

## Q.1 CODE :

```
Filled_rectangle.cpp 4, U X
SRA_Pixels_Assignment_2 > Tasks > Filled_rectangle.cpp > ...
1  #include<iostream>
2
3  #include<opencv2/highgui.hpp>
4  #include<opencv2/imgcodecs.hpp>
5  #include<opencv2/imgproc.hpp>
6
7  using namespace std;
8  using namespace cv;
9
10 int main(){
11     Mat img;
12     img=imread("train.jpeg");
13     imshow("Original Image", img);
14     int wid=img.size().width;
15     int height=img.size().height;
16     int xstart, ystart, len, hgt, row, col, channel, xfinal, yfinal;
17     cout<<"\n(1/4) Enter x and y coordiantes of top-left corner of rectangle : \n";
18     cin>>xstart>>ystart;
19     cout<<"\n(2/4) Enter length of rectangle : \n";
20     cin>>len;
21     cout<<"\n(3/4) Enter height of rectangle : \n";
22     cin>>hgt;
23     cout<<"\n(4/4) Enter code for color for rectangle : 0->blue; 1->green; 2->red :\n";
24     cin>>channel;
25     xfinal=xstart+len;
26     yfinal=ystart+hgt;
27     for(row=xstart; row<=xfinal; row++){
28         for(col=ystart; col<=yfinal; col++){
29             if(channel==0){
30                 img.at<Vec3b>(col, row)[0] = 255;
31                 img.at<Vec3b>(col, row)[1] = 0;
32                 img.at<Vec3b>(col, row)[2] = 0;
```

```
Filled_rectangle.cpp 4, U X
SRA_Pixels_Assignment_2 > Tasks > Filled_rectangle.cpp > ...
10 int main(){
24     cin>>channel;
25     xfinal=xstart+len;
26     yfinal=ystart+hgt;
27     for(row=xstart; row<=xfinal; row++){
28         for(col=ystart; col<=yfinal; col++){
29             if(channel==0){
30                 img.at<Vec3b>(col, row)[0] = 255;
31                 img.at<Vec3b>(col, row)[1] = 0;
32                 img.at<Vec3b>(col, row)[2] = 0;
33             }
34             else if(channel==1){
35                 img.at<Vec3b>(col, row)[0] = 0;
36                 img.at<Vec3b>(col, row)[1] = 255;
37                 img.at<Vec3b>(col, row)[2] = 0;
38             }
39             else if(channel==2){
40                 img.at<Vec3b>(col, row)[0] = 0;
41                 img.at<Vec3b>(col, row)[1] = 0;
42                 img.at<Vec3b>(col, row)[2] = 255;
43             }
44             else{
45                 cout<<"\nInvalid digit entered. Please enter one from given options.\n";
46             }
47         }
48     }
49     imshow("Processed Image", img);
50     waitKey(0);
51     return 0;
52 }
```

## Q.1 OUTPUT :

```
PROBLEMS 8 OUTPUT DEBUG CONSOLE TERMINAL PORTS
prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Tasks$ make SRC=./Filled_rectangle.cpp
Building...
prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Tasks$ ./assignment_2



(1/4) Enter x and y coordiantes of top-left corner of rectangle :
56      79

(2/4) Enter length of rectangle :
67

(3/4) Enter height of rectangle :
43

(4/4) Enter code for color for rectangle : 0->blue; 1->green; 2->red :
0

