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18	<p>Do the following tasks in OpenCV.</p> <ul style="list-style-type: none"> • Load an image & Give the title of the image • Change the image to grayscale • Print the shape of image • Display the maximum and minimum pixels of image • Crop the image. • Save the Image 		

1. Write a program to compute the net run rate for a tournament.

Code:

```
tn=input("Enter Team name:")
n=int(input("Enter no. of matches played:"))
to=0    #variable to store total overs played
tr=0    #variable to store total runs
tagr=0 #variable to store total runs conceded
togr=0 #variable to store total overs bowled for
i in range(n):
    r=int(input("Enter runs scored in match"+str(i+1)+":"))
    o=int(input("Enter overs played:"))
    tr=tr+r
    to=to+o
    agr=int(input("Enter runs conceded in match"+str(i+1)+":"))
    ogr=int(input("Enter overs bowled:"))
    tagr+=agr
    togr+=ogr
nrr=(tr/to)-(tagr/togr)    #to find the net run rate
print("Net runrate is:",nrr)
```

Output:

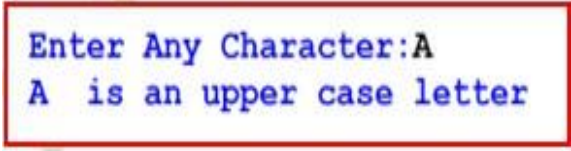
```
Enter Team name:India
Enter no. of matches played:3
Enter runs scored in match1:254
Enter overs played:47
Enter runs conceded in match:1:253
Enter overs bowled:50
Enter runs scored in match2:199
Enter overs played:50
Enter runs conceded in match:2:110
Enter overs bowled:35
Enter runs scored in match3:225
Enter overs played:50
Enter runs conceded in match:3:103
Enter overs bowled:41
Net runrate is: 0.9138321995464853
```

2. Write a program to check whether the given character is an uppercase letter or lowercase letter or a digit or a special character.

Code:

```
#Input the character to check
ch=input("Enter Any Character:") if
ch.isupper():
    print(ch, " is an upper case letter") elif
ch.islower():
    print(ch, " is a lower case letter")
elif ch.isdigit():
    print(ch, " is a digit") elif
ch.isspace():
    print(ch, " is a space")
else:
    print(ch," is a special character")
```

Output:

A screenshot of a terminal window showing the program's output. The prompt 'Enter Any Character:' is followed by the input 'A'. The output line shows 'A is an upper case letter'. The entire screenshot is enclosed in a red rectangular border.

```
Enter Any Character:A
A  is an upper case letter
```

3. Write a program to find the maximum number out of the given three different numbers.

```
#Take input or three number to compare
n1=int(input("Enter the Number1:"))
n2=int(input("Enter the Number2:"))
n3=int(input("Enter the Number3:"))
if n1>n2 and n1>n3:
    print(n1, " Number 1 is greater")
elif n2>n1 and n2>n3:
    print(n2, " Number 2 is greater") elif
n3>n1 and n3>n2:
    print(n3, " Number 3 is greater")
else:
    print("All are same")
```

Output:

```
Enter the Number1:45
Enter the Number2:32
Enter the Number3:89
89 - Number 3 is greater
. . .
```

4. An electric power distribution company charges its domestic consumers as follows. Write a program that read the customer number & power consumed and prints the amount to be paid by the customer. Note that output should be well formatted.

Consumption Units	Rate of Charge
0-100	Rs. 1 per unit
101-300	Rs. 100 plus Rs. 1.25 per unit in excess of 100
301-500	Rs. 350 plus Rs. 1.50 per unit in excess of 300
501 and above	Rs. 650 plus Rs. 1.75 per unit in excess of 500

#Input Data

```
cno=int(input("Enter Consumer Number:"))
```

```
pc=int(input("Enter power consumed:"))
```

```
if pc>0 and pc<=100:
```

```
    bill_amt=pc*1
```

```
elif pc>100 and pc<=300:
```

```
    bill_amt=100+(pc-100)*1.25
```

```
elif pc>300 and pc<=500:
```

```
    bill_amt=350+(pc-300)*1.50
```

```
elif pc>500:
```

```
    bill_amt=650+(pc-500)*1.75
```

```
else:
```

```
    print("Invalid Power Consumed Units"))
```

```
print("\t\tABC Power Company Ltd.")
```

```
print("~"*60)
```

```
print("Consumer Number:",cno)
```

```
print("Consumed Units:",pc) print("_____")
```

```
print("Bill Amount:",bill_amt)
```

