The Goal of this code:

Compare image enhancement for the same image in JPEG and PNG formats

Import necessary libraries

```
import cv2
import numpy as np
import matplotlib.pyplot as plt
```

Read the noisy image in JPEG format

```
img_jpg = cv2.imread('input.jpg')
```

Read the noisy image in JPEG format

```
img_png = cv2.imread('input.png')
```

Display a single image using Matplotlib.

Parameters:

- img (numpy.ndarray): The image to be displayed.
- title (str): Title for the image plot. Default is an empty string.
- fig_height (int): Height of the figure in inches. Default is 8.
- fig_width (int): Width of the figure in inches. Default is 6.

```
def show_img_plt(img, title='', fig_height=8, fig_width=6):
    plt.figure(figsize=(fig_height, fig_width))
    plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
    plt.title(title)
    plt.axis('off')
    plt.show()
```

Display multiple images using Matplotlib in a grid layout.

Parameters:

- rows (int): Number of rows in the grid layout.
- columns (int): Number of columns in the grid layout.
- img_names (list): List of images to be displayed.
- titles (list): List of titles for each image. Default is None.
- cmap (str or None): Colormap for the images. Default is None.
- vmin (float or None): Minimum value for colormap normalization. Default is 0.
- vmax (float or None): Maximum value for colormap normalization. Default is 255.

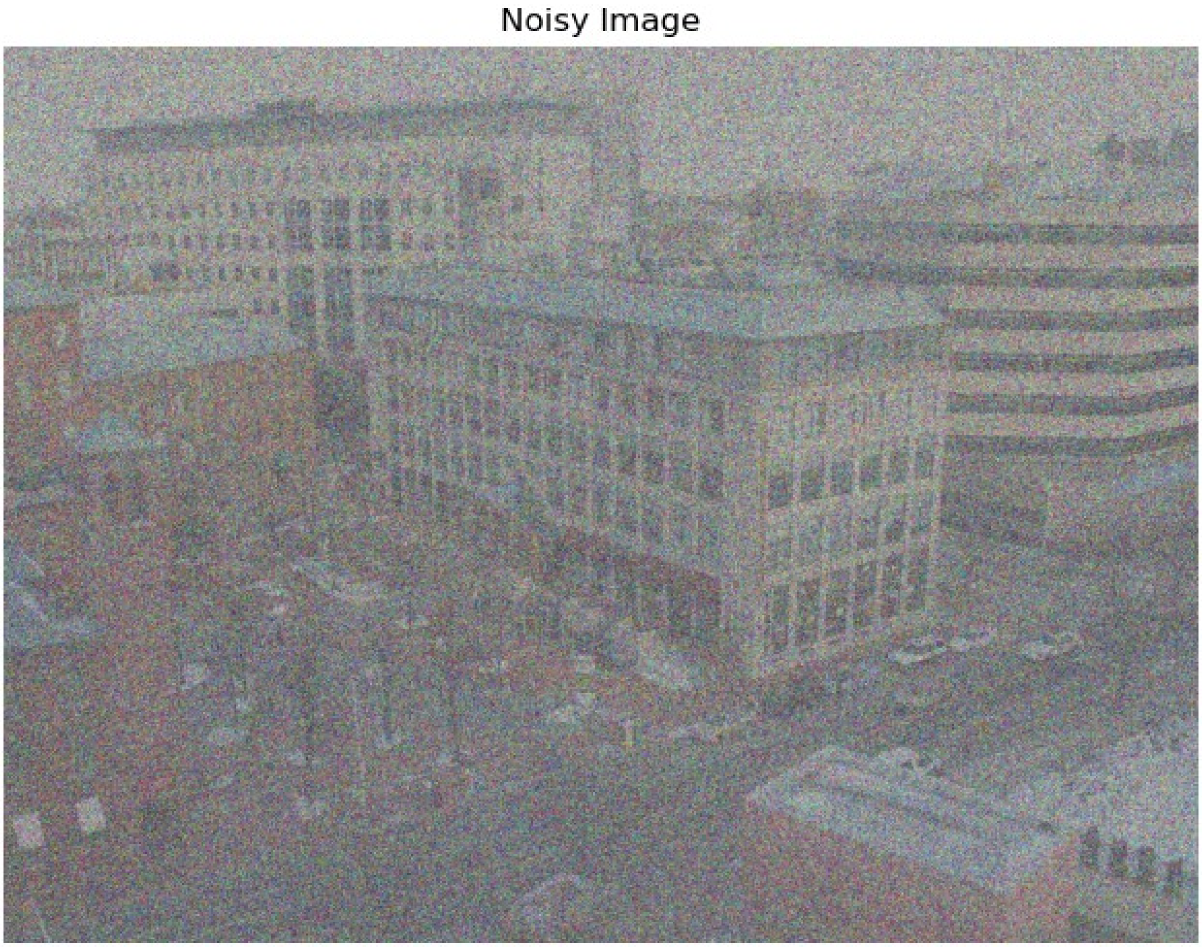
```
def show_mult_img_plt(rows, columns, img_names, titles=None,
cmap=None, vmin=0, vmax=255):
    fig = plt.figure(figsize=(15, 17), dpi=100)
    for i in range(len(img_names)):
        ax = fig.add_subplot(rows, columns, i + 1)
        ax.imshow(cv2.cvtColor(img_names[i], cv2.COLOR_BGR2RGB),
cmap=cmap, vmin=vmin, vmax=vmax)
        ax.axis('off')
        if titles:
            ax.set_title(titles[i])
```

