PCVK
BINARY MORPHOLOGHICAL
OPERATIONS

Arranged By:

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PROGRAM STUDI D-IV TEKNIK INFORMATIKA

JURUSAN TEKNOLOGI INFORMASI

POLITEKNIK NEGERI MALANG

1. Importing Library

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

     Mounted at /content/drive


[ ]  import cv2
     import numpy as np
     from matplotlib import pyplot as plt
```

GITHUB LINK : https://github.com/Rjndrkha/PCVK_Genap_2022

2. **Make the dilation operation and show the results on the image of the Structuring Element shaped 5 x 5 square without using the OpenCV morphology library, this generating the results shows in the figure (Use image "j.png")**

```
img = cv2.imread('/content/drive/MyDrive/PCVK/Images/j.png')
kernel = np.ones((5,5), np.uint8)
dilation = cv2.dilate(img, kernel, iterations = 1)

plt.subplot(121),plt.imshow(img),plt.title('Citra Awal')
plt.subplot(122),plt.imshow(dilation),plt.title('Citra Hasil Dilasi')

(<matplotlib.axes._subplots.AxesSubplot at 0x7f2e8a23de90>,
 <matplotlib.image.AxesImage at 0x7f2e8a1a7710>,
 Text(0.5, 1.0, 'Citra Hasil Dilasi'))
```
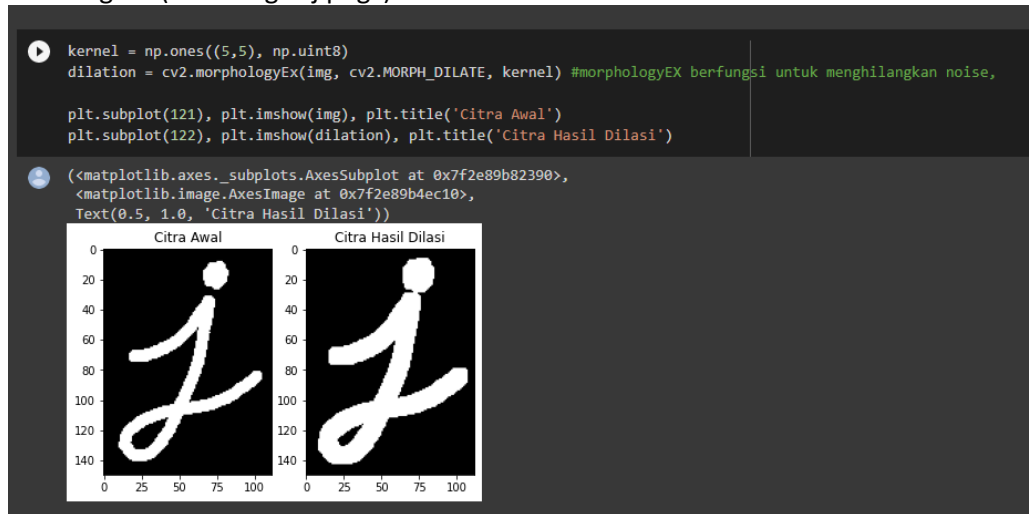

3. Make the erosion operation and show the results on the image of the Structuring Element shaped 5 x 5 square without using the OpenCV morphology library, thus generating the results shows in the figure (Use image "j.png")

```
[ ]  kernel = np.ones((5,5), np.uint8)
     erosion = cv2.erode(img, kernel, iterations = 1)

     plt.subplot(121), plt.imshow(img), plt.title('Citra Awal')
     plt.subplot(122), plt.imshow(erosion), plt.title('Citra Hasil Erosi')

