Image-Transformation

AIM:

To perform image transformation such as Translation, Scaling, Shearing, Reflection, Rotation and Cropping using OpenCV and Python.

SOFTWARE REQUIRED:

Anaconda - Python 3.7

ALGORITHM:

Step 1:

Import the necessary libraries and read the original image and save it as a image variable.

Step 2:

Translate the image using M=np.float32([[1,0,20],[0,1,50],[0,0,1]])
translated_img=cv2.warpPerspective(input_img,M,(cols,rows))

Step 3:

Scale the image using M=np.float32([[1.5,0,0],[0,2,0],[0,0,1]])
scaled_img=cv2.warpPerspective(input_img,M,(cols,rows))

Step 4:

Shear the image using M_x=np.float32([[1,0.2,0],[0,1,0],[0,0,1]])
sheared_img_xaxis=cv2.warpPerspective(input_img,M_x,(cols,rows))

Step 5:

Reflection of image can be achieved through the code M_x=np.float32([[1,0,0],[0,-1,rows],[0,0,1]])
reflected_img_xaxis=cv2.warpPerspective(input_img,M_x,(cols,rows))

Step 6:

Rotate the image using angle=np.radians(45) M=np.float32([[np.cos(angle),-(np.sin(angle)),0], [np.sin(angle),np.cos(angle),0],[0,0,1]]) rotated_img=cv2.warpPerspective(input_img,M,(cols,rows))

Step 7:

Crop the image using cropped_img=input_img[20:150,60:230]

Step 8:

Display all the Transformed images.

PROGRAM:

```
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```

i)Image Translation:

```
import numpy as np
import cv2
import matplotlib.pyplot as plt
input_image = cv2.imread("4.jfif")
input_image = cv2.cvtColor(input_image, cv2.COLOR_BGR2RGB)
plt.axis("off")
plt.imshow(input_image)
plt.show()
rows, cols, dim = input_image.shape
M= np. float32([[1, 0, 100],
                [0, 1, 200],
                [0, 0, 1]])
translated_image = cv2.warpPerspective (input_image, M, (cols, rows))
plt.imshow (translated_image)
plt.show()
```

ii) Image Scaling:

```
import numpy as np
import cv2
import matplotlib.pyplot as plt
input_image = cv2.imread("4.jfif")
input_image = cv2.cvtColor(input_image, cv2.COLOR_BGR2RGB)
plt.axis("off")
plt.imshow(input_image)
plt.show()
#Transformation matrix for Scaling
```

```
rows, cols, dim = input_image.shape
M = np. float32 ([[1.5, 0, 0],
                  [0, 1.8, 0],
                  [0, 0, 1]])
scaled_img = cv2.warpPerspective (input_image, M, (cols*2, rows*2))
plt.imshow (scaled_img)
plt.show()
```

iii)Image shearing:

```
import numpy as np
import cv2
import matplotlib.pyplot as plt
input_image = cv2.imread("car.png")
input_image = cv2.cvtColor(input_image, cv2.COLOR_BGR2RGB)
plt.axis("off")
plt.imshow(input_image)
plt.show()
M_x = np.float32([[1, 0.5, 0],
                  [0, 1, 0],
                  [0, 0, 1]])
M_y = np.float32([[1, 0, 0],
                 [0.5, 1, 0],
                 [0, 0, 1]])
sheared_img_xaxis = cv2.warpPerspective (input_image, M_x, (int(cols *1.5), int (rows
*1.5)))
sheared_img_yaxis = cv2.warpPerspective (input_image, M_y, (int (cols *1.5), int (rows
*1.5)))
plt.imshow (sheared_img_xaxis)
plt.show()
plt.imshow (sheared_img_yaxis)
plt.show()
```

iv)Image Reflection:

```
import numpy as np
import cv2
import matplotlib.pyplot as plt
input_image=cv2.imread("car.png")
input_image=cv2.cvtColor(input_image, cv2.COLOR_BGR2RGB)
plt.axis("off")
plt.imshow(input_image)
plt.show()
rows, cols, dim = input_image.shape
```

