Digital Image Processing

Lab 04

Image Preprocessing (Edge Detection)

---

01. Extracting Colors Channel

Read the image and extract its color channel as

- **grayscale image**
- **color images**

Then display the images to verify the operations has succeeded.

In [1]:

```
import cv2
%matplotlib inline
import matplotlib.pyplot as plt
```

In [2]:

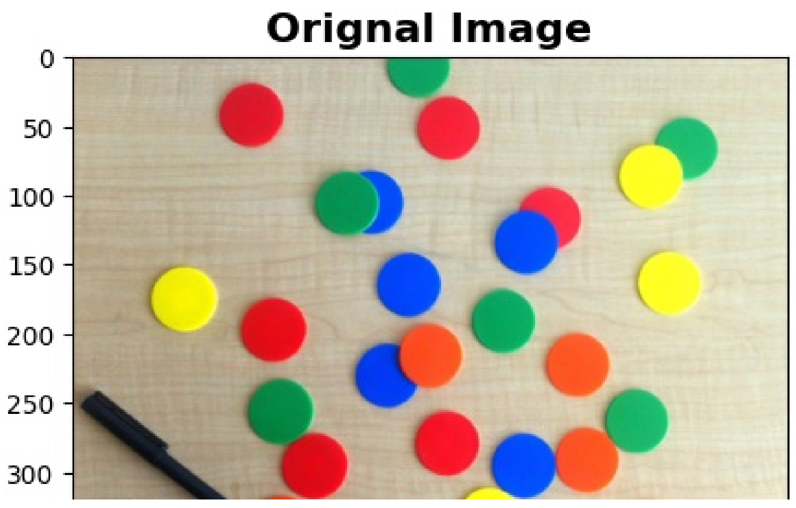
```
path = "C:\\Users\\hp\\Google Drive\\Fiverr Work\\2022\\33. Computer Vision Course\\pict
ures"
```

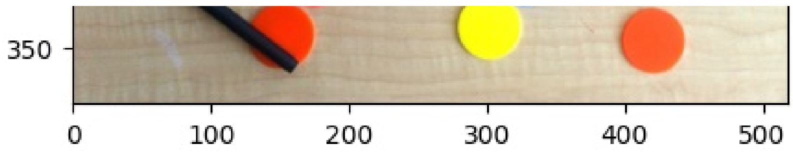
In [3]:

```
img = cv2.imread(path+"\\coloredChips.png")   # took path and name of image as an argument

RGBImage = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)

plt.figure(figsize=(5,5))
plt.imshow(RGBImage)
plt.title("Orignal Image", fontsize = 16, fontweight = 'bold')
```

Out[3]:

```
Text(0.5, 1.0, 'Orignal Image')
```





Get grayscale image of each channel

In [4]:

```python
def getGrayscaleImages(image):

    b = image[:,:,0]
    g = image[:,:,1]
    r = image[:,:,2]

    return b, g, r
```

Get Colored Image of each channel (First Method)

In [5]:

```python
import numpy as np

def colorChannelImages(image):

    dimension = image.shape
    height, width = dimension[0], dimension[1]

    zeroChannel = np.zeros((height, width), "uint8")

    b, g, r = getGrayscaleImages(image)

    blueImage = cv2.merge([b, zeroChannel, zeroChannel])
    greenImage = cv2.merge([zeroChannel, g, zeroChannel])
    redImage = cv2.merge([zeroChannel, zeroChannel, r])

    return blueImage, greenImage, redImage
```

