# UNIVERSITAS NUSA PUTRA
# FAKULTAS TEKNIK, KOMPUTER DAN DESAIN
# TEKNIK INFORMATIKA

**NIM** : **20220040082**

**NAMA MAHASISWA** : **Saila Julia**

**KELAS** : **TI22A**

**MATA KULIAH** : **PENGOLAHAN CITRA DIGITAL**

**PRAKTIKUM SESI** : **5, 6**

1. Buatlah program untuk pemrosesan citra digital seperti gambar-gambar berikut ini:

   a. Translasi Citra

```python
import imageio.v3 as img
import numpy as np
import matplotlib.pyplot as plt

def Translasi(image, shiftX, shiftY):

    imgTranslasi = np.roll(image, shift=shiftY, axis=0)  # Geser vertikal
    imgTranslasi = np.roll(imgTranslasi, shift=shiftX, axis=1)  # Geser horizontal

    # Mengisi bagian yang kosong dengan warna hitam (0)
    if shiftY > 0:
        imgTranslasi[:shiftY, :] = 0  # Bagian atas jika geser ke bawah
    elif shiftY < 0:
        imgTranslasi[shiftY:, :] = 0  # Bagian bawah jika geser ke atas
    if shiftX > 0:
        imgTranslasi[:, :shiftX] = 0  # Bagian kiri jika geser ke kanan
    elif shiftX < 0:
        imgTranslasi[:, shiftX:] = 0  # Bagian kanan jika geser ke kiri

    return imgTranslasi


image = img.imread("/users/alunsujjada/downloads/tiger.jpg")

imgResult = Translasi(image, shiftX=50, shiftY=-300)

plt.figure(figsize=(10,10))
plt.subplot(2,1,1)
plt.imshow(image)
plt.subplot(2,1,2)
plt.imshow(imgResult)
plt.show()
```

b. Mirroring

```
import numpy as np
import imageio as img
import matplotlib.pyplot as plt

path = 'D:\\source.jpg'
image = img.imread(path)

height, width = image.shape[:2]
horizontal = np.zeros_like(image)
vertical = np.zeros_like(image)

for y in range(height):
    for x in range(width):
        horizontal[y, x] = image[y, width - 1 - x]

for y in range(height):
    for x in range(width):
        vertical[y,x] = image[height - 1-y,x]

plt.figure(figsize=(10, 5))

plt.subplot(1, 3, 1)
plt.imshow(image)

plt.subplot(1, 3, 2)
plt.imshow(horizontal)

plt.subplot(1, 3, 3)
plt.imshow(vertical)

plt.show()
```

c. Rotasi Citra

```
import imageio as img
import numpy as np
import matplotlib.pyplot as plt

def rotateImage(image,degree):
    radian_deg = np.radians(degree)
    cos_deg, sin_deg = np.cos(radian_deg), np.sin(radian_deg)

    height, width = image.shape[:2]
    max_dim = int(np.sqrt(height**2 + width**2))
    outputImage = np.zeros((max_dim,max_dim,3),dtype=image.dtype)

    centerY, centerX = max_dim//2, max_dim//2

    for y in range(-height//2,height//2):
        for x in range(-width//2,width//2):
            newX = int(cos_deg * x - sin_deg * y) + centerX
            newY = int(sin_deg * x + cos_deg * y) + centerY

            if 0 <=newX <  max_dim and 0 <= newY < max_dim:
                outputImage[newY,newX] = image[y + height//2, x + width//2]
    return outputImage

image = img.imread('D:/source.jpg')

rotated_image = rotateImage(image, 45)

plt.subplot(1, 2, 1)
plt.imshow(image)

plt.subplot(1, 2, 2)
plt.imshow(rotated_image)

plt.show()
```

d. Zooming

```python
import numpy as np
import imageio as img
import matplotlib.pyplot as plt

def zoomPlus(image, factor):
    height, width = image.shape[:2]
    new_height = int(height / factor)
    new_width = int(width / factor)
    imgZoom = np.zeros((new_height, new_width, 3), dtype=image.dtype)

    for y in range(new_height):
        for x in range(new_width):

            ori_y = int(y * factor)
            ori_x = int(x * factor)

            ori_y = min(ori_y, height - 1)
            ori_x = min(ori_x, width - 1)

            imgZoom[y, x] = image[ori_y, ori_x]

    return imgZoom


image = img.imread('D:\\source.jpg')
skala = 2.0

imgZoom= zoomPlus(image, skala)
img.imwrite("D:\\z.jpg",imgZoom)
plt.subplot(1, 2, 1)
plt.imshow(image)

plt.subplot(1, 2, 2)
plt.imshow(imgZoom)
plt.show()
```