```



## Q.2 CODE :

```
Filled_Circle.cpp 4, U X
SRA_Pixels_Assignment_2 > Tasks > Filled_Circle.cpp > ...
1  #include <iostream>
2  #include <cmath>
3  #include <opencv2/highgui.hpp>
4  #include <opencv2/imgcodecs.hpp>
5  #include <opencv2/imgproc.hpp>
6
7  using namespace std;
8  using namespace cv;
9
10 int main(){
11     Mat img;
12     img=imread("./Images/train.jpeg");
13     imshow("Original Image", img);
14     //waitKey(0);
15     int xcen, ycen, rad, row, col, X, Y, R, channel, xnew, ynew;
16     cout<<"\n***Information : ***";
17     cout<<"\nWidth of image : "<<img.size().width;
18     cout<<"\nHeight of image : "<<img.size().height;
19     cout<<"\n(1/3) Enter x and y coordiantes of centre of circle : \n";
20     cin>>xcen>>ycen;
21     cout<<"\n(2/3) Enter radius of circle : \n";
22     cin>>rad;
23     cout<<"\n(3/3) Enter code for color for circle : 0->blue; 1->green; 2->red : \n";
24     cin>>channel;
25     R=rad*rad;
26     for(row=0; row<=img.size().width; row++){
27         for(col=0; col<=img.size().height; col++){
28             xnew=row;
29             ynew=col;
30             X=(xnew-xcen)*(xnew-xcen);
31             Y=(ynew-ycen)*(ynew-ycen);
32             if(X+Y<=R){
33                 img.at<Vec_3C>(row,col)[channel]=255;
34             }
35         }
36     }
37     imshow("Processed Image", img);
38     waitKey(0);
39     return 0;
40 }
```

```
Filled_Circle.cpp 4, U X
SRA_Pixels_Assignment_2 > Tasks > Filled_Circle.cpp > ...
10 int main(){
28     xnew=row;
29     ynew=col;
30     X=(xnew-xcen)*(xnew-xcen);
31     Y=(ynew-ycen)*(ynew-ycen);
32     if((X+Y)<=R){
33         if(channel==0){
34             img.at<Vec3b>(ynew,xnew)[0] = 255;
35             img.at<Vec3b>(ynew,xnew)[1] = 0;
36             img.at<Vec3b>(ynew,xnew)[2] = 0;
37         }
38         else if(channel==1){
39             img.at<Vec3b>(ynew,xnew)[0] = 0;
40             img.at<Vec3b>(ynew,xnew)[1] = 255;
41             img.at<Vec3b>(ynew,xnew)[2] = 0;
42         }
43         else if(channel==2){
44             img.at<Vec3b>(ynew,xnew)[0] = 0;
45             img.at<Vec3b>(ynew,xnew)[1] = 0;
46             img.at<Vec3b>(ynew,xnew)[2] = 255;
47         }
48         else{
49             cout<<"\nInvalid digit entered. Please enter one from given options.\n";
50         }
51     }
52 }
53 }
54 imshow("Processed Image", img);
55 waitKey(0);
56 return 0;
57 }
```

## Q.2 OUTPUT :

```
PROBLEMS 4 OUTPUT DEBUG CONSOLE TERMINAL PORTS
prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Tasks$ make SRC=./Filled_Circle.cpp
Building...
prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Tasks$ ./assignment_2

(1/3) Enter x and y coordiantes of centre of circle :
78      94

(2/3) Enter radius of circle :
20

(3/3) Enter code for color for circle : 0->blue; 1->green; 2->red :
1

```



## Q.3 CODE :

Hollow\_Rectangle.cpp 4, U X

SRA\_Pixels\_Assignment\_2 > Tasks > Hollow\_Rectangle.cpp > ...

```
1  #include <iostream>
2
3  #include <opencv2/highgui.hpp>
4  #include <opencv2/imgcodecs.hpp>
5  #include <opencv2/imgproc.hpp>
6
7  using namespace std;
8  using namespace cv;
9
10 int main(){
11     Mat img, img1;
12     img1=imread("train.jpeg");
13     img=imread("train.jpeg");
14     imshow("Original Image", img);
15     // waitKey(0);
16     int xstart, ystart, len, hgt, row, col, channel, xfinal, yfinal, wt;
17     cout<<"\n***Information : ***";
18     cout<<"\nWidth of image : "<<img1.size().width;
19     cout<<"\nHeight of image : "<<img1.size().height;
20     cout<<"\n(1/5) Enter x and y coordiantes of top-left corner of rectangle : \n";
21     cin>>xstart>>ystart;
22     cout<<"\n(2/5) Enter length of rectangle : \n";
23     cin>>len;
24     cout<<"\n(3/5) Enter height of rectangle : \n";
25     cin>>hgt;
26     cout<<"\n(4/5) Enter thickness of border of rectangle : \n";
27     cin>>wt;
28     cout<<"\n(5/5) Enter code for color for rectangle : 0->blue; 1->green; 2->red : \n";
29     cin>>channel;
30     xfinal=xstart+len;
31     yfinal=ystart+hgt;
32     for(row=ystart; row<=yfinal; row++){
```

