ipcv-lab1

August 8, 2024

[1]:
```
pip install opencv-python
```

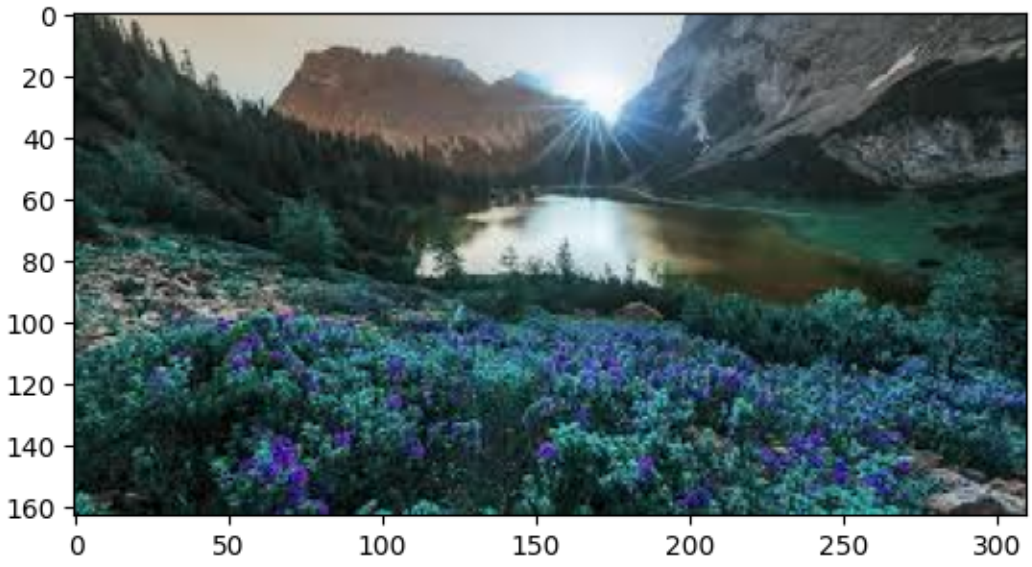
```
Requirement already satisfied: opencv-python in /usr/local/lib/python3.10/dist-
packages (4.10.0.84)
Requirement already satisfied: numpy>=1.21.2 in /usr/local/lib/python3.10/dist-
packages (from opencv-python) (1.26.4)
```

[2]:
```
import matplotlib.pyplot as plt
import cv2
```

[3]:
```
IMG_PATH="nature.jpg"
img=cv2.imread(IMG_PATH,1)
```

[4]:
```
plt.imshow(img)
```

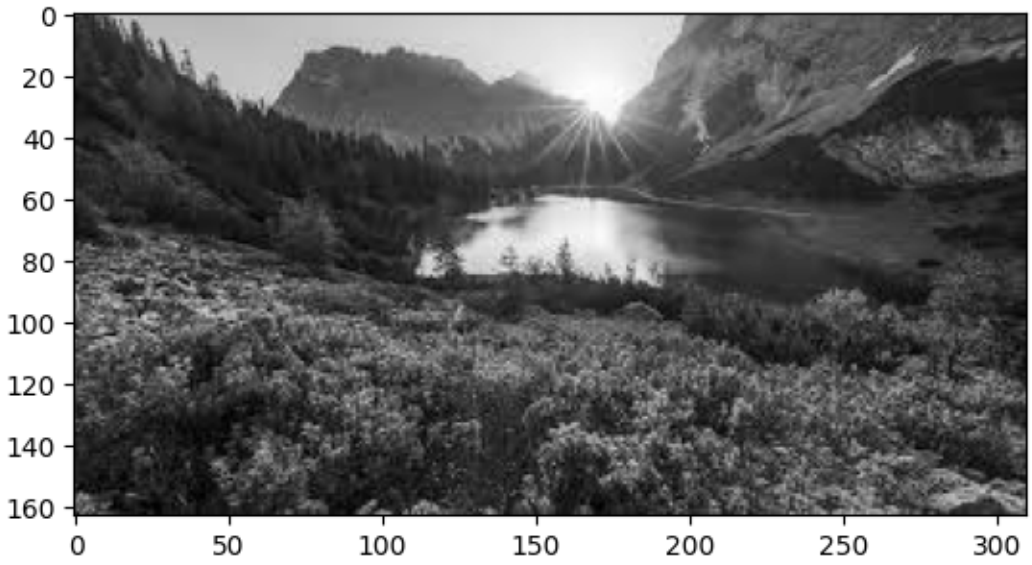
[4]:
```
<matplotlib.image.AxesImage at 0x7fc1e0e34310>
```