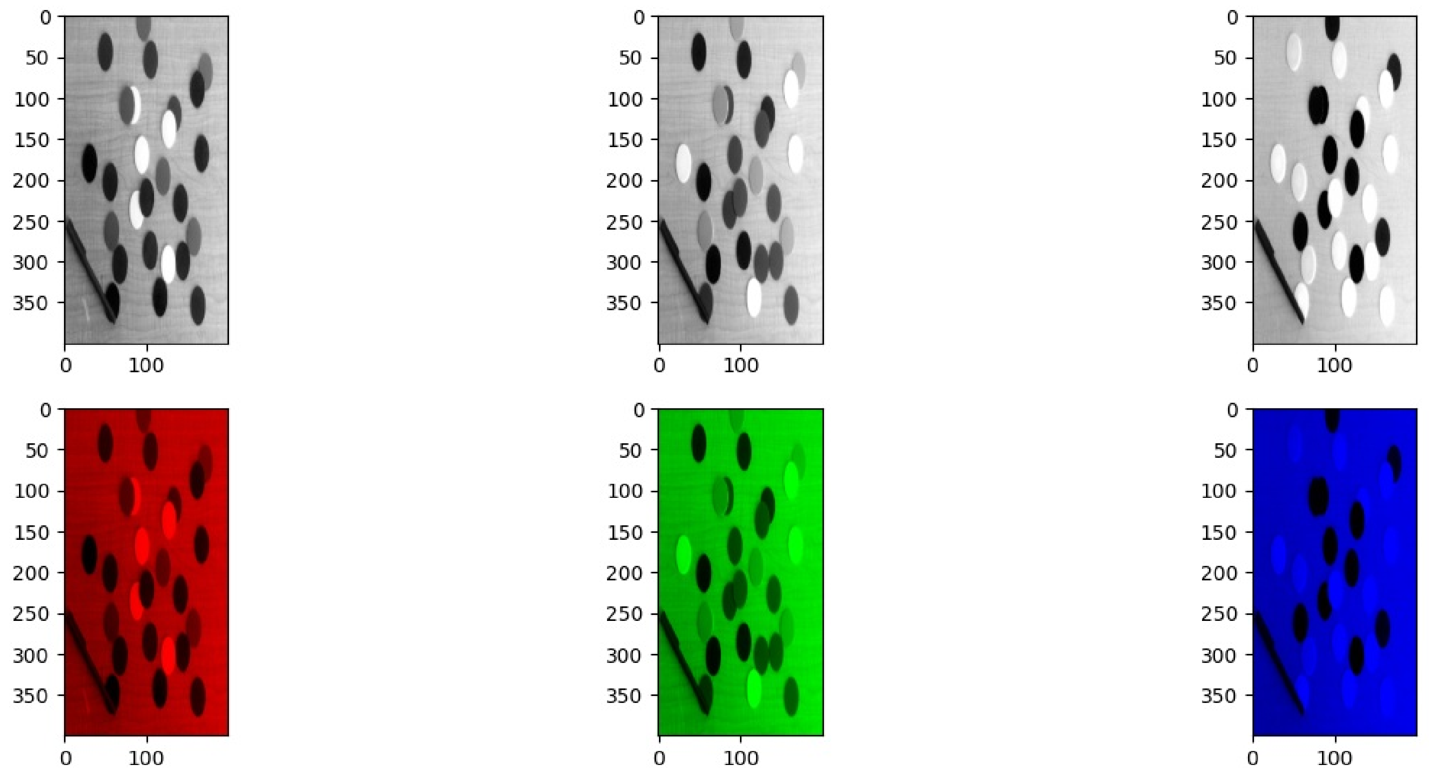
In [22]:

```python
path = "C:\\Users\\hp\\Google Drive\\Fiverr Work\\2022\\33. Computer Vision Course\\pict
ures"

img = cv2.imread(path+"\\coloredChips.png")
imgResized = cv2.resize(img, (200, 400))

print(imgResized.shape)

b, g, r = getGrayscaleImages(imgResized)
blue, green, red = colorChannelImages(imgResized)

plt.figure(figsize=(15,10))
plt.subplot(3,3,1)
plt.imshow(b, cmap="gray")
plt.subplot(3,3,2)
plt.imshow(g, cmap="gray")
plt.subplot(3,3,3)
plt.imshow(r, cmap="gray")
plt.subplot(3,3,4)
plt.imshow(blue, cmap="gray")
plt.subplot(3,3,5)
plt.imshow(green, cmap="gray")
plt.subplot(3,3,6)
plt.imshow(red, cmap="gray")
```

```
(400, 200, 3)
```

