



Image Transformations

```
In [ ]: from google.colab import drive
drive.mount('/content/drive')
```

Mounted at /content/drive

```
In [ ]: import cv2
import numpy as np
import matplotlib.pyplot as plt

# Load image (convert BGR -> RGB for matplotlib)
img = cv2.imread("/content/drive/MyDrive/Engineering/Sem5/PCV/PR2/Image2.jpg")
img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
(h, w) = img.shape[:2]
```

Image Translation

```
In [ ]: def translate(img, x, y):
    M = np.float32([[1, 0, x], [0, 1, y]])
    return cv2.warpAffine(img, M, (w, h))
```

Reflection

```
In [ ]: reflection_x = cv2.flip(img, 0)
reflection_y = cv2.flip(img, 1)
reflection_xy = cv2.flip(img, -1)
```

Rotation

```
In [ ]: def rotate(img, angle, scale=1.0):
    center = (w // 2, h // 2)
    M = cv2.getRotationMatrix2D(center, angle, scale)
    return cv2.warpAffine(img, M, (w, h))

rotated = rotate(img, 45)
```

Scaling

```
In [ ]: scaled_up = cv2.resize(img, None, fx=1.5, fy=1.5, interpolation=cv2.INTER_LINEAR)
scaled_down = cv2.resize(img, None, fx=0.5, fy=0.5, interpolation=cv2.INTER_LINEAR)
```

Cropping

```
In [ ]: cropped = img[50:200, 100:300]
```

Shearing in x-axis

```
In [ ]: M_x = np.float32([[1, 0.5, 0],
                        [0, 1, 0]])
shear_x = cv2.warpAffine(img, M_x, (int(w*1.5), h))
```

Shearing in y-axis

```
In [ ]: M_y = np.float32([[1, 0, 0],
                        [0.5, 1, 0]])
shear_y = cv2.warpAffine(img, M_y, (w, int(h*1.5)))
```

Display Output

```
In [ ]: titles = ["Original", "Translated", "Reflection X", "Reflection Y", "Reflection Z",
                  "Rotated", "Scaled Up", "Scaled Down", "Cropped", "Sheared X", "Sheared Y"]

images = [img, translate(img, 100, 50), reflection_x, reflection_y, reflection_z,
          rotated, scaled_up, scaled_down, cropped, shear_x, shear_y]

plt.figure(figsize=(15, 12))
for i in range(len(images)):
    plt.subplot(3, 4, i+1)
    plt.imshow(images[i])
    plt.title(titles[i])
    plt.axis("off")

plt.tight_layout()
plt.show()
```

Original



Translated



Reflection X



Reflection Y



Reflection XY



Rotated



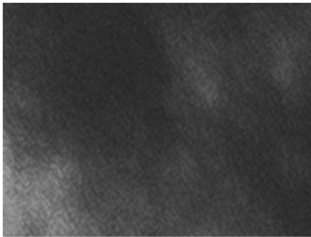
Scaled Up



Scaled Down



Cropped



Sheared X



Sheared Y