0.1 Convert the image to grayscale

[5]:
```
grey_img=cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
plt.imshow(grey_img, cmap="gray")
```

[5]:
```
<matplotlib.image.AxesImage at 0x7fc1e0d841c0>
```



0.2 Implementing image cropping functionality

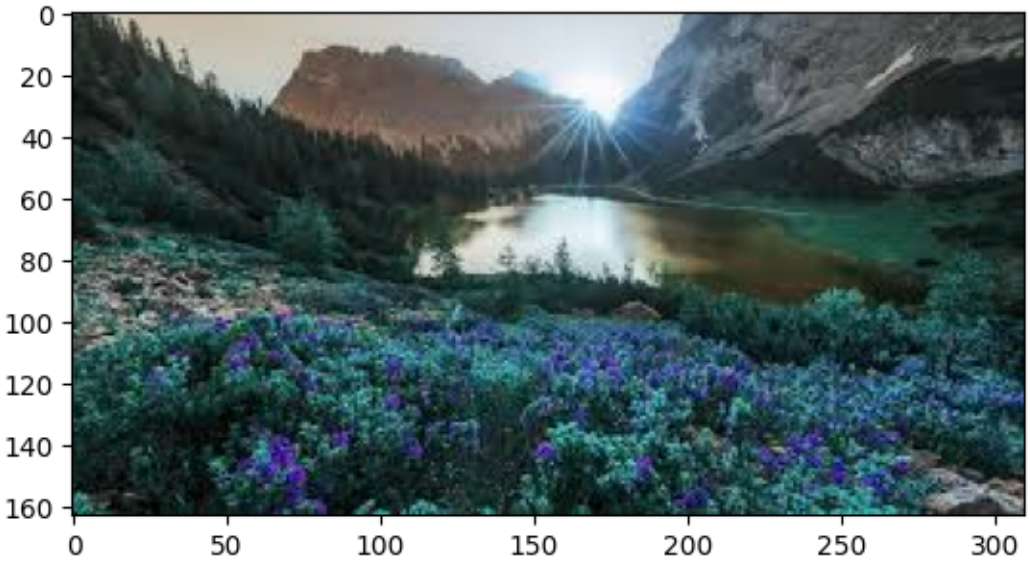
[6]:
```
x,y,w,h=100,100,400,400
```

[7]:
```
crop_img=img[y:y+h,x:x+w]
```

[12]:
```
img_a=cv2.imread("nature.jpg",1)
```

[13]:
```
plt.imshow(img_a)
```

[13]:
```
<matplotlib.image.AxesImage at 0x7fc1e022a7a0>
```



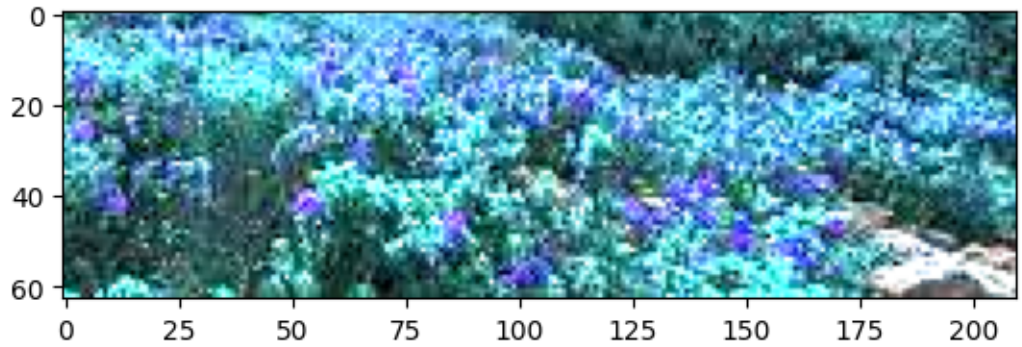
0.3 Arithmetic Addition operations on the image