Hollow\_Rectangle.cpp 4, U X

SRA\_Pixels\_Assignment\_2 > Tasks > Hollow\_Rectangle.cpp > ...

```
10 int main(){
30     xfinal=xstart+len;
31     yfinal=ystart+hgt;
32     for(row=xstart; row<=xfinal; row++){
33         for(col=ystart; col<=yfinal; col++){
34             if(channel==0){
35                 img.at<Vec3b>(col, row)[0] = 255;
36                 img.at<Vec3b>(col, row)[1] = 0;
37                 img.at<Vec3b>(col, row)[2] = 0;
38             }
39             else if(channel==1){
40                 img.at<Vec3b>(col, row)[0] = 0;
41                 img.at<Vec3b>(col, row)[1] = 255;
42                 img.at<Vec3b>(col, row)[2] = 0;
43             }
44             else if(channel==2){
45                 img.at<Vec3b>(col, row)[0] = 0;
46                 img.at<Vec3b>(col, row)[1] = 0;
47                 img.at<Vec3b>(col, row)[2] = 255;
48             }
49             else{
50                 cout<<"\nInvalid digit entered. Please enter one from given options.\n";
51             }
52         }
53     }
54     xstart=xstart+wt;
55     ystart=ystart+wt;
56     xfinal=xfinal-wt;
57     yfinal=yfinal-wt;
58     len=len-(2*wt);
59     hgt=hgt-(2*wt);
60     for(row=xstart; row<=xfinal; row++){
```

```

G+ Hollow_Rectangle.cpp 4, U X
SRA_Pixels_Assignment_2 > Tasks > G+ Hollow_Rectangle.cpp > ...
10 int main(){
43     },
44     else if(channel==2){
45         img.at<Vec3b>(col, row)[0] = 0;
46         img.at<Vec3b>(col, row)[1] = 0;
47         img.at<Vec3b>(col, row)[2] = 255;
48     }
49     else{
50         cout<<"\nInvalid digit entered. Please enter one from given options.\n";
51     }
52 }
53 }
54 xstart=xstart+wt;
55 ystart=ystart+wt;
56 xfinal=xfinal-wt;
57 yfinal=yfinal-wt;
58 len=len-(2*wt);
59 hgt=hgt-(2*wt);
60 for(row=xstart; row<=xfinal; row++){
61     for(col=ystart; col<=yfinal; col++){
62         img.at<Vec3b>(col, row)[0]=img1.at<Vec3b>(col, row)[0];
63         img.at<Vec3b>(col, row)[1]=img1.at<Vec3b>(col, row)[1];
64         img.at<Vec3b>(col, row)[2]=img1.at<Vec3b>(col, row)[2];
65     }
66 }
67 imshow("Processed Image", img);
68 waitKey(0);
69 return 0;
70 }

```

### Q.3 OUTPUT :

```

PROBLEMS 4 OUTPUT DEBUG CONSOLE TERMINAL PORTS
• prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Task$ make SRC=./Hollow_Rectangle.cpp
Building...
○ prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Task$ ./assignment_2

(1/5) Enter x and y coordiantes of top-left corner of rectangle :
98      47


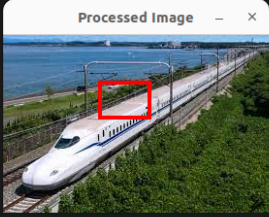
(2/5) Enter length of rectangle :
54

(3/5) Enter height of rectangle :
39

(4/5) Enter thickness of border of rectangle :
4

(5/5) Enter code for color for rectangle : 0->blue; 1->green; 2->red :
2