Output:

```
Enter Cusumer Number:1002
Enter power consumed:230
~~~~~
                ABC Power Company Ltd.
~~~~~
Consumer Number: 1002
Consumed Units: 230
-----
Bill Amount: 262.5
```

5. Write a program to check whether the entered number is Armstrong or not.

```
n=int(input("Enter number to check:"))
#Store the original number into temporary variable t=n
s=0
#Computing the sum of cube of each digit and iterating until n=0
while n!=0:
    r=n%10
    s=s+(r**3)
    n//=10
#Checking & displaying whether armstrong or not
if t==s:
    print(s," is Armstrong number")
else:
    print(s," is not an Artmstrong number")
```

Output:

```
Enter number to check:153
153  is Armstrong number
```


6. Write a program to print a multiplication table of the entered number.

```
#Take input to accept a number for printing Multiplication table
```

```
n=int(input("Enter number to print multiplication table:"))
```

```
#Take for loop for multiple for
```

```
i in range(1,11):
```

```
    print (n," x ", i, " = ", n*i )
```

Output:

```
Enter number to print multiplication tabl
8 x 1 = 8
8 x 2 = 16
8 x 3 = 24
8 x 4 = 32
8 x 5 = 40
8 x 6 = 48
8 x 7 = 56
8 x 8 = 64
8 x 9 = 72
8 x 10 = 80
```

7. Write a program to generate the following pattern:

```
1
2  3
4  5  6
7  8  9  10
11 12 13 14 15
```

```
#Take input for n lines
n=int(input("Enter n:"))
#Generating Pattern k=1
for i in range(1,n+1):
    for j in range(1,i+1):
        print(k,end=" ")
        k=k+1
    print("\n")
print()
```

Output:

```
Enter n:5
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

8. Write a program to create a list of students' marks with user-defined values and find the maximum.

```
#Take input for n lines
n=int(input("Enter no. of subjects:"))

#Creating empty list
list1=[]

#Accepting marks and appending marks into the list
for i in range(n):

    m=int(input("Enter marks:"))

    list1.append(m)

print("Maximum marks scored:",max(list1))
```

Output:

```
Enter no. of subjects:5
Enter marks:20
Enter marks:52
Enter marks:41
Enter marks:63
Enter marks:88
Maximum marks scored: 88
```

9. Write a program to create a list of numbers and swap the content with the next value divisible by 5. For example: list = [4,25,31,7,35,44,55]Output: [25,4,31,35,7,55,44]

```
#Take input for no of subjects
n=int(input("Enter no. of subjects:"))
#Creating empty list
list1=[]
#Accepting marks and appending marks into the list
for i in range(n): m=int(input("Enter
    marks:")) list1.append(m)
#Swaping elements
for i in range(len(list1)) : if
    list1[i] % 5 == 0 :
        list1[ i ], list1[i-1] = list1[ i - 1 ] , list1[i]
print("List after swap:",list1)
```

Output:

```
Enter no. of subjects:5
Enter marks:21
Enter marks:55
Enter marks:33
Enter marks:45
Enter marks:25
List after swap: [55, 21, 45, 25, 33]
```

10. Write a program to count the frequency of every element in a given list.

```
#Creating empty list
list1 = []
#Take input for n no. of elements
n=int(input("Enter the no. of elements:"))
#Append the values into the list
for i in range(n):
    val=int(input("Enter value "+str(i+1)+":"))
    list1.append(val)
#Declaring a dictionary object to store the data
f = {} #Initially dictionary will be empty
print(f) #to check the dictionary
for i in list1:
    if (i in f):
        f[i] += 1
    else:
        f[i] = 1
print(f)
print(f.items()) #to check the index and value inside the dictionary
#Displaying the data
for i, j in f.items():
    print(i, "->", j)
```

Output:

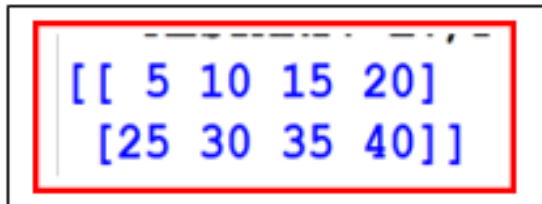
```
Enter the no. of elements:5
Enter value 1:24
Enter value 2:21
Enter value 3:24
Enter value 4:23
Enter value 5:24
24 -> 3
21 -> 1
23 -> 1
```

Unit 4 Data Science Programs

11. Write a program to create a 2D array using NumPy.

