Edge detection using Canny, Prewitt, and Gaussian Blur

Edge detection is an image processing technique used to identify edges

How are edges detected?

Sudden changes in pixel intensity characterize edges.We look for such changes in the neighboring pixels to detect edges

Canny edge detection

it is a three stage process for extracting edges from an image

1)Noise reduction

2)Calculating the Intensity Gradient of the Image

3)Suppression of False Edges

4)Hysteresis Thresholding

In [9]:

```
pip install opencv-python
```

```
Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: opencv-python in c:\users\kamal\appdata\roamin
g\python\python310\site-packages (4.9.0.80)
Requirement already satisfied: numpy>=1.21.2 in c:\program files\anaconda\lib
\site-packages (from opencv-python) (1.23.5)
Note: you may need to restart the kernel to use updated packages.
```

In [10]:

```
from skimage.io import imread
from matplotlib.pyplot import imshow
from matplotlib.pyplot import plot,subplot
import matplotlib.pyplot as plt
import cv2
import numpy as np
plt.style.use('seaborn')
```

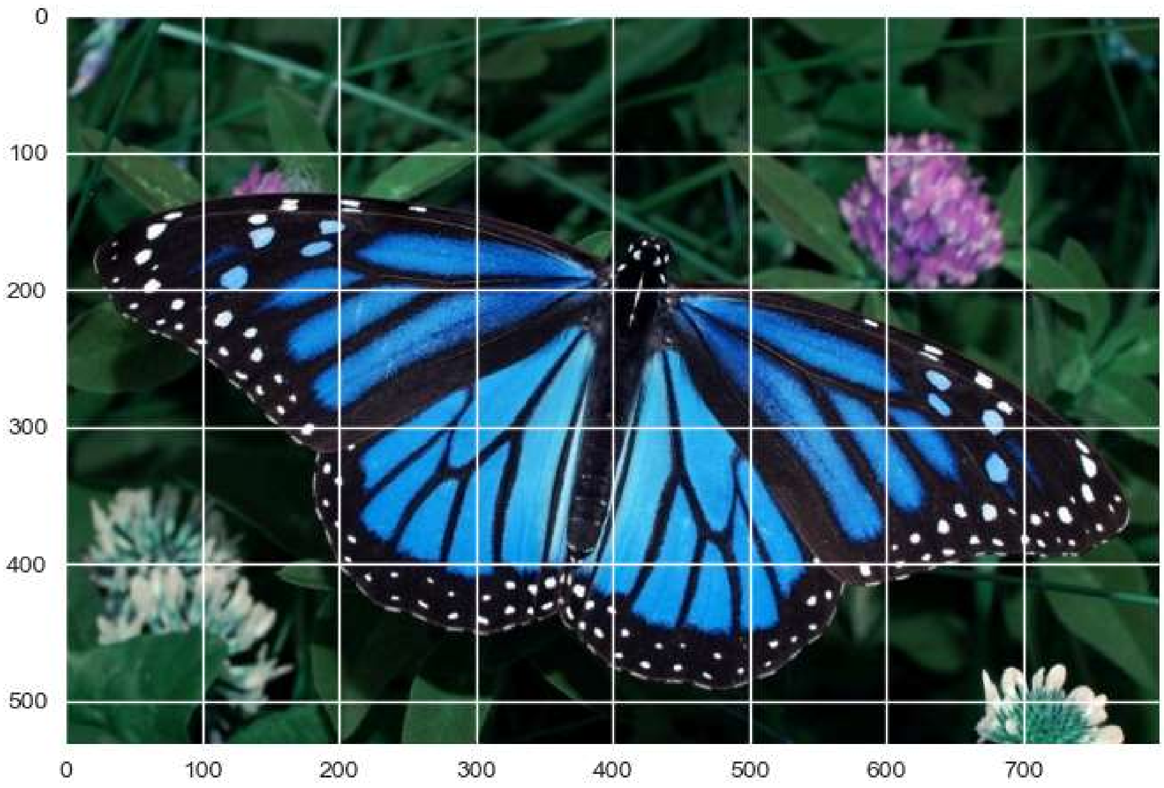
```
C:\Users\kamal\AppData\Local\Temp\ipykernel_9820\1156266310.py:7: MatplotlibD
eprecationWarning: The seaborn styles shipped by Matplotlib are deprecated si
nce 3.6, as they no longer correspond to the styles shipped by seaborn. Howev
er, they will remain available as 'seaborn-v0_8-<style>'. Alternatively, dire
ctly use the seaborn API instead.
  plt.style.use('seaborn')
```