```

### Q.4 CODE :

Hollow\_Circle.cpp 4, U X

SRA\_Pixels\_Assignment\_2 > Tasks > Hollow\_Circle.cpp > ...

```
1  #include <iostream>
2  #include <cmath>
3  #include <opencv2/highgui.hpp>
4  #include <opencv2/imgcodecs.hpp>
5  #include <opencv2/imgproc.hpp>
6
7  using namespace std;
8  using namespace cv;
9
10 int main(){
11     Mat img1, img;
12     img1=imread("train.jpeg");
13     img=imread("train.jpeg");
14     imshow("Original Image", img1);
15     int xcen, ycen, rad, row, col, X, Y, R, channel, xnew, ynew, wt;
16     cout<<"\n(1/4) Enter x and y coordiantes of centre of circle : \n";
17     cin>>xcen>>ycen;
18     cout<<"\n(2/4) Enter radius of circle : \n";
19     cin>>rad;
20     cout<<"\n(3/4) Enter thickness of border of circle : \n";
21     cin>>wt;
22     cout<<"\n(4/4) Enter code for color for circle : 0->blue; 1->green; 2->red : \n";
23     cin>>channel;
24     R=rad*rad;
25     for(row=0; row<=img.size().width; row++){
26         for(col=0; col<=img.size().height; col++){
27             xnew=row;
28             ynew=col;
29             X=(xnew-xcen)*(xnew-xcen);
30             Y=(ynew-ycen)*(ynew-ycen);
31             if((X+Y)<=R){
32                 if(channel==0){
```

Hollow\_Circle.cpp 4, U X

SRA\_Pixels\_Assignment\_2 > Tasks > Hollow\_Circle.cpp > ...

```
10 int main(){
31     if(channel==0){
32         if((X+Y)<=R){
33             img.at<Vec3b>(ynew,xnew)[0] = 255;
34             img.at<Vec3b>(ynew,xnew)[1] = 0;
35             img.at<Vec3b>(ynew,xnew)[2] = 0;
36         }
37     }
38     else if(channel==1){
39         if((X+Y)<=R){
40             img.at<Vec3b>(ynew,xnew)[0] = 0;
41             img.at<Vec3b>(ynew,xnew)[1] = 255;
42             img.at<Vec3b>(ynew,xnew)[2] = 0;
43         }
44     }
45     else if(channel==2){
46         if((X+Y)<=R){
47             img.at<Vec3b>(ynew,xnew)[0] = 0;
48             img.at<Vec3b>(ynew,xnew)[1] = 0;
49             img.at<Vec3b>(ynew,xnew)[2] = 255;
50         }
51     }
52     else{
53         cout<<"\nInvalid digit entered. Please enter one from given options.\n";
54     }
55 }
56
57 R=(rad-wt)*(rad-wt);
58 for(row=0; row<=274; row++){
59     for(col=0; col<=182; col++){
60         xnew=row;
61         ynew=col;
62         X=(xnew-xcen)*(xnew-xcen);
63         Y=(ynew-ycen)*(ynew-ycen);
64         if((X+Y)<=R){
65             img.at<Vec3b>(ynew,xnew)[0] = img1.at<Vec3b>(ynew,xnew)[0];
```

```
Hollow_Circle.cpp 4, U X
SRA_Pixels_Assignment_2 > Tasks > Hollow_Circle.cpp > ...
10 int main(){
47     }
48     else{
49         cout<<"\nInvalid digit entered. Please enter one from given options.\n";
50     }
51 }
52 }
53 R=(rad-wt)*(rad-wt);
54 for(row=0; row<=274; row++){
55     for(col=0; col<=182; col++){
56         xnew=row;
57         ynew=col;
58         X=(xnew-xcen)*(xnew-xcen);
59         Y=(ynew-ycen)*(ynew-ycen);
60         if((X+Y)<=R){
61             img.at<Vec3b>(ynew,xnew)[0] = img1.at<Vec3b>(ynew,xnew)[0];
62             img.at<Vec3b>(ynew,xnew)[1] = img1.at<Vec3b>(ynew,xnew)[1];
63             img.at<Vec3b>(ynew,xnew)[2] = img1.at<Vec3b>(ynew,xnew)[2];
64         }
65     }
66 }
67 imshow("Processed Image", img);
68 waitKey(0);
69 return 0;
70 }
```