[14]:
```
x,y,w,h=100,100,400,400
crop_img_a=img_a[y:y+h,x:x+w]
```

0.4 Arithmetic Subtraction operations on the image

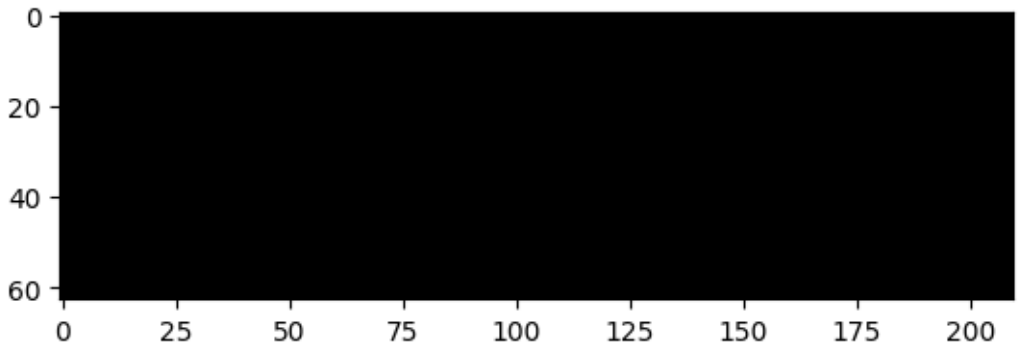
[15]:
```
add_img=cv2.add(crop_img,crop_img_a)
plt.imshow(add_img)
```

[15]:
```
<matplotlib.image.AxesImage at 0x7fc1e02b8df0>
```



[16]:
```
sub_img=cv2.subtract(crop_img,crop_img_a)
plt.imshow(sub_img)
```

[16]:
```
<matplotlib.image.AxesImage at 0x7fc1e0132050>
```



[18]:
```
pip install tensorflow
```

```
Requirement already satisfied: tensorflow in /usr/local/lib/python3.10/dist-
packages (2.17.0)
Requirement already satisfied: absl-py>=1.0.0 in /usr/local/lib/python3.10/dist-
packages (from tensorflow) (1.4.0)
Requirement already satisfied: astunparse>=1.6.0 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers>=24.3.25 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (24.3.25)
Requirement already satisfied: gast!=0.5.0,!=0.5.1,!=0.5.2,>=0.2.1 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (0.6.0)
Requirement already satisfied: google-pasta>=0.1.1 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (0.2.0)
Requirement already satisfied: h5py>=3.10.0 in /usr/local/lib/python3.10/dist-
packages (from tensorflow) (3.11.0)
Requirement already satisfied: libclang>=13.0.0 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (18.1.1)
Requirement already satisfied: ml-dtypes<0.5.0,>=0.3.1 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (0.4.0)
Requirement already satisfied: opt-einsum>=2.3.2 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (3.3.0)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-
packages (from tensorflow) (24.1)
Requirement already satisfied:
protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<5.0.0dev,>=3.20.3
in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.20.3)
Requirement already satisfied: requests<3,>=2.21.0 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (2.32.3)
```

```
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-
packages (from tensorflow) (71.0.4)
Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.10/dist-
packages (from tensorflow) (1.16.0)
Requirement already satisfied: termcolor>=1.1.0 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (2.4.0)
Requirement already satisfied: typing-extensions>=3.6.6 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (4.12.2)
Requirement already satisfied: wrapt>=1.11.0 in /usr/local/lib/python3.10/dist-
packages (from tensorflow) (1.16.0)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (1.64.1)
Requirement already satisfied: tensorboard<2.18,>=2.17 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (2.17.0)
Requirement already satisfied: keras>=3.2.0 in /usr/local/lib/python3.10/dist-
packages (from tensorflow) (3.4.1)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (0.37.1)
Requirement already satisfied: numpy<2.0.0,>=1.23.5 in
/usr/local/lib/python3.10/dist-packages (from tensorflow) (1.26.4)
Requirement already satisfied: wheel<1.0,>=0.23.0 in
/usr/local/lib/python3.10/dist-packages (from astunparse>=1.6.0->tensorflow)
(0.44.0)
Requirement already satisfied: rich in /usr/local/lib/python3.10/dist-packages
(from keras>=3.2.0->tensorflow) (13.7.1)
Requirement already satisfied: namex in /usr/local/lib/python3.10/dist-packages
(from keras>=3.2.0->tensorflow) (0.0.8)
Requirement already satisfied: optree in /usr/local/lib/python3.10/dist-packages
(from keras>=3.2.0->tensorflow) (0.12.1)
Requirement already satisfied: charset-normalizer<4,>=2 in
/usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorflow)
(3.3.2)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-
packages (from requests<3,>=2.21.0->tensorflow) (3.7)
Requirement already satisfied: urllib3<3,>=1.21.1 in
/usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorflow)
(2.0.7)
Requirement already satisfied: certifi>=2017.4.17 in
/usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorflow)
(2024.7.4)
Requirement already satisfied: markdown>=2.6.8 in
/usr/local/lib/python3.10/dist-packages (from
tensorboard<2.18,>=2.17->tensorflow) (3.6)
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in
/usr/local/lib/python3.10/dist-packages (from
tensorboard<2.18,>=2.17->tensorflow) (0.7.2)
Requirement already satisfied: werkzeug>=1.0.1 in
/usr/local/lib/python3.10/dist-packages (from
```

```
tensorboard<2.18,>=2.17->tensorflow) (3.0.3)
Requirement already satisfied: MarkupSafe>=2.1.1 in
/usr/local/lib/python3.10/dist-packages (from
werkzeug>=1.0.1->tensorboard<2.18,>=2.17->tensorflow) (2.1.5)
Requirement already satisfied: markdown-it-py>=2.2.0 in
/usr/local/lib/python3.10/dist-packages (from rich->keras>=3.2.0->tensorflow)
(3.0.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in
/usr/local/lib/python3.10/dist-packages (from rich->keras>=3.2.0->tensorflow)
(2.16.1)
Requirement already satisfied: mdurl~=0.1 in /usr/local/lib/python3.10/dist-
packages (from markdown-it-py>=2.2.0->rich->keras>=3.2.0->tensorflow) (0.1.2)
```

