INT3404E 20 - Image Processing: Homeworks 1

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Grayscale-image Function:

```
def grayscale_image(image):
    height, width, _ = image.shape
    img_gray = np.zeros((height, width))
    for y in range(height):
        for x in range(width):
            b, g, r = image[y, x]
            p = 0.299 * r + 0.587 * g + 0.114 * b
            img_gray[y, x] = p
    return img_gray
```

Result:

Figure 1: Greyscale Image

Rotated-image Function:

```
def rotate_image(image, angle):
    image_center = tuple(np.array(image.shape[1::-1]) / 2)
    rot_mat = cv2.getRotationMatrix2D(image_center, angle, 1.0)
    result = cv2.warpAffine(image, rot_mat, image.shape[1::-1], flags=cv2.INTER_LINEAR)
    return result
```

Result:

Figure 2: Rotated Image

Flipped-image Function:

```
def flip_image(image):
    img_flip = cv2.flip(image, 0)
    return img_flip
```

Result:

Figure 3: Flipped Image