Ex1_Output

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Name: Vivek Vitthal Avhad (3059)

```python
[1]: import cv2
     import matplotlib.pyplot as plt
```

```python
[30]: image1 = cv2.imread(r'Ex1.jpg')
```

```python
[31]: # Display the image using matplotlib
      plt.imshow(cv2.cvtColor(image1, cv2.COLOR_BGR2RGB))
      plt.axis('off')   # Hide the axis
      #plt.show()
```

```
[31]: (-0.5, 3023.5, 4031.5, -0.5)
```

```
[32]: cv2.imwrite('Ex1_Output.jpg', image1)
      print("Image saved successfully as 'output_image.jpg'")
```

Image saved successfully as 'output_image.jpg'

```
[33]: gray_image1 = cv2.cvtColor(image1, cv2.COLOR_BGR2GRAY)
      plt.imshow(cv2.cvtColor(gray_image1, cv2.COLOR_BGR2RGB))
      plt.axis('off')   # Hide the axis
```

[33]: (-0.5, 3023.5, 4031.5, -0.5)


```
[14]: complement_image1 = 255 - gray_image1   # Complement of the grayscale image
      plt.imshow(cv2.cvtColor(complement_image1, cv2.COLOR_BGR2RGB))
      plt.axis('off')   # Hide the axis
```

[14]: (-0.5, 3023.5, 4031.5, -0.5)

1. Write code to read and display a PNG image.

```
[35]: image2 = cv2.imread(r'Q1_png.png')
```

```
[36]: plt.imshow(cv2.cvtColor(image2, cv2.COLOR_BGR2RGB))
      plt.axis('off')   # Hide the axis
```

[36]: (-0.5, 877.5, 399.5, -0.5)

2. Convert a color image to HSV (Hue, Saturation, Value) format using OpenCV.

```
[37]: gray_image2 = cv2.cvtColor(image2, cv2.COLOR_BGR2GRAY)
      plt.imshow(cv2.cvtColor(gray_image2, cv2.COLOR_BGR2RGB))
      plt.axis('off')
```

[37]: (-0.5, 877.5, 399.5, -0.5)

3. Implement code to resize an image to half its original size.

```
[47]: height, width = image2.shape[:2]
      print(width, height)
```

878 400

```
[62]: new_dimensions = (width // 4, height // 4)
      resized_image = cv2.resize(image2, new_dimensions, interpolation=cv2.
        ↪INTER_LINEAR)
```

```
[66]: plt.imshow(cv2.cvtColor(resized_image, cv2.COLOR_BGR2RGB))
      plt.axis('off')
```

[66]: (-0.5, 218.5, 99.5, -0.5)

4. Write a program to rotate an image by 90 degrees.

```
rotated_image = cv2.rotate(image2, cv2.ROTATE_90_COUNTERCLOCKWISE)
#rotated_image = cv2.rotate(image2, cv2.ROTATE_90_CLOCKWISE)
```

```
[72]: plt.imshow(cv2.cvtColor(rotated_image, cv2.COLOR_BGR2RGB))
plt.axis('off')
```

[72]: (-0.5, 399.5, 877.5, -0.5)

5. Modify the code to save the complemented image as a PNG file instead of JPG.

```
[73]: cv2.imwrite('Ex1_Output.png', image1)
```

```
[73]: True
```

6. Implement a function to overlay text on an image using OpenCV.

```
[109]: def overlay_text1(image, text, position, font=cv2.FONT_HERSHEY_SIMPLEX,␣
       ↪font_scale=1, color=(255, 255, 255), thickness=2):
           """
           Overlays text on an image.

           Parameters:
           - image: The input image
           - text: The text to overlay
           - position: The bottom-left corner of the text string in the image
           - font: Font type (default is cv2.FONT_HERSHEY_SIMPLEX)
           - font_scale: Font scale (default is 1)
           - color: Text color in BGR (default is white)
           - thickness: Thickness of the lines used to draw the text (default is 2)
           """
           cv2.putText(image, text, position, font, font_scale, color, thickness, cv2.
       ↪LINE_AA)
       def overlay_text2(image, text, position, font=cv2.FONT_HERSHEY_SIMPLEX,␣
       ↪font_scale=1, color=(0, 0, 0), thickness=2):
           """
           Overlays text on an image.

           Parameters:
           - image: The input image
           - text: The text to overlay
           - position: The bottom-left corner of the text string in the image
           - font: Font type (default is cv2.FONT_HERSHEY_SIMPLEX)
           - font_scale: Font scale (default is 1)
           - color: Text color in BGR (default is white)
           - thickness: Thickness of the lines used to draw the text (default is 2)
           """
           cv2.putText(image, text, position, font, font_scale, color, thickness, cv2.
       ↪LINE_AA)
```

```
[124]: # Read the original image
       image3 = cv2.imread('Q1_png.png')
```

```
[125]: overlay_text1(image3, 'RR', (50, 80))
       overlay_text2(image3, 'Saif Mulani', (140, 230))
```

```
[126]: plt.imshow(cv2.cvtColor(image3, cv2.COLOR_BGR2RGB))
       plt.axis('off')
```

[126]: (-0.5, 877.5, 399.5, -0.5)


```
[127]: cv2.imwrite('Q2_image_with_text.png', image3)
```

[127]: True