     (<matplotlib.axes._subplots.AxesSubplot at 0x7f2e8a208bd0>,
      <matplotlib.image.AxesImage at 0x7f2e89c70450>,
      Text(0.5, 1.0, 'Citra Hasil Erosi'))
```
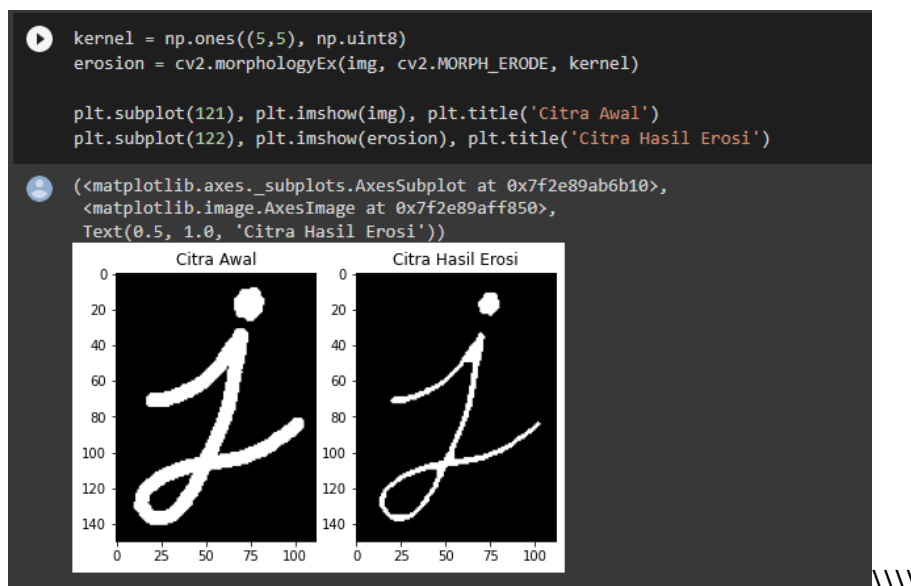
4. Make the dilation operation and show the results on the image of the Structuring Element shaped 5 x 5 square using the OpenCV morphology library, thus generating the results shows in the figure (Use image "j.png")

```python
kernel = np.ones((5,5), np.uint8)
dilation = cv2.morphologyEx(img, cv2.MORPH_DILATE, kernel) #morphologyEX berfungsi untuk menghilangkan noise,

plt.subplot(121), plt.imshow(img), plt.title('Citra Awal')
plt.subplot(122), plt.imshow(dilation), plt.title('Citra Hasil Dilasi')
```

```
(<matplotlib.axes._subplots.AxesSubplot at 0x7f2e89b82390>,
 <matplotlib.image.AxesImage at 0x7f2e89b4ec10>,
 Text(0.5, 1.0, 'Citra Hasil Dilasi'))
```


5. Make the erotion operation and show the results on the image of the Structuring Element shaped 5 x 5 square using the OpenCV morphology library, thus generating the results shows in the figure (Use image "j.png")
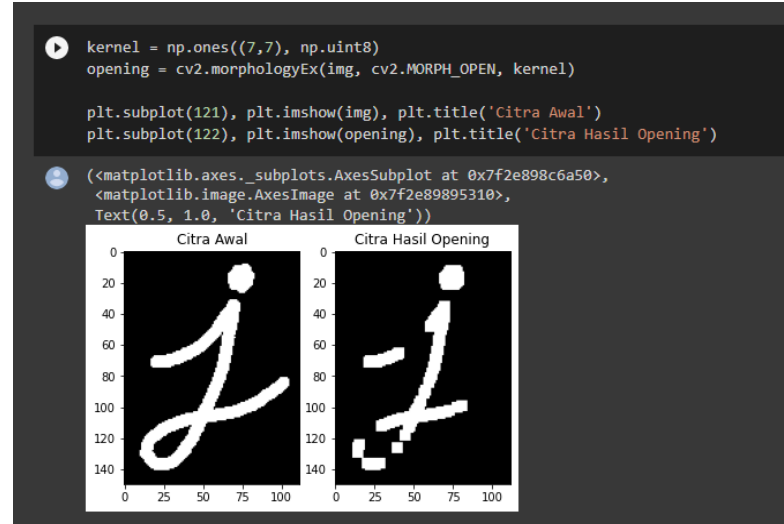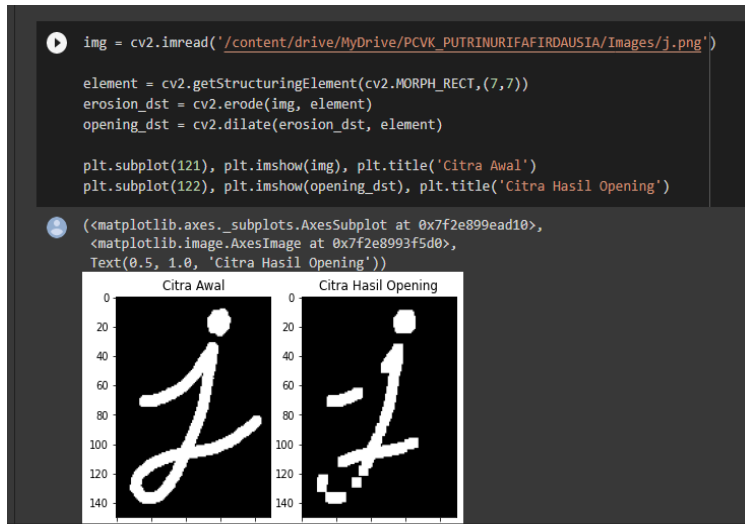
```python
kernel = np.ones((5,5), np.uint8)
erosion = cv2.morphologyEx(img, cv2.MORPH_ERODE, kernel)

plt.subplot(121), plt.imshow(img), plt.title('Citra Awal')
plt.subplot(122), plt.imshow(erosion), plt.title('Citra Hasil Erosi')
```

