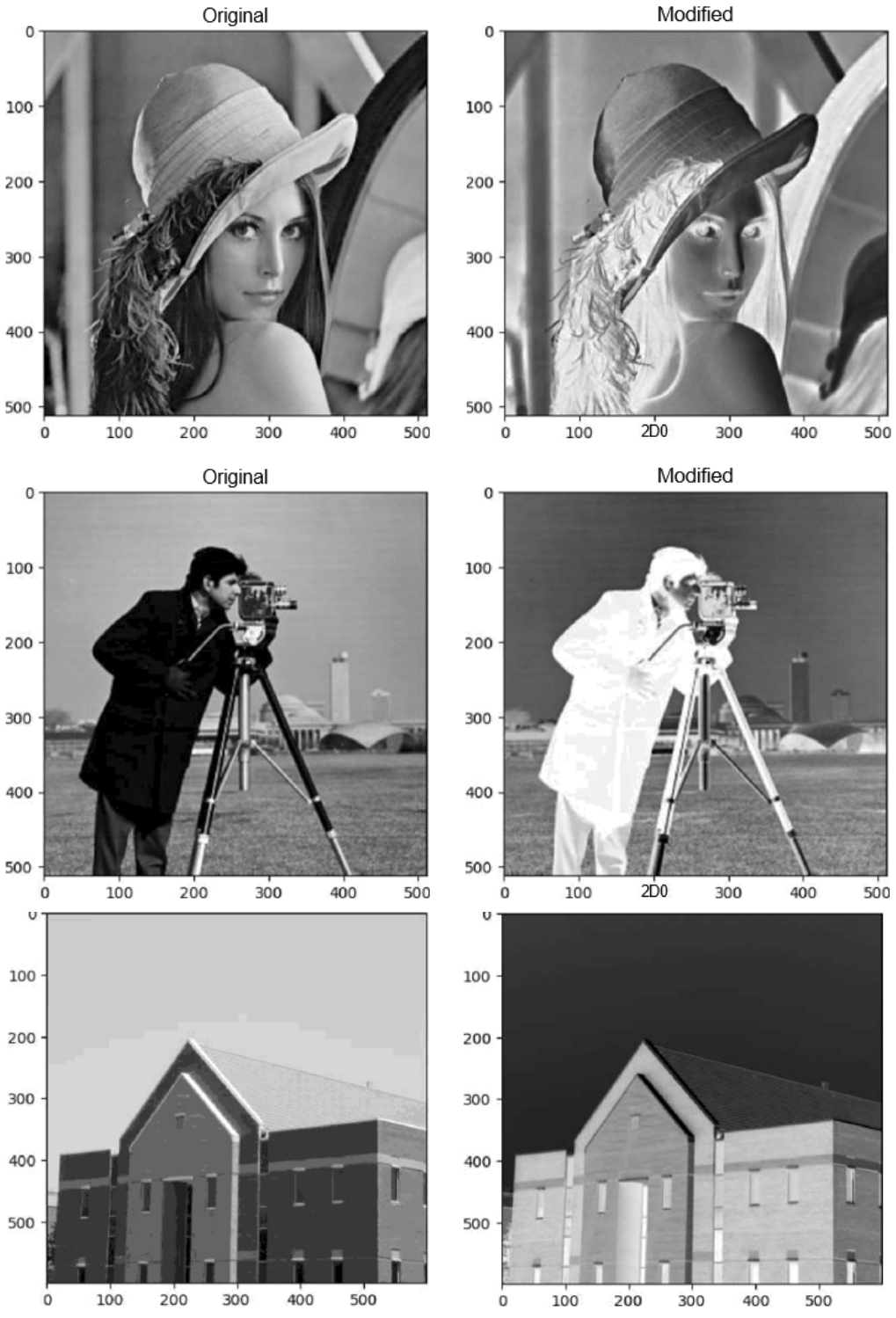
Exercícios- Fundamentos

Operação Ponto a Ponto

1. Calcular o Negativo das imagens.

```
from ast import main
import matplotlib.pyplot as plt
import numpy as np
from PIL import Image

paths = ['./lena_gray_512.tif', './cameraman.tif', './house.tif']
images = [np.array(Image.open(path)) for path in paths]

def invert_image(img: np.ndarray) -> np.ndarray:
    return 255 - img


def process(img, cb: callable) -> np.ndarray:
    inverted_img = cb(img.copy())

    plt1 = plt.subplot(1, 2, 1)
    plt1.imshow(img, cmap='gray')
    plt1.set_title('Original')
    plt2 = plt.subplot(1, 2, 2)
    plt2.imshow(inverted_img, cmap='gray')
    plt2.set_title('Modified')

plt.figure(figsize=(10, 10))

plt.show()


if __name__ =="__main__":
    main()
```