Define the function to remove noise and show images to compare them

```
def denoise(img):
    # Show the original noisy image
    show_img_plt(img, title='Noisy Image', fig_height=8, fig_width=6)

    # Denoising process:
    # Step 1: Apply median filter twice to reduce noise
    median_image = cv2.medianBlur(img, 3)
    median_image2 = cv2.medianBlur(median_image, 3)

    # Step 2: Apply Gaussian filter to further enhance denoising
    gaussian_blurred = cv2.GaussianBlur(median_image2, (3, 3), 0)

    # Enhancement using CLAHE method
    # Split the image into its RGB channels
    r, g, b = cv2.split(gaussian_blurred)

    # Apply Contrast Limited Adaptive Histogram Equalization (CLAHE)
to each channel
    clahe = cv2.createCLAHE(clipLimit=50)
    cl_r = clahe.apply(r)
    cl_g = clahe.apply(g)
    cl_b = clahe.apply(b)

    # Merge the enhanced channels back into a single image
    output = cv2.merge((cl_r, cl_g, cl_b))

    return output
```

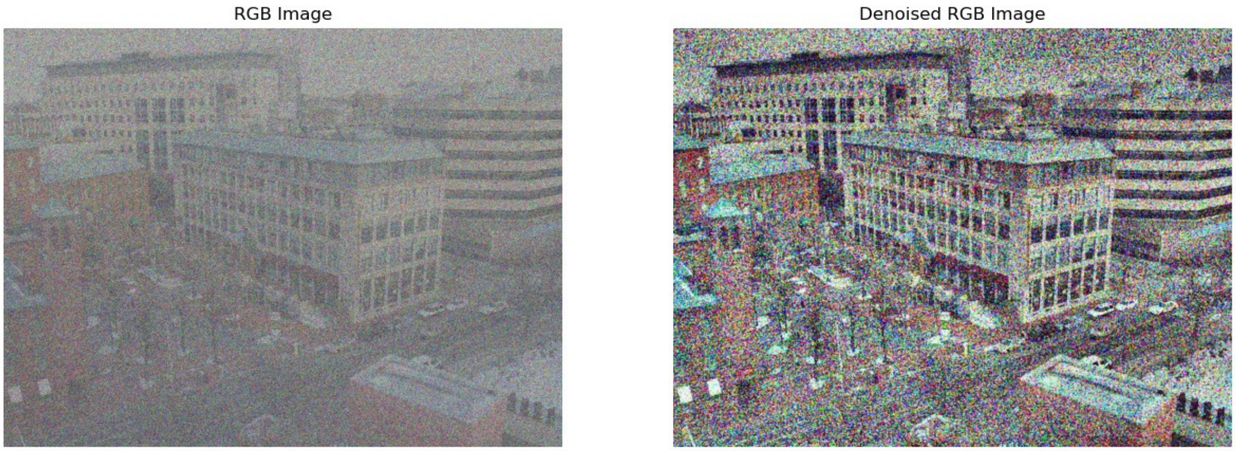
Denoise the image in JPEG format

```
output_jpg = denoise(img_jpg)
```