[19]:
```
import tensorflow as tf
import numpy as np
```

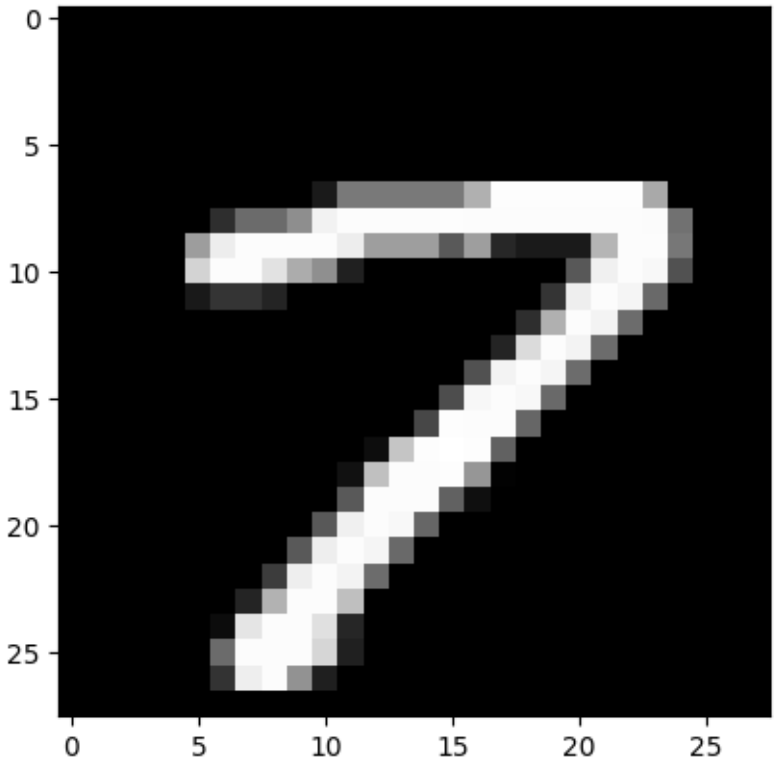
0.5 Reading the MNIST dataset

[20]:
```
(x_train, y_train),(x_test, y_test)= tf.keras.datasets.mnist.load_data()
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-
datasets/mnist.npz
11490434/11490434             0s
0us/step
```