```
#import numpy package import  
  
numpy as np  
  
#Creating array using arange() function  
  
arr=np.arange(5,45,5)  
  
#reshaping array for 2D  
  
arr=arr.reshape(2,4)  
  
#printing array print(arr)
```

Output:

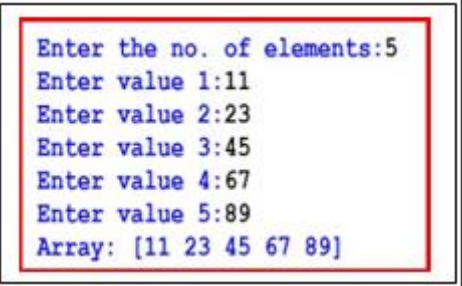


```
[[ 5 10 15 20]  
 [25 30 35 40]]
```

12. Write a program to convert a python list to a NumPy array.

```
#Import NumPy Package import
numpy as np #Creating empty
list
l = []
#Take input for n no. of elements n=int(input("Enter
the no. of elements:")) #Append the values into the
list
for i in range(n):
    val=int(input("Enter value "+str(i+1)+":"))
    l.append(val)
#Converting list into numpy array arr=np.array(l)
print("Array:",arr)
```

Output:

A screenshot of a terminal window showing the execution of the Python program. The text is as follows:

```
Enter the no. of elements:5
Enter value 1:11
Enter value 2:23
Enter value 3:45
Enter value 4:67
Enter value 5:89
Array: [11 23 45 67 89]
```

The text is displayed in a monospaced font, with the prompt text in blue and the user input in black. The entire output is enclosed in a red rectangular border.

13. Write a program to create a dataframe named new_frame of class averages of different subjects () for premidterm and midterm examination and store the data in the columns 'premidterm' and 'midterm'. Assign subject names as row index and Display the frame

```
import pandas as pd
#Creating lists for data
subjects=['sst', 'maths', 'Sci', '2lang','Eng', 'AI']

#creating a dictionary with class averages
clas_avg={'premidterm':[70,68,71,75,73,70],'midterm':[70,69,70,75,73,74]}

#Creating data frame with the given data
newframe=pd.DataFrame(clas_avg,index=subjects)
print(newframe)
```

Output:

premidterm	midterm
sst	70
maths	69
Sci	70
2lang	75
Eng	73
AI	74

14. Write a program to represent the data the data frame created in previous question on bar chart (xlabel=subjects,ylabel=class average).create subplots for ‘premidterm’ and ‘midterm’.

```
import matplotlib.pyplot as plt
import pandas as pd #Creating
lists for data
subjects=['sst', 'maths', 'Sci', '2lang','Eng', 'AI']

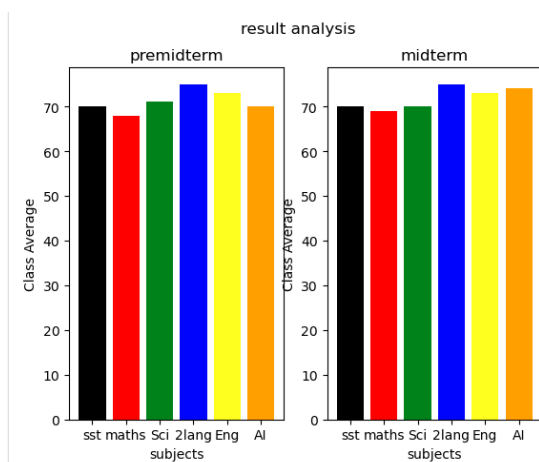
#creating a dictionary with class averages
clas_avg={'premidterm':[70,68,71,75,73,70],'midterm':[70,69,70,75,73,74]}

#Creating data frame with the given data
newframe=pd.DataFrame(clas_avg,index=subjects)
print(newframe)

#Creating bar graph with different bar colours #
for PRE MIDTERM
plt.subplot(1, 2, 1)
plt.bar(subjects,clas_avg['premidterm'],color=['black','red','green','blue','yellow','orange'])
plt.xlabel('subjects') plt.ylabel('Class
Average') plt.title('premidterm')