In [11]:

```
butterfly = cv2.imread('butterfly.jpg')
imshow(butterfly)
```

Out[11]:

```
<matplotlib.image.AxesImage at 0x2588993f460>
```



In [12]:

```
image1 = cv2.imread('butterfly.jpg', cv2.IMREAD_GRAYSCALE)
```

converting image into rgb format

In [13]:

```
image_colour = cv2.cvtColor(image1,cv2.COLOR_BGR2RGB)
```

In [17]:
```
print(image1.dtype)
print(image1.shape)
```

```
uint8
(532, 800)
```

converting to grayscale

In [22]:
```
gray_image = cv2.cvtColor(butterfly,cv2.COLOR_BGR2GRAY)
```

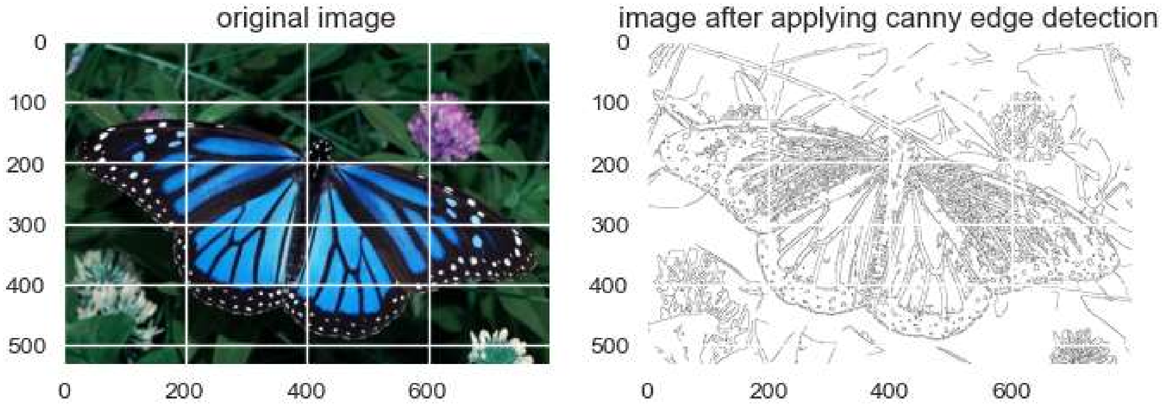
applying canny edge detection

In [23]:
```
edged_image = cv2.Canny(gray_image, threshold1 = 30, threshold2 = 100)
```

In [24]:
```
subplot(1,2,1)
imshow(butterfly)
plt.title('original image')

subplot(1,2,2)
imshow(edged_image)
plt.title('image after applying canny edge detection')
```

Out[24]:
```
Text(0.5, 1.0, 'image after applying canny edge detection')
```



applying prewitt operator for edge detection

In [25]:
```
prewitt_x = cv2.filter2D(image1, -1, np.array([[-1, 0, 1], [-1, 0, 1], [-1, 0,
prewitt_y = cv2.filter2D(image1, -1, np.array([[-1, -1, -1], [0, 0, 0], [1, 1,
```

Combining the edge-detected images prewitt_x and prewitt_y

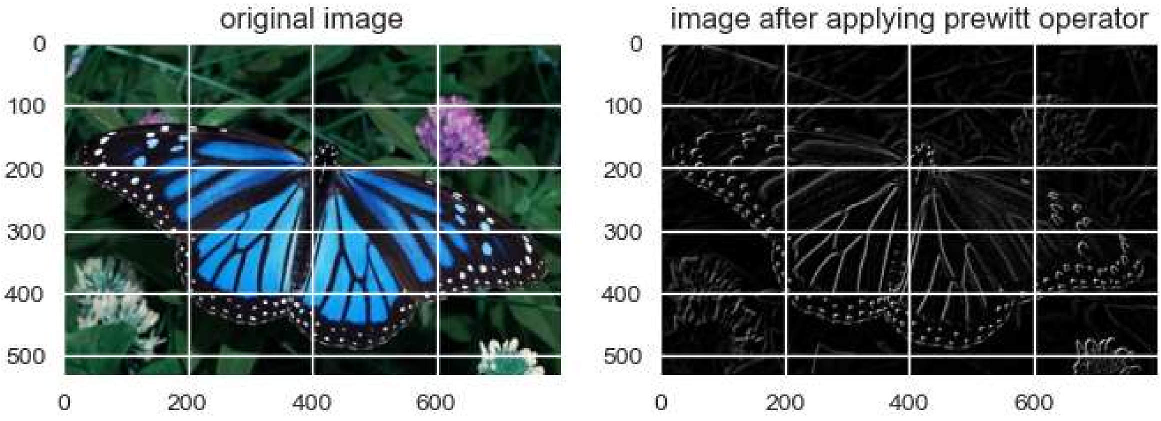
In [26]:

```
prewitt_edges = cv2.addWeighted(prewitt_x, 0.5, prewitt_y, 0.5, 0)
```

In [27]:

```
subplot(1,2,1)
imshow(butterfly)
plt.title('original image')

subplot(1,2,2)
plt.imshow(prewitt_edges, cmap = 'gray')
plt.title('image after applying prewitt operator')
plt.show()
```