Out[22]:

```
<matplotlib.image.AxesImage at 0x19fe1909220>
```



In [18]:

```
grayscalResult = np.hstack((b, g, r))
colorResult = np.hstack((blue, green, red))

cv2.imshow("image", imgResized)
cv2.imshow("grayScale channel Images", grayscalResult)
cv2.imshow("color channel Images", colorResult)

cv2.waitKey()
cv2.destroyAllWindows()
```

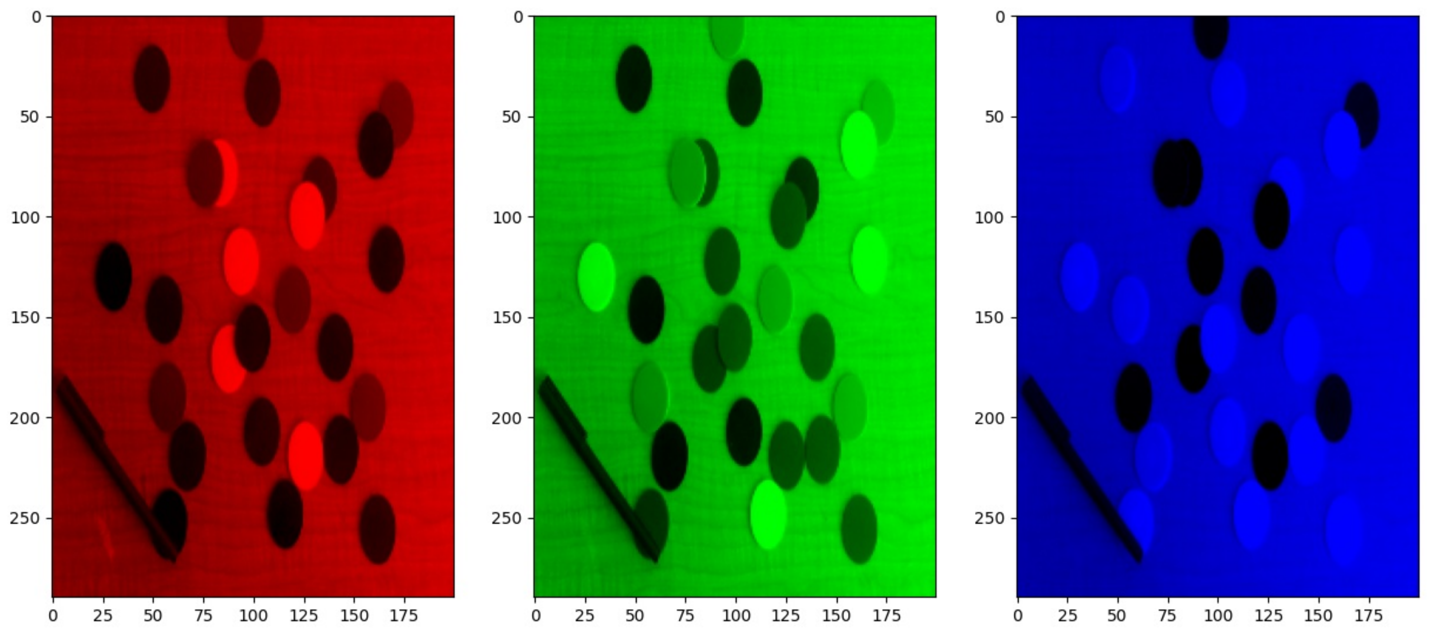
Simple method to Extract the channel

In [23]:

```
import cv2

path = "C:\\Users\\hp\\Google Drive\\Fiverr Work\\2022\\33. Computer Vision Course\\pict
ures"

image = cv2.imread(path+"\\coloredChips.png")
# image = cv2.imread(colorStripe)#pass correct object
image =cv2.resize(image, (200,290))
bw,gw,rw=cv2.split(image) #pass correct object

b = image.copy()
# set green and red channels to 0
b[:,:,1] = 0
b[:,:,2] = 0
g = image.copy()
# set blue and red channels to 0
g[:,:,0] = 0
g[:,:,2] = 0
r = image.copy()
# set blue and green channels to 0
r[:,:,0] = 0
r[:,:,1] = 0

plt.figure(figsize=(15,10))
plt.subplot(1,3,1)
plt.imshow(b, cmap="gray")
plt.subplot(1,3,2)
plt.imshow(g, cmap="gray")
plt.subplot(1,3,3)
plt.imshow(r, cmap="gray")
```