# for MIDTERM
plt.subplot(1, 2, 2)
plt.bar(subjects,clas_avg['midterm'],color=['black',    'red',  'green',    'blue', 'yellow','orange'])
plt.xlabel('subjects') plt.ylabel('Class
Average') plt.title('midterm')
```

Output:



15. Write a program to calculate the mean, mode and median for the given data: [5,6,1,3,4,5,6,2,7,8,6,5,4,6,5,1,2,3,4]

```
import statistics  
l=[5,6,1,3,4,5,6,2,7,8,6,5,4,6,5,1,2,3,4]  
#Display mean, mode and median value using functions  
print("Mean Value:%.2f"%statistics.mean(l)) print("Mode  
Value:%.2f"%statistics.mode(l)) print("Median  
Value:%.2f"%statistics.median(l))
```

OR

```
import numpy as np  
  
import statistics as st  
  
array1 = np.array([5,6,1,3,4,5,6,2,7,8,6,5,4,6,5,1,2,3,4])  
  
print(array1)  
  
print("\nMean: ", np.mean(array1))  
  
print("\nMedian: ", np.median(array1))  
  
print("\nMode: ", st.mode(array1))
```

Output:

```
Mean Value:4.37  
Mode Value:5.00  
Median Value:5.00
```

16. Write a program to calculate variance and standard deviation for the given

data:[33,44,55,67,54,22,33,44,56,78,21,31,43,90,21,33,44,55,87]

```
#import statistics import statistics
```

```
#Creating list
```

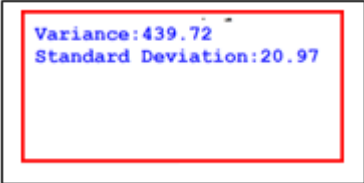
```
l=[33,44,55,67,54,22,33,44,56,78,21,31,43,90,21,33,44,55,87]
```

```
#Display varaince and standard deviation value using functions
```

```
print("Variance:%.2f"%statistics.variance(l))
```

```
print("Standard Deviation:%.2f"%statistics.stdev(l))
```

Output:



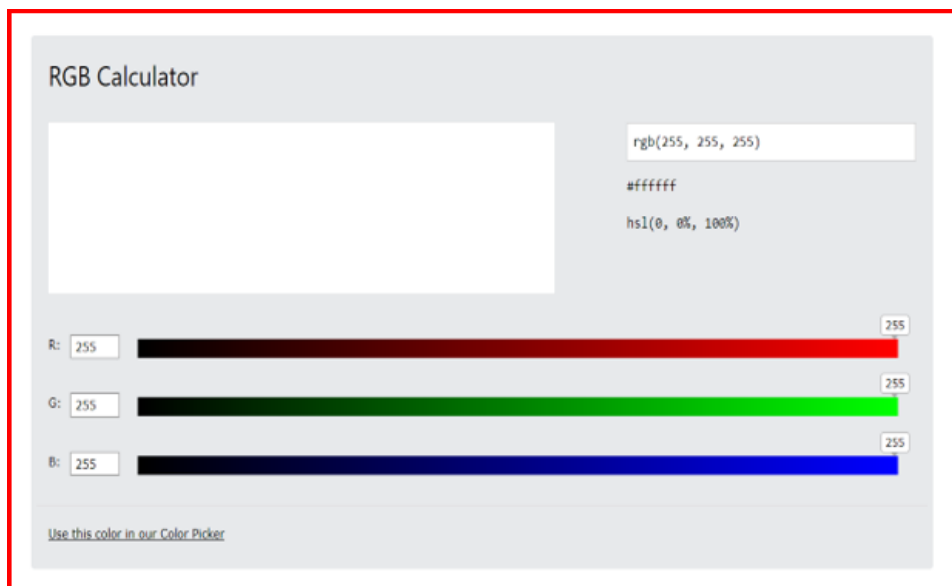
```
Variance:439.72
Standard Deviation:20.97
```

Unit 5 Computer Vision

17. Visit [this link](https://www.w3schools.com/colors/colors_rgb.asp) (https://www.w3schools.com/colors/colors_rgb.asp). On the basis of this online tool, try and write answers of all the below-mentioned questions.

- What is the output colour when you put $R=G=B=255$?
- What is the output colour when you put $R=G=255, B=0$?
- What is the output colour when you put $R=255, G=0, B=255$?
- What is the output colour when you put $R=0, G=255, B=255$?
- What is the output colour when you put $R=G=B=0$?
- What is the output colour when you Put $R=0, G=0, B=255$?
- What is the output colour when you Put $R=255, G=0, B=0$?
- What is the output colour when you put $R=0, G=255, B=0$?
- What is the value of your colour?

Output:



The screenshot shows the 'RGB Calculator' interface. On the left, there is a large white square representing the selected color. To its right, the color is represented in three formats: `rgb(255, 255, 255)`, `#ffffff`, and `hsl(0, 0%, 100%)`. Below these, there are three horizontal sliders for Red (R), Green (G), and Blue (B). Each slider has a value input box on the left (all set to 255) and a numerical label on the right (all set to 255). The Red slider is filled with red, the Green slider with green, and the Blue slider with blue. At the bottom left, there is a link that says 'Use this color in our Color Picker'.

18. Do the following tasks in OpenCV.

- Load an image & Give the title of the image
- Change the image to grayscale
- Print the shape of image
- Display the maximum and minimum pixels of image
- Crop the image.
- Save the Image

1. Load Image and Give the title of image