Gaussian blur

applying gaussian blur to image

In [28]:

```
blurred1 = cv2.GaussianBlur(image1, (5, 5), 0)
blurred2 = cv2.GaussianBlur(image1, (9, 9), 0)
```

calculating difference of gaussian

In [29]:

```
dog = blurred1 - blurred2
```

In [ ]:

```

```

Applying a binary thresholding to the DoG image

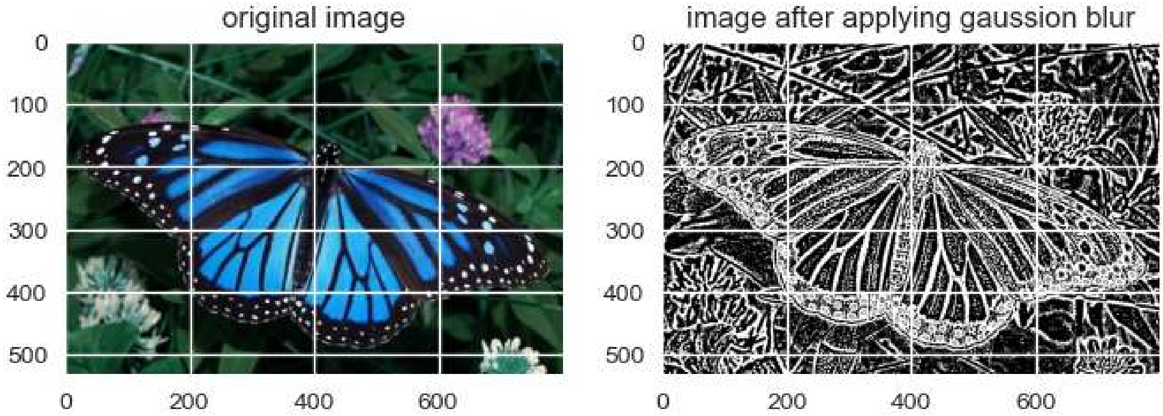
In [30]:

```
_, edges = cv2.threshold(dog, 30, 255, cv2.THRESH_BINARY)
```

In [31]:

```
subplot(1,2,1)
imshow(butterfly)
plt.title('original image')

subplot(1,2,2)
plt.imshow(edges, cmap='gray')
plt.title('image after applying gaussion blur')
plt.show()
```

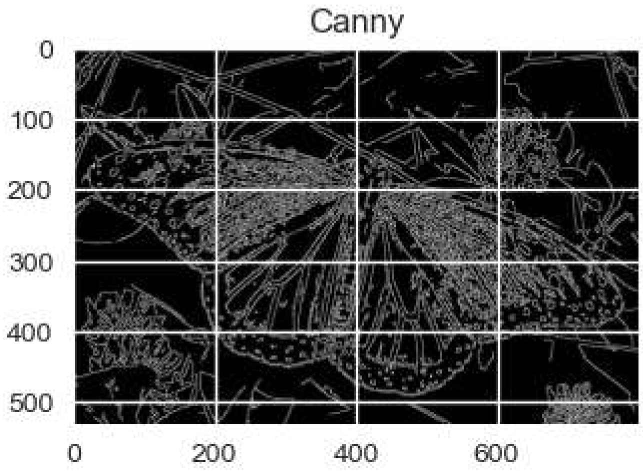


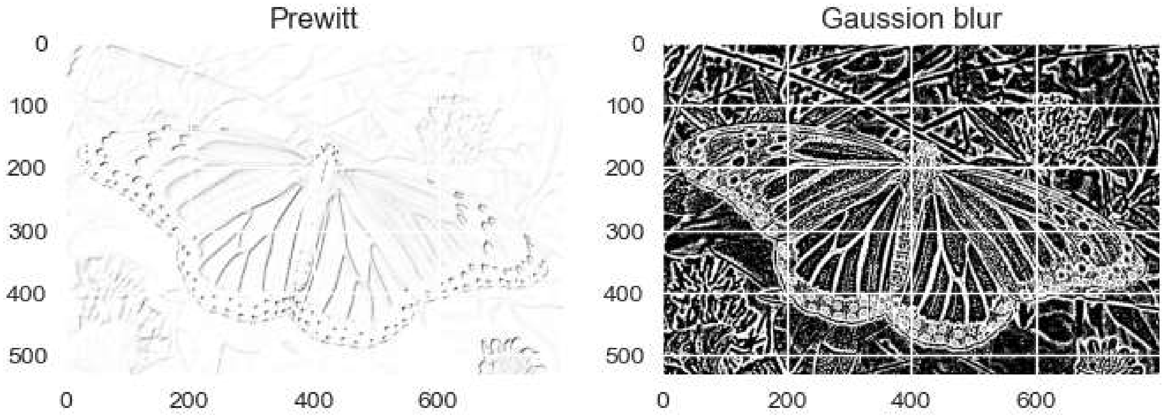
Comparing all the three image outputs

In [32]:
```
subplot(2,2,1)
plt.imshow(edged_image, cmap='gray')
plt.title('Canny')
plt.show()

subplot(2,2,3)
imshow(prewitt_edges)
plt.title('Prewitt')

subplot(2,2,4)
plt.imshow(edges, cmap='gray')
plt.title('Gaussion blur')
plt.show()
```





CONCLUSION

For tasks demanding high accuracy, the Canny edge detector is often the preferred choice due to its ability to deliver precise results in intricate settings. On the other hand, if speed and simplicity are more important, Sobel or Prewitt edge detectors can be a good option, although they may provide less detailed edge detection.

```
In [ ]:
```