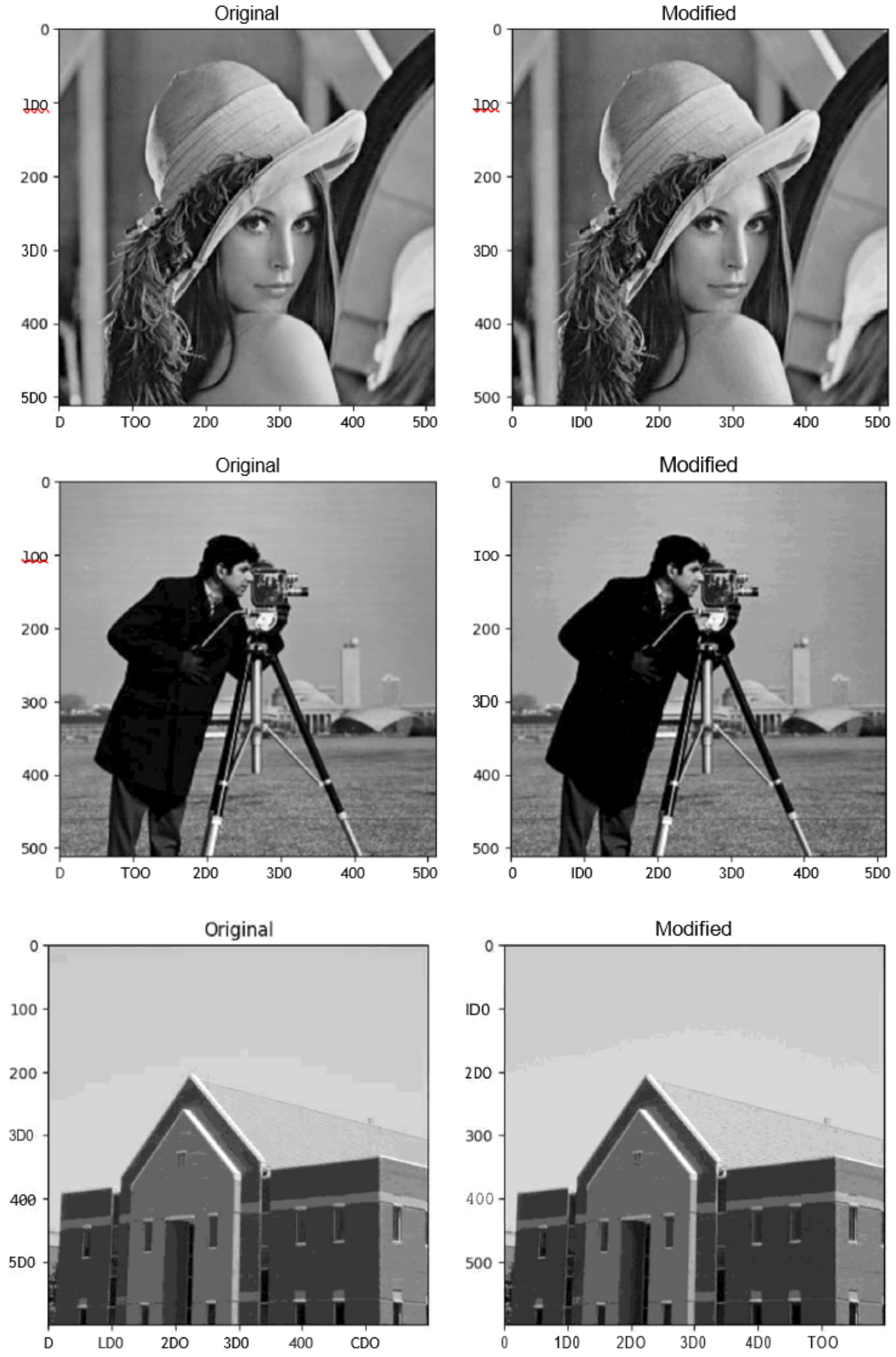
RESULTADOS:



2. Diminuir a intensidade dos pixels pela metade.

```
def half_intensity(img: np.ndarray) -> np.ndarray:
return img // 5
for_each_imgs(half_intensity)
```