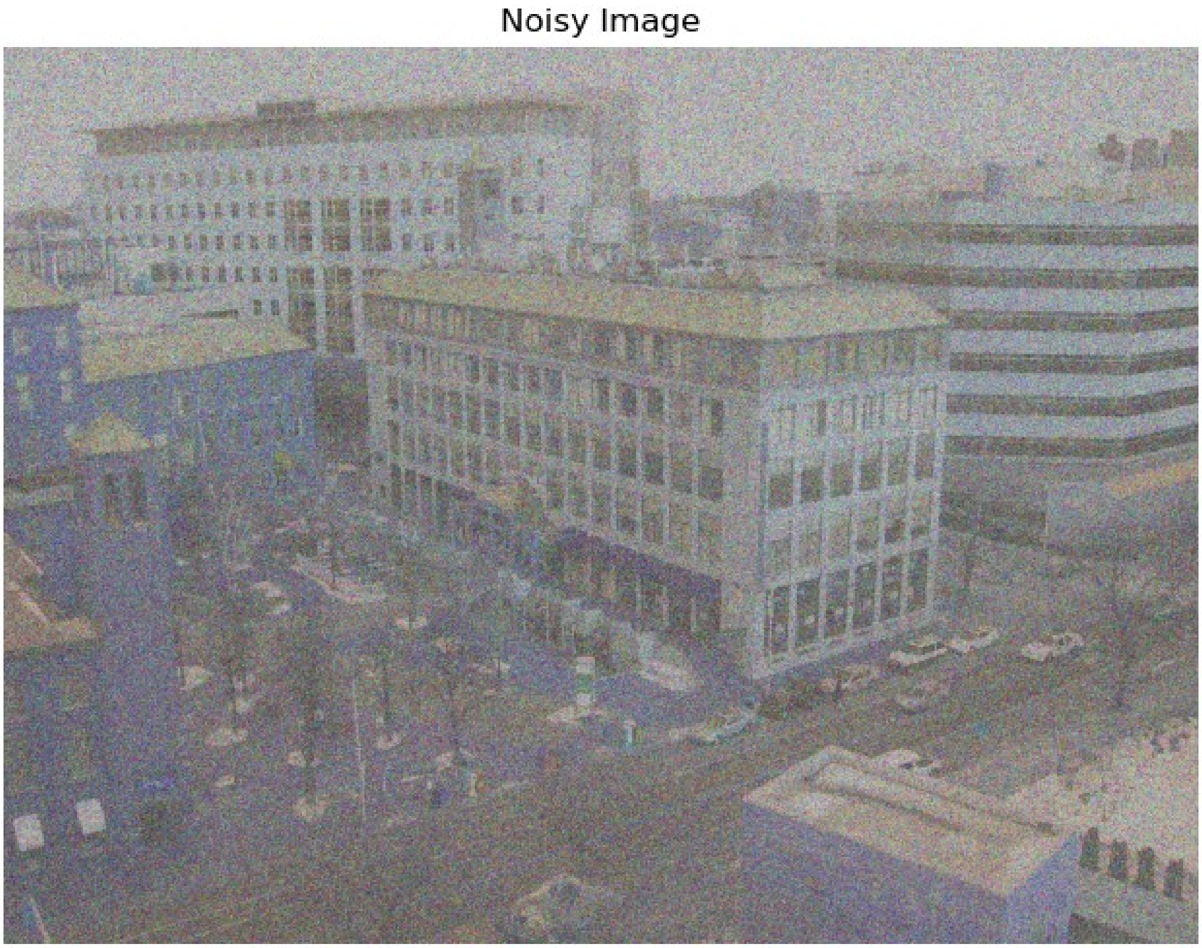
Display the denoised and enhanced image

```
show_mult_img_plt(1, 2, [img_jpg, output_jpg], ['RGB Image', 'Denoised
RGB Image'])
```



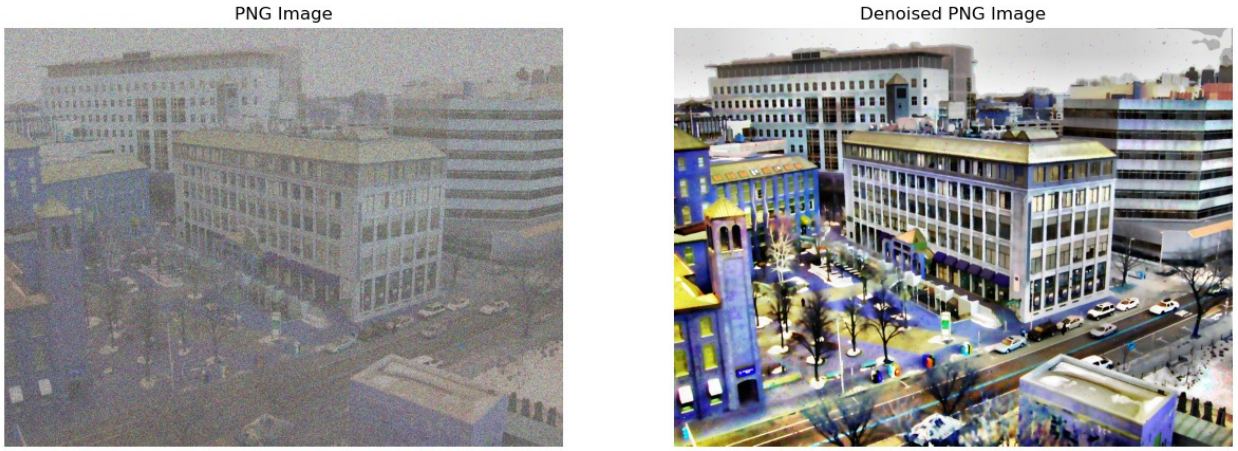
Denoise the image in PNG format

```
output_png = denoise(img_png)
```



Display the denoised and enhanced image

```
show_mult_img_plt(1, 2, [img_png, output_png], ['PNG Image', 'Denoised
PNG Image'])
```



Conclusion:

In this code, we compared the performance of image enhancement techniques on the same image stored in both JPEG and PNG formats. Generally, PNG images tend to retain more data due to their lossless compression, resulting in potentially better performance for image enhancement tasks. However, the actual improvement may vary depending on the specific characteristics of the images and the enhancement techniques applied.