```
#import required module cv2, matplotlib and numpy
```

```
import cv2
```

```
import matplotlib.pyplot as plt
```

```
import numpy as np
```

```
#Load the image file into memory
```

```
img = cv2.imread('octopus.png')
```

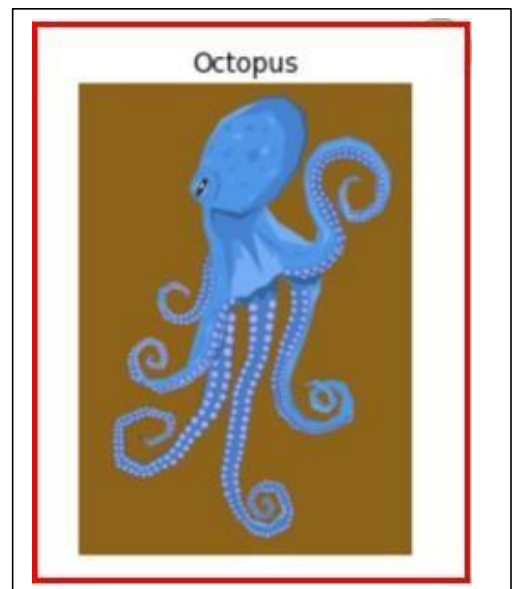
```
#Display Image
```

```
plt.imshow(img)
```

```
plt.title('Octopus')
```

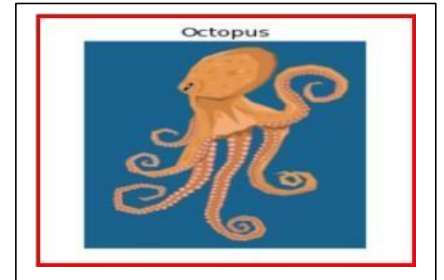
```
plt.axis('off')
```

```
plt.show()
```



2. Change the colour of image and Change the image to grayscale

```
#import required module cv2, matplotlib and numpy import
cv2
import matplotlib.pyplot as plt
import numpy as np
#Load the image file into memory img
= cv2.imread('octopus.png') #Chaning
image colour image colour
plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
plt.title('Octopus')
plt.axis('off') plt.show()
```



3. Print the shape of image

```
import cv2
img = cv2.imread('octopus.png',0)
print(img.shape)
```

(1920, 1357)

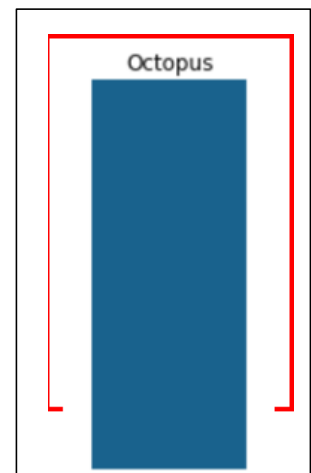
4. Display the maximum and minimum pixels of image

```
import cv2
img = cv2.imread('octopus.png',0)
print(img.min())
print(img.max())
```

0
255

5. Crop the image and extract the part of an image

```
import cv2
import matplotlib.pyplot as plt
img = cv2.imread('octopus.png')
pi = img[150:400, 100:200]
plt.imshow(cv2.cvtColor(pi, cv2.COLOR_BGR2RGB))
plt.title('Octopus')
plt.axis('off') plt.show()
```



6. Save the Image

```
import cv2
import matplotlib.pyplot as plt
img = cv2.imread('octopus.png')
plt.imshow(img)
cv2.imwrite('oct.jpg', img)
plt.title('Octopus')
plt.axis('off') plt.show()
```