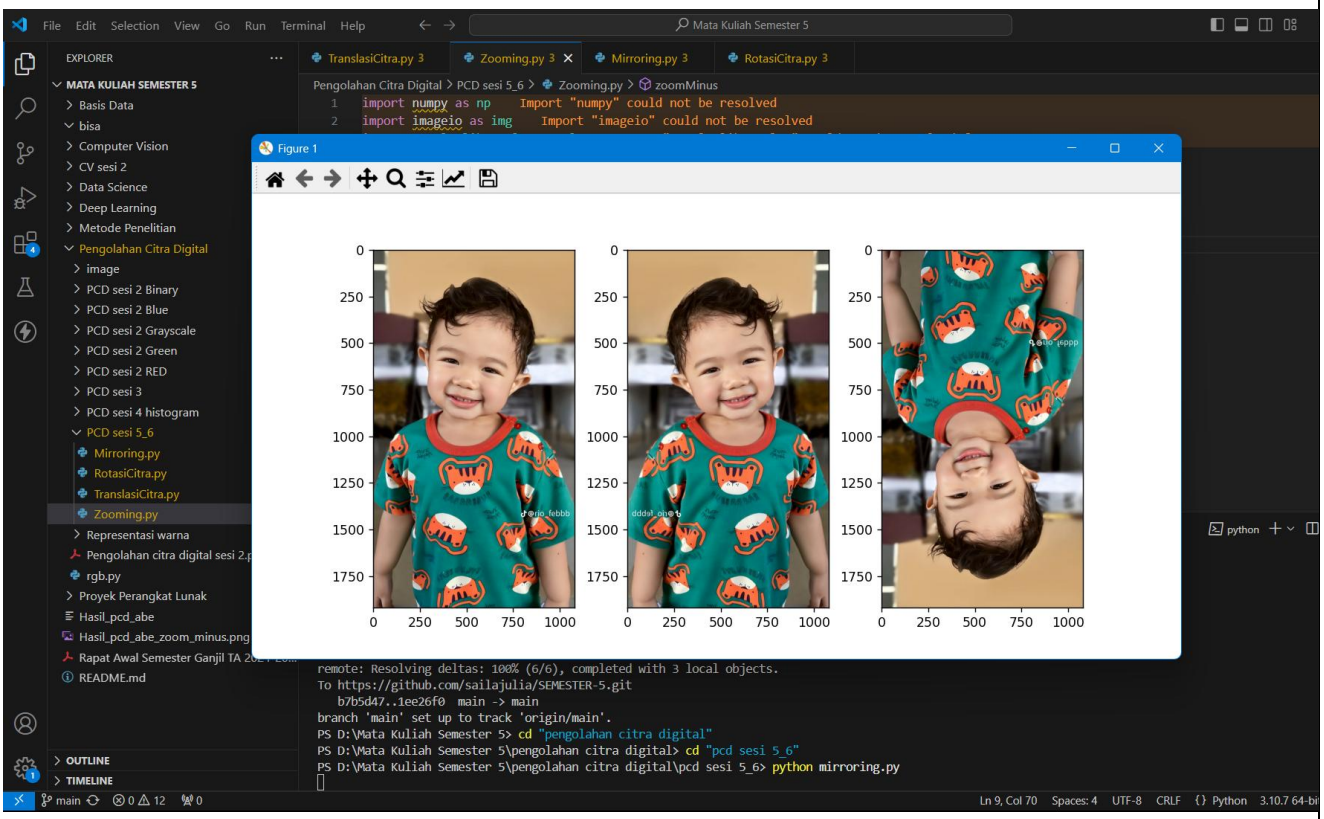
2. Ubahlah kode program tersebut yaitu