[21]:
```
digit_value=7
indices=np.where(y_train==digit_value)[0]

random_index=np.random.choice(indices)
random_image=x_train[random_index]
plt.imshow(random_image, cmap='gray')
```

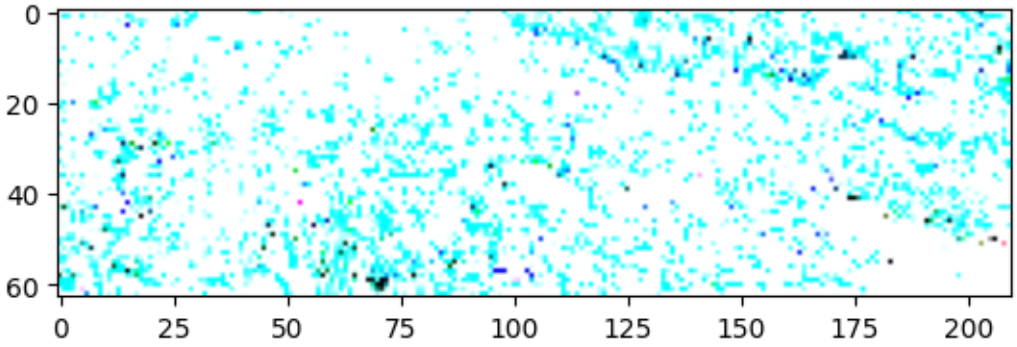
[21]:
```
<matplotlib.image.AxesImage at 0x7fc16bb2a9e0>
```



0.6 Aritmetic multiplication operations

[34]:
```
mul_img=cv2.multiply(crop_img,crop_img_a)
plt.imshow(mul_img)
```

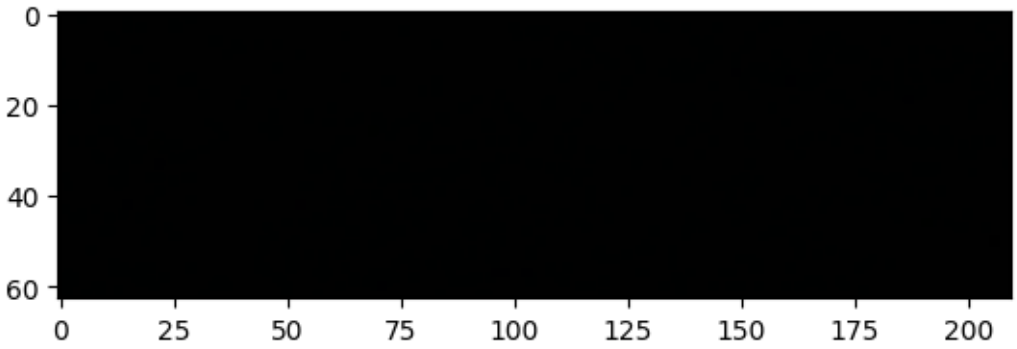
[34]:
```
<matplotlib.image.AxesImage at 0x7fc1682ccc70>
```



0.7 Aritmetic division operations

[36]:
```
div_img = cv2.divide(crop_img, crop_img_a)
plt.imshow(div_img)
```

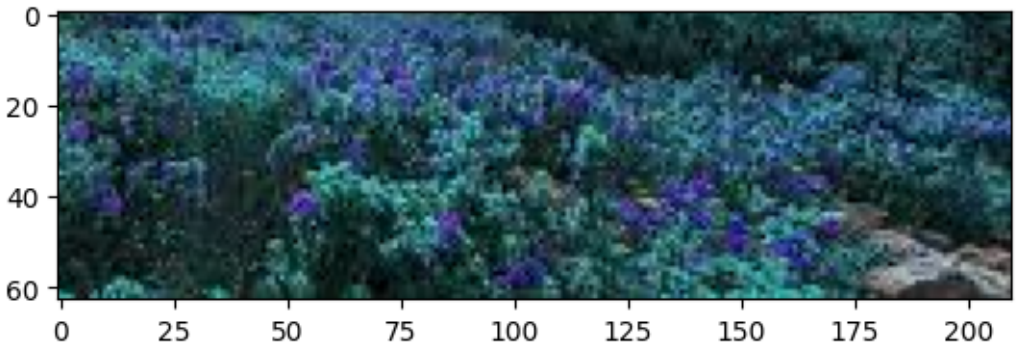
[36]: <matplotlib.image.AxesImage at 0x7fc16804ead0>