Out[23]:

```
<matplotlib.image.AxesImage at 0x19fe1c8e5b0>
```



In [24]:

```
# RGB - Blue
cv2.imshow('B-RGB', b)
cv2.imshow('BW B-RGB', bw)
# RGB - Green
cv2.imshow('G-RGB', g)
cv2.imshow('Gw-RGB', gw)
# RGB - Red
cv2.imshow('R-RGB', r)
cv2.imshow('w-RGB', rw)

cv2.waitKey(0)
cv2.destroyAllWindows()
```

Before Executing the part 02 of this plab you have to Open Countoring_01.ipynb file and uderstand how we find the contours in an image!

02. Image Preprocessing for Edge Detection

To detect objects in an image a common approach is to find the contours of the objects against the image background. The contours are referred to as edges in image processing, to find these edges a number of pre-processing steps can be done to an image to get better edge detection. Do the following steps to the image piece05.png.

- **Convert it to grayscale**
- **Blur the gray image using Gaussian Blur to reduce the noise in the image**
- **Use canny to find the edges**
- **Dilate the edges to fill in small gaps that might appear when using canny**
- **Now use the findContors on the diluted image, How many objects can you find?**

Simple

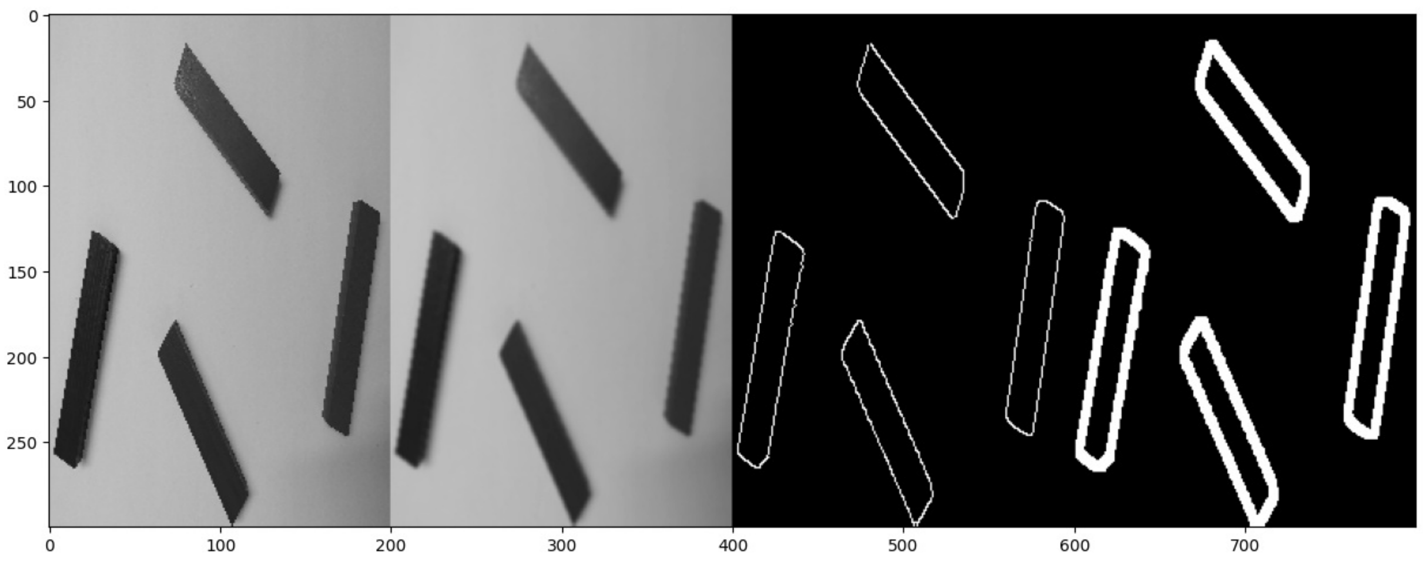
In [28]:

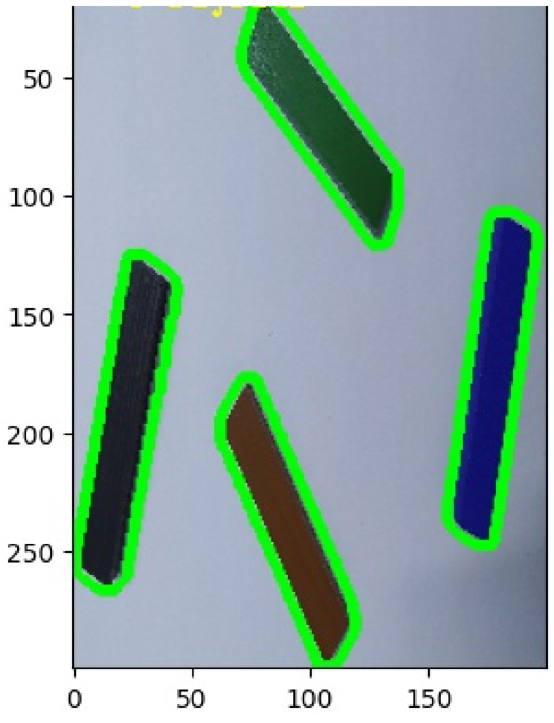
```
import cv2 as cv
import numpy as np

path ="C:\\Users\\hp\\Google Drive\\Fiverr Work\\2022\\15. Teaching OpenCV to Client\\Pi
cs+scripts\\Pictures"

img = cv.imread(path + "\\piece05.png")
imgResized = cv.resize(img, (200, 300))

kernel = np.ones((5,5), "uint8")

imgGray = cv.cvtColor(imgResized, cv.COLOR_BGR2GRAY)

blurImg = cv.GaussianBlur(imgGray, (5,5), 0)

cannyImge = cv.Canny(blurImg, 10, 150)

imgDilation = cv.dilate(cannyImge, kernel, iterations=1)

contours, hierarchy = cv.findContours(imgDilation,
    cv.RETR_EXTERNAL, cv.CHAIN_APPROX_NONE)

print(len(contours))


cv.drawContours(imgResized, contours, -1, (0, 255, 0), 3)
cv.putText(imgResized, str(len(contours))+" objects", (20, 20), cv.FONT_HERSHEY_COMPLEX,
            0.5, (255, 255, 0), 1)

result = np.hstack((imgGray, blurImg, cannyImge, imgDilation))

plt.figure(figsize=(15,10))
plt.imshow(result, cmap="gray")

plt.figure(figsize=(5,5))
plt.imshow(imgResized, cmap="gray")

# cv.imshow("image", imgResized)
# cv.imshow("output", result)

# cv.waitKey()
# cv.destroyAllWindows()
```

```
4
```