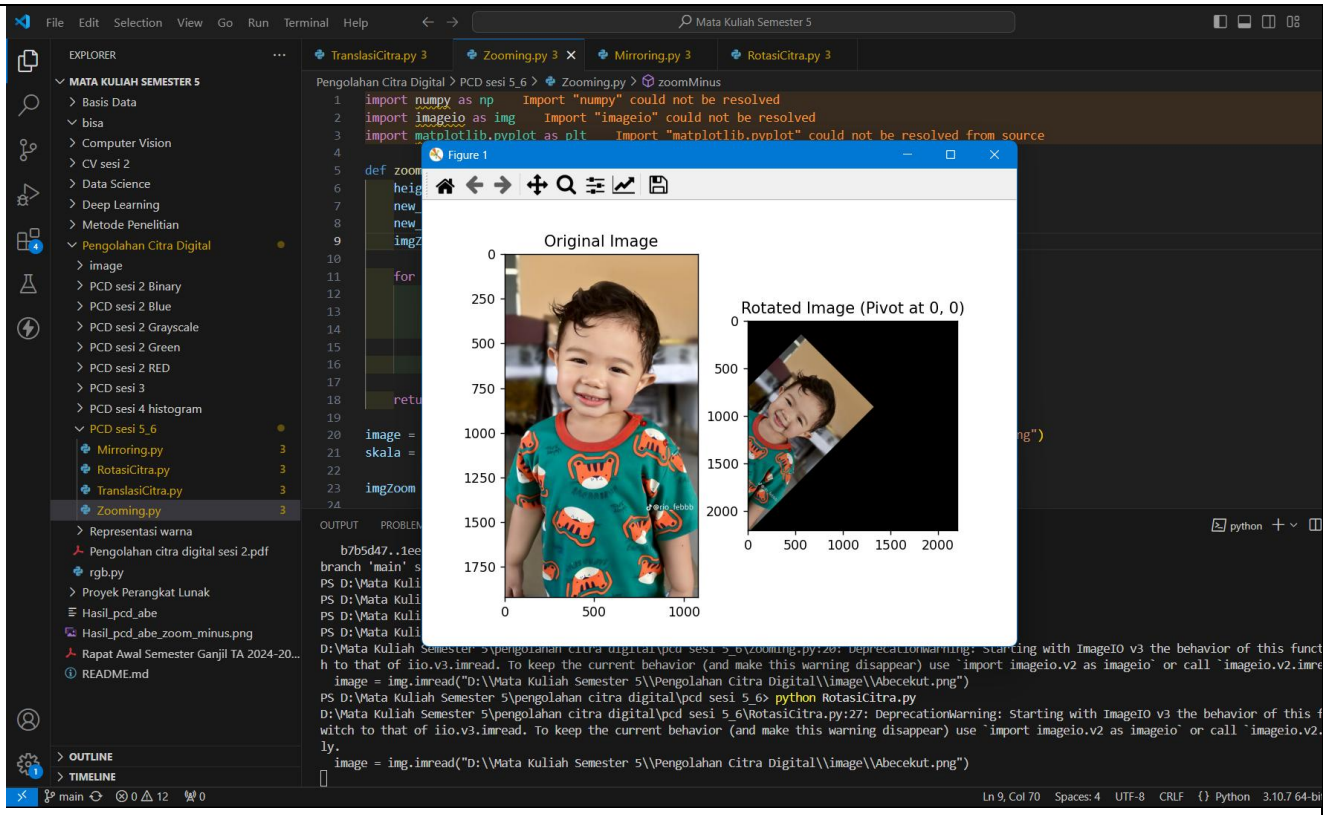
   a. Mirroring untuk vertical dan horizontal dilakukan secara bersamaan