0.8 Perform arithmetic blending operations on the images

[37]:
```
alpha = 0.5
beta = 0.5
blend_img = cv2.addWeighted(crop_img, alpha, crop_img_a, beta, 0)
plt.imshow(blend_img)
```

[37]: <matplotlib.image.AxesImage at 0x7fc1680c06a0>



0.9 Implementing AND, OR, NOT, XOR logical operations on the images

[22]:
```
bitwise_and=cv2.bitwise_and(crop_img,crop_img_a, mask=None)
```

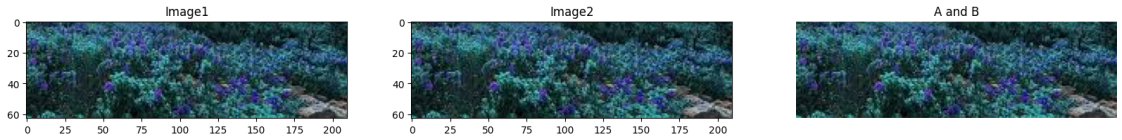
[23]:
```
bitwise_or=cv2.bitwise_or(crop_img,crop_img_a, mask=None)
```

[24]:
```
bitwise_not=cv2.bitwise_not(crop_img, mask=None)
```

[25]:
```
bitwise_xor=cv2.bitwise_xor(crop_img,crop_img_a, mask=None)
```

[26]:
```
fig=plt.figure(figsize=(20,5))

plt.subplot(1,3,1)
plt.imshow(crop_img)
plt.title('Image1')

plt.subplot(1,3,2)
plt.imshow(crop_img_a)
plt.title('Image2')

fig.add_subplot(1,3,3)
plt.imshow(bitwise_and)
plt.axis('off')
plt.title("A and B")
```

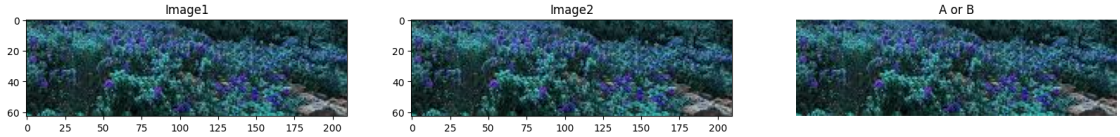
[26]:
```
Text(0.5, 1.0, 'A and B')
```



[27]:
```
fig=plt.figure(figsize=(20,7))

plt.subplot(1,3,1)
plt.imshow(crop_img)
plt.title('Image1')

plt.subplot(1,3,2)
plt.imshow(crop_img_a)
plt.title('Image2')

fig.add_subplot(1,3,3)
plt.imshow(bitwise_or)
plt.axis('off')
```