```
M_x=np.float32([[1,0,0],
               [0,-1,rows],
               [0,0,1]])
M_y=np.float32([[-1,0,cols],
               [0,1,0],
               [0,0,1]])
reflected_img_xaxis=cv2.warpPerspective(input_image,M_x,(cols,rows))
reflected_img_yaxis=cv2.warpPerspective(input_image,M_y,(cols,rows))
plt.imshow(reflected_img_yaxis)
plt.show()
```

v)Image Rotation:

```
angle=np.radians(45)
M=np.float32([[np.cos(angle),-(np.sin(angle)),0],
               [np.sin(angle),np.cos(angle),0],
               [0,0,1]])
rotated_img=cv2.warpPerspective(input_image,M,(cols,rows))
plt.axis('off')
plt.imshow(rotated_img)
plt.show()
```

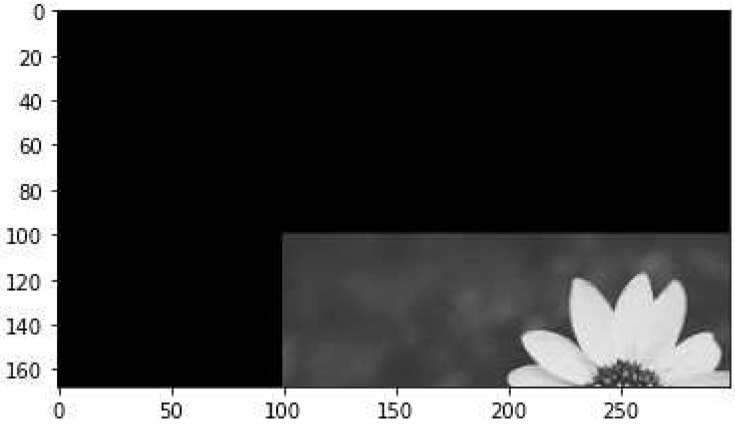
vi)Image Cropping:

```
cropped_img=input_image[20:150,60:230]
plt.axis('off')
plt.imshow(cropped_img)
plt.show()
```

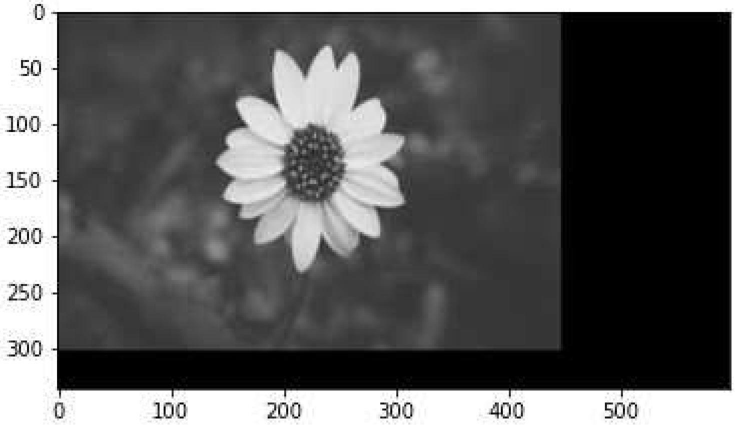
Output:

Original Image:

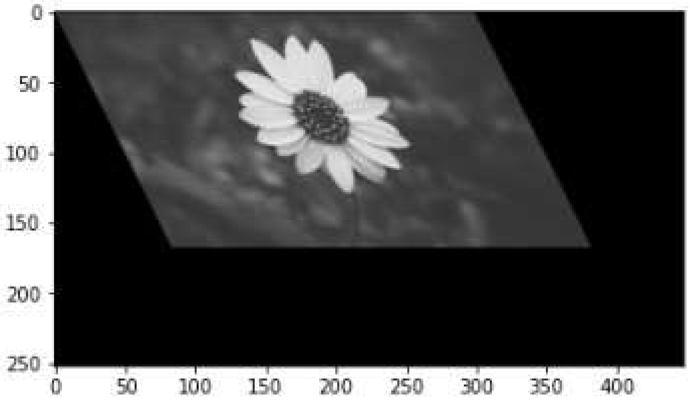
i)Image Translation:

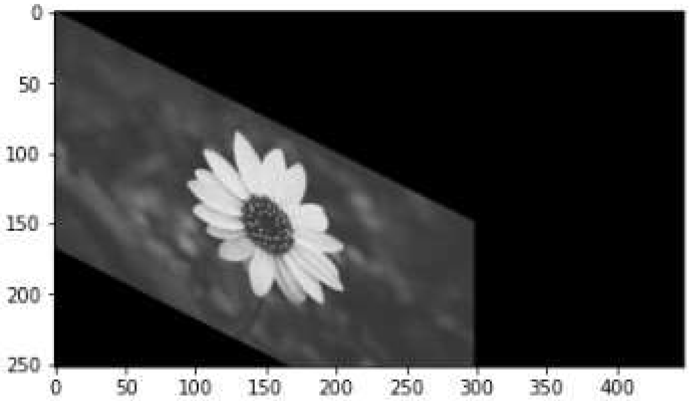


ii) Image Scaling:

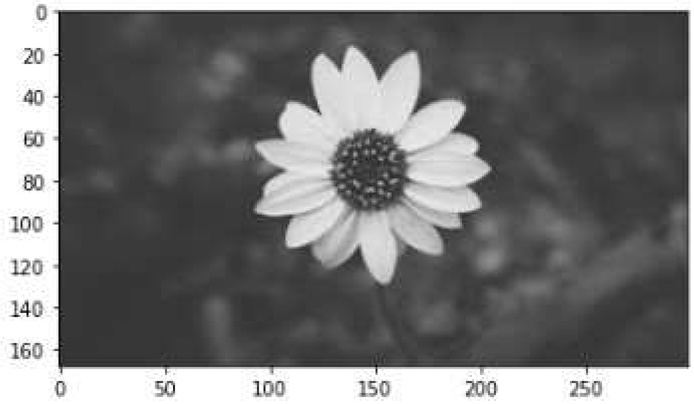


iii)Image shearing:

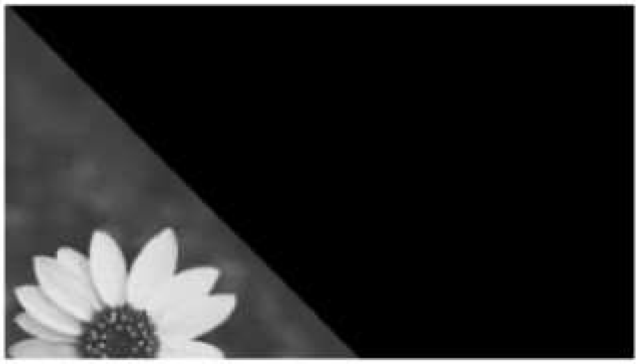




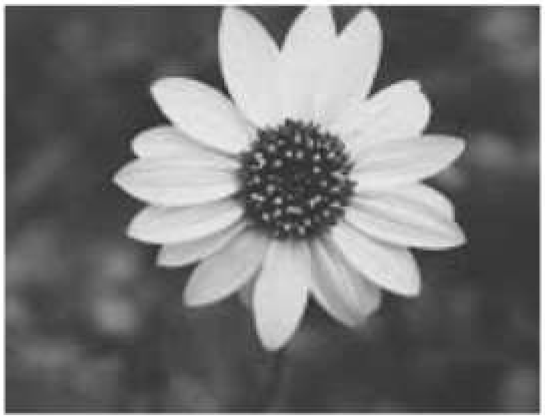
iv)Image Reflection:



v)Image Rotation:



vi)Image Cropping:



Result:

Thus the different image transformations such as Translation, Scaling, Shearing, Reflection, Rotation and Cropping are done using OpenCV and python programming.