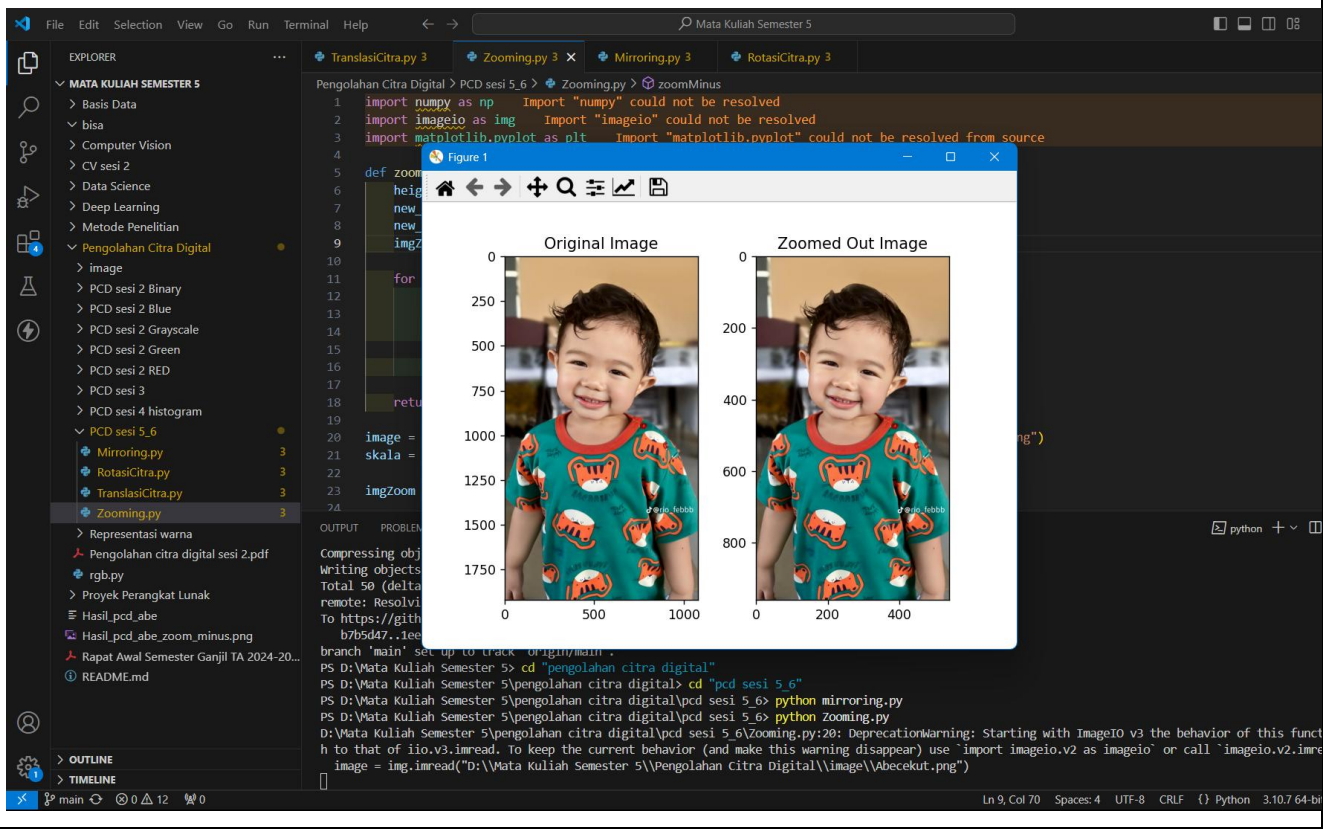
   b. Rotasi Citra menggunakan pivot di titik (0,0) pojok kiri atas

   c. Zoom Minus untuk memperkecil gambar.

# LEMBAR JAWABAN

| NO. | JAWABAN |
|---|---|
| 2.a | Link github https://github.com/sailajulia/SEMESTER-5/blob/main/Pengolahan%20Citra%20Digital/PCD%20sesi%205_6/Mirroring.py   |
| 2.b | Link github https://github.com/sailajulia/SEMESTER-5/blob/main/Pengolahan%20Citra%20Digital/PCD%20sesi%205_6/RotasiCitra.py |




2.c [https://github.com/sailajulia/SEMESTER-5/blob/main/Pengolahan%20Citra%20Digital/PCD%20sesi%205_6/Zooming.py](https://github.com/sailajulia/SEMESTER-5/blob/main/Pengolahan%20Citra%20Digital/PCD%20sesi%205_6/Zooming.py)