#### Q.4 OUTPUT :

```
PROBLEMS 4 OUTPUT DEBUG CONSOLE TERMINAL PORTS
prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Tasks$ make SRC=./Hollow_Circle.cpp
Building...
prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Tasks$ ./assignment_2


(1/4) Enter x and y coordiantes of centre of circle :
103 49

(2/4) Enter radius of circle :
25

(3/4) Enter thickness of border of circle :
5

(4/4) Enter code for color for circle : 0->blue; 1->green; 2->red :
0

```



## Q.5 CODE :

```
Rotate_180_deg.cpp 4, U X
SRA_Pixels_Assignment_2 > Tasks > Rotate_180_deg.cpp > ...
1  #include <iostream>
2  #include <cstdlib>
3  #include <opencv2/highgui.hpp>
4  #include <opencv2/imgcodecs.hpp>
5  #include <opencv2/imgproc.hpp>
6
7  using namespace std;
8  using namespace cv;
9
10 int main(){
11     Mat orig=imread("train.jpeg");
12     imshow("Original Image", orig);
13     int maxdim;
14     int orig_wid=orig.size().width;
15     int orig_hgt=orig.size().height;
16     if(orig_wid>orig_hgt){
17         maxdim=orig_wid;
18     }
19     else{
20         maxdim=orig_hgt;
21     }
22
23     Mat space(maxdim, maxdim, CV_8UC3, Scalar(0, 0, 0));
24     Mat space1(maxdim, maxdim, CV_8UC3, Scalar(0, 0, 0));
25     Mat space2(maxdim, maxdim, CV_8UC3, Scalar(0, 0, 0));
26     Mat space_done(orig_hgt, orig_wid, CV_8UC3, Scalar(0, 0, 0));
27
28     for(int y=0; y<orig_wid; y++){
29         for(int x=0; x<orig_hgt; x++){
30             space.at<Vec3b>(x, y)=orig.at<Vec3b>(x, y);
31         }
32     }
```

```
Rotate_180_deg.cpp 4, U X
SRA_Pixels_Assignment_2 > Tasks > Rotate_180_deg.cpp > ...
10 int main(){
31 }
32
33
34     for(int y=0; y<maxdim; y++){
35         for(int x=0; x<maxdim; x++){
36             space1.at<Vec3b>(y, x)=space.at<Vec3b>(x, y);
37         }
38     }
39
40
41     for(int y=0, y1=(maxdim-1); y<maxdim, y1>=0; y++, y1--){
42         for(int x=0, x1=(maxdim-1); x<maxdim, x1>=0; x++, x1--){
43             space2.at<Vec3b>(y, x)=space1.at<Vec3b>(x1, y1);
44         }
45     }
46
47     int differ=abs(orig_hgt-orig_wid)-1;
48
49     for(int y=0; y<maxdim; y++){
50         for(int t=differ; t<maxdim; t++){
51             int t1=t-differ;
52             space_done.at<Vec3b>(t1, y)=space2.at<Vec3b>(t, y);
53         }
54     }
55
56     imshow("Processed Image", space_done);
57     waitKey(0);
58
59     return 0;
60 }
```

## Q.5 OUTPUT :



PROBLEMS 4 OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Tasks$ make SRC=./Rotate_180_deg.cpp
Building...
prithvi@prithvi-Inspiron-15-3530:~/SRA_Pixels/SRA_Pixels_Assignment_2/Tasks$ ./assignment_2
```