Out[28]:

```
<matplotlib.image.AxesImage at 0x19fe23ab130>
```





With trackbar

In [26]:

```
# Exercise 05: Preparing Image for edge detection

import cv2 as cv
import numpy as np

def nothing(x):
    pass

path ="C:\\Users\\hp\\Google Drive\\Fiverr Work\\2022\\15. Teaching OpenCV to Client\\Pi
cs+scripts\\Pictures"

cv.namedWindow("output")

cv.createTrackbar("kernel1", "output", 0, 55, nothing)
cv.createTrackbar("kernel2", "output", 0, 55, nothing)
cv.createTrackbar("cannyLower", "output", 3, 255, nothing)
cv.createTrackbar("cannyUpper", "output", 255, 255, nothing)

while True:

    kernel1 = cv.getTrackbarPos("kernel1", "output")
    kernel2 = cv.getTrackbarPos("kernel2", "output")
    cannyLower = cv.getTrackbarPos("cannyLower", "output")
    cannyUpper = cv.getTrackbarPos("cannyUpper", "output")

    img = cv.imread(path + "\\piece05.png")
    imgResized = cv.resize(img, (200, 300))

    # # for dilation
    dilateKernel = np.ones((5,5), "uint8")

    imgGray = cv.cvtColor(imgResized, cv.COLOR_BGR2GRAY)

    # As kernel is size of odd dimension
    if (kernel1*kernel2)%2 == 1:
        dilateKernel = np.ones((kernel1,kernel2), "uint8")
        blurImg = cv.GaussianBlur(imgGray, (kernel1,kernel2), 0)
    else:
        blurImg = cv.GaussianBlur(imgGray, (3,3), 0)

    cannyImge = cv.Canny(blurImg, cannyLower, cannyUpper)
```

```python
    imgDilation = cv.dilate(cannyImge, dilateKernel, iterations=1)

    contours, hierarchy = cv.findContours(imgDilation,
        cv.RETR_EXTERNAL, cv.CHAIN_APPROX_NONE)

    print(len(contours))

    cv.drawContours(imgResized, contours, -1, (0, 255, 0), 3)
    cv.putText(imgResized, str(len(contours))+" objects", (20, 20), cv.FONT_HERSHEY_COMP
LEX,
                0.5, (255, 255, 0), 1)

    result = np.hstack((imgGray, blurImg, cannyImge, imgDilation))

    cv.imshow("image", imgResized)
    cv.imshow("output", result)

    k = cv.waitKey(1)

    if k == ord("q"):
        cv.destroyAllWindows()
```

```
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4
4

---------------------------------------------------------------------------
error                                     Traceback (most recent call last)
c:\Users\hp\Google Drive\Fiverr Work\2022\33. Computer Vision Course\Lab 04\Lab04Computer
```

```
vision.ipynb Cell 22 in 2
     <a href='vscode-notebook-cell:/c%3A/Users/hp/Google%20Drive/Fiverr%20Work/2022/33.%2
0Computer%20Vision%20Course/Lab%2004/Lab04ComputerVision.ipynb#Y104sZmlsZQ%3D%3D?line=15'
>16</a> cv.createTrackbar("cannyUpper", "output", 255, 255, nothing)
     <a href='vscode-notebook-cell:/c%3A/Users/hp/Google%20Drive/Fiverr%20Work/2022/33.%2
0Computer%20Vision%20Course/Lab%2004/Lab04ComputerVision.ipynb#Y104sZmlsZQ%3D%3D?line=17'
>18</a> while True:
---> <a href='vscode-notebook-cell:/c%3A/Users/hp/Google%20Drive/Fiverr%20Work/2022/33.%2
0Computer%20Vision%20Course/Lab%2004/Lab04ComputerVision.ipynb#Y104sZmlsZQ%3D%3D?line=19'
>20</a>     kernel1 = cv.getTrackbarPos("kernel1", "output")
     <a href='vscode-notebook-cell:/c%3A/Users/hp/Google%20Drive/Fiverr%20Work/2022/33.%2
0Computer%20Vision%20Course/Lab%2004/Lab04ComputerVision.ipynb#Y104sZmlsZQ%3D%3D?line=20'
>21</a>     kernel2 = cv.getTrackbarPos("kernel2", "output")
     <a href='vscode-notebook-cell:/c%3A/Users/hp/Google%20Drive/Fiverr%20Work/2022/33.%2
0Computer%20Vision%20Course/Lab%2004/Lab04ComputerVision.ipynb#Y104sZmlsZQ%3D%3D?line=21'
>22</a>     cannyLower = cv.getTrackbarPos("cannyLower", "output")

error: OpenCV(4.6.0) D:\a\opencv-python\opencv-python\opencv\modules\highgui\src\window_w
32.cpp:2581: error: (-27:Null pointer) NULL window: 'output' in function 'cvGetTrackbarPo
s'
```