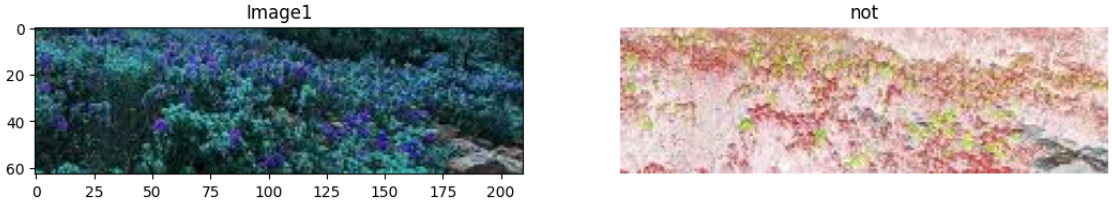
```
plt.title("A or B")
```

[27]:
```
Text(0.5, 1.0, 'A or B')
```



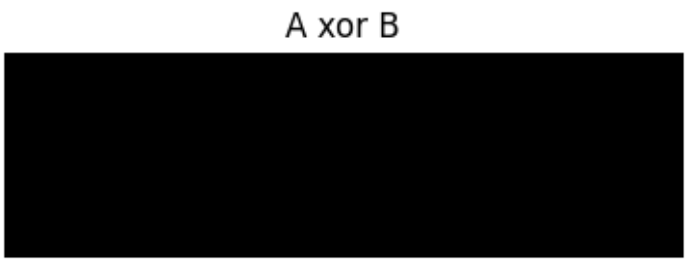
[28]:
```
fig=plt.figure(figsize=(20,7))

plt.subplot(1,3,1)
plt.imshow(crop_img)
plt.title('Image1')



fig.add_subplot(1,3,2)
plt.imshow(bitwise_not)
plt.axis('off')
plt.title("not")
```

[28]:
```
Text(0.5, 1.0, 'not')
```

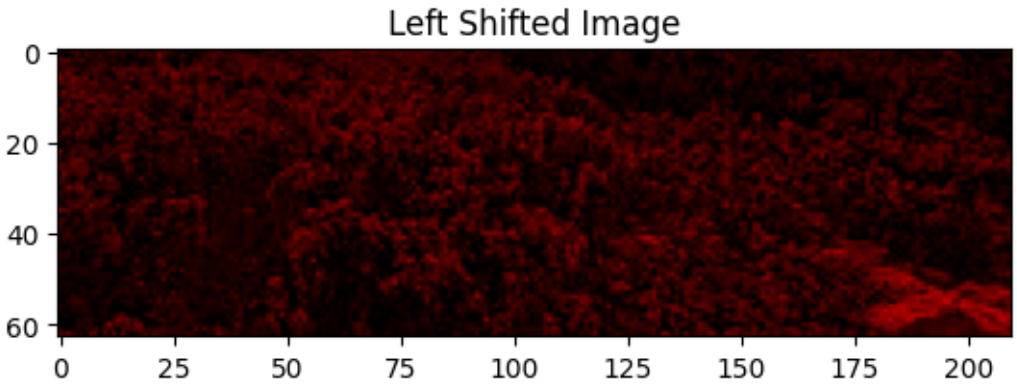


[29]:
```
fig=plt.figure(figsize=(10,5))
fig.add_subplot(2,2,4)
plt.imshow(bitwise_xor)
plt.axis('off')
plt.title("A xor B")
```

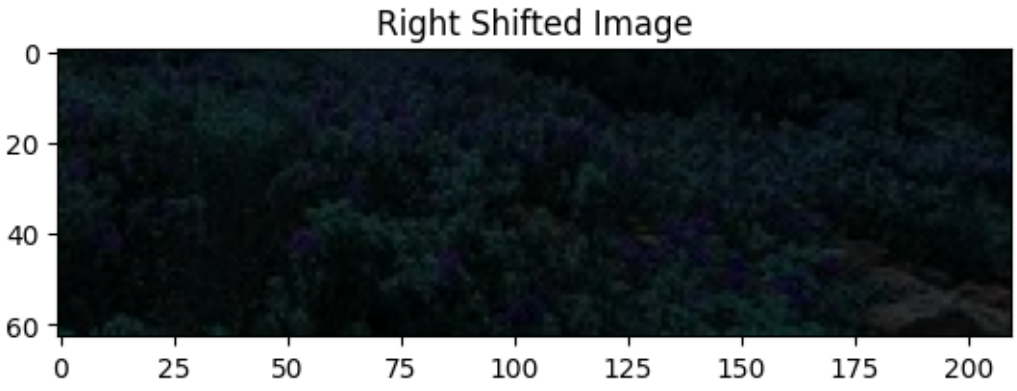
[29]:
```
Text(0.5, 1.0, 'A xor B')
```



[31]:
```
num_bits = 2
left_shifted_img = cv2.bitwise_and(crop_img, 255 << num_bits)

plt.imshow(left_shifted_img)
plt.title("Left Shifted Image")
plt.show()
```



[32]:
```
num_bits = 2
right_shifted_img = crop_img >> num_bits

plt.imshow(right_shifted_img)
plt.title("Right Shifted Image")
plt.show()
```


Right Shifted Image
0
20
40
60
0
25
50
75
100
125
150
175
200