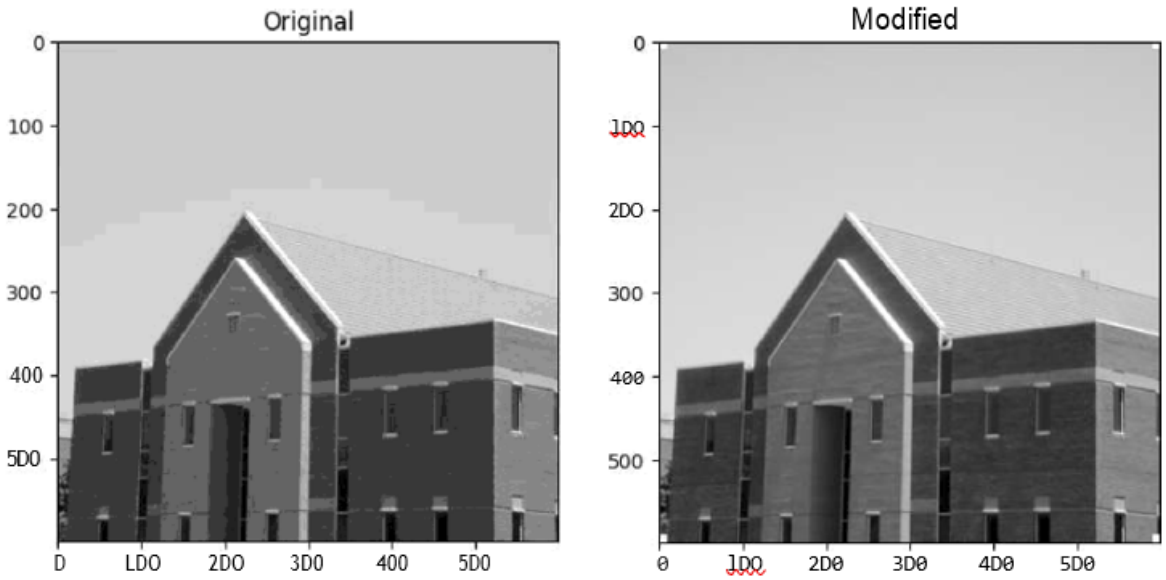
RESULTADOS:



3. Incluir quadrados brancos nos 4 cantos das imagens

```
square_size = 10
square_color = 255

def add_squares(img: np.ndarray) -> np.ndarray:

img[:square_size, :square_size] = square_color
img[:square_size, -square_size:] = square_color
img[-square_size:, :square_size] = square_color
img[-square_size:, -square_size:] = square_color

return img for_each_imgs(add_squares)
```

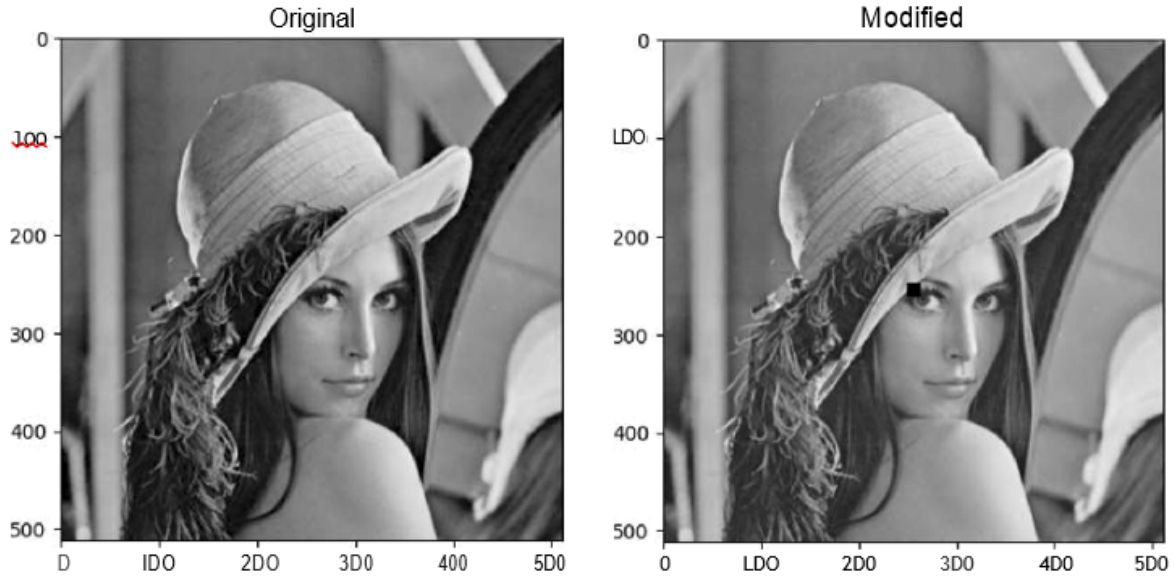
RESULTADOS:

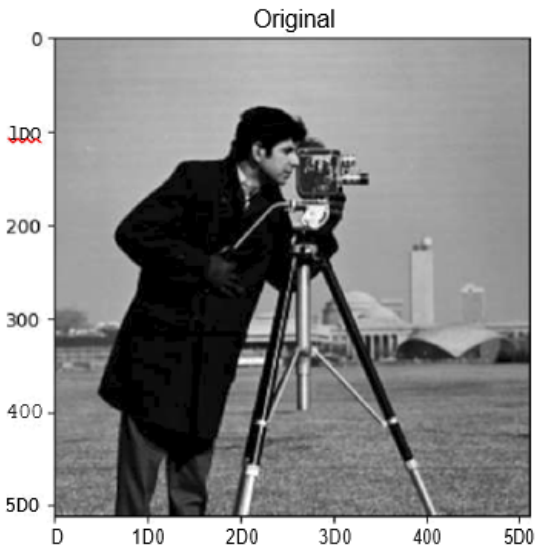


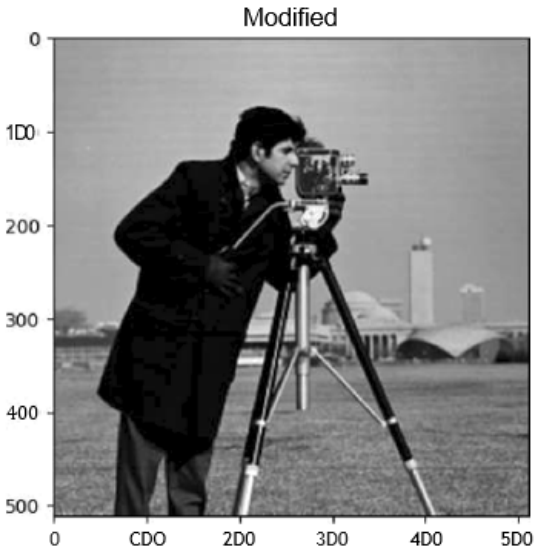
4. Incluir 1 quadrado no centro das imagens.

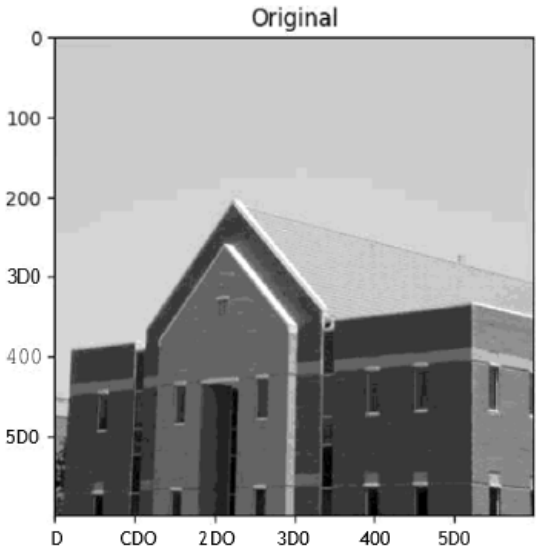
```
square_color = 0
square_size = 15

def add_square_center(img: np.ndarray) -> np.ndarray:
shape = img.shape

center = (shape[0] // 2, shape[1] // 2)

img[center[0] - square_size // 2:center[0] + square_size // 2,
center[1] - square_size // 2:center[1] + square_size // 2] =
square_color return img

for_each_imgs(add_square_center)
```

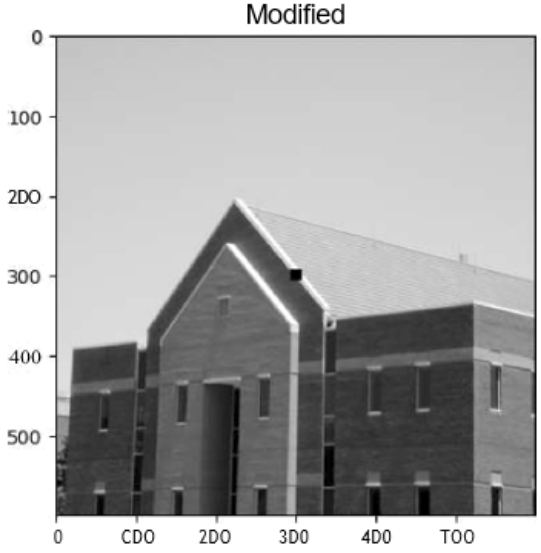
RESULTADOS:


Original
0
100
200
300
400
500
D
IDO
2DO
3D0
400
5D0
Modified
0
LDO
200
300
400
500
0
LDO
2D0
3D0
4D0
5D0


Original
0
1D0
200
300
400
5D0
D
1D0
2D0
3D0
400
5D0


Modified
0
1D0
200
300
400
500
0
CDO
2D0
3D0
4D0
5D0


Original
0
100
200
3D0
400
5D0
D
CDO
2DO
3D0
400
5D0


Modified
0
100
2DO
300
400
500
0
CDO
2DO
3D0
4D0
TOO