```
(<matplotlib.axes._subplots.AxesSubplot at 0x7f2e89ab6b10>,
 <matplotlib.image.AxesImage at 0x7f2e89aff850>,
 Text(0.5, 1.0, 'Citra Hasil Erosi'))
```
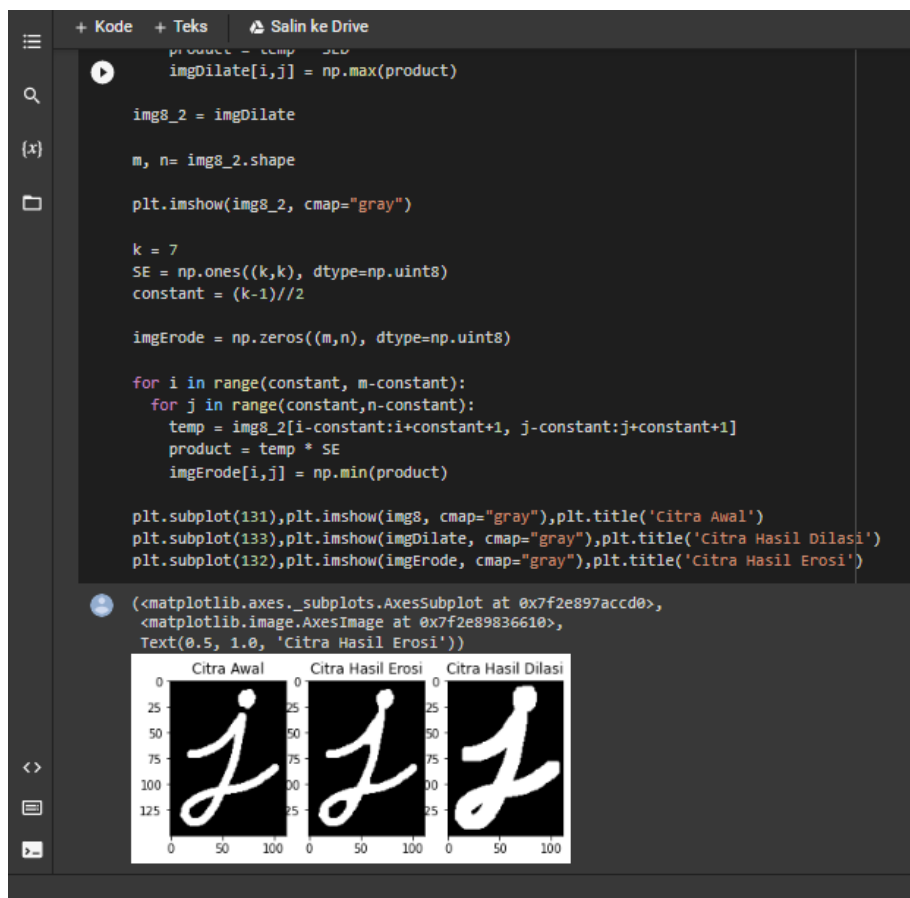

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6. Make the Opening operation and show the results on the image of the Structuring Element shaped 7 x 7 square with and without using the OpenCV morphology library, thus generating the results shows in the figure (Use image "j.png")



```python
img = cv2.imread('/content/drive/MyDrive/PCVK_PUTRINURIFAFIRDAUSIA/Images/j.png')

element = cv2.getStructuringElement(cv2.MORPH_RECT,(7,7))
erosion_dst = cv2.erode(img, element)
opening_dst = cv2.dilate(erosion_dst, element)

plt.subplot(121), plt.imshow(img), plt.title('Citra Awal')
plt.subplot(122), plt.imshow(opening_dst), plt.title('Citra Hasil Opening')
```

```
(<matplotlib.axes._subplots.AxesSubplot at 0x7f2e899ead10>,
 <matplotlib.image.AxesImage at 0x7f2e8993f5d0>,
 Text(0.5, 1.0, 'Citra Hasil Opening'))
```



```python
kernel = np.ones((7,7), np.uint8)
opening = cv2.morphologyEx(img, cv2.MORPH_OPEN, kernel)

plt.subplot(121), plt.imshow(img), plt.title('Citra Awal')
plt.subplot(122), plt.imshow(opening), plt.title('Citra Hasil Opening')
```

```
(<matplotlib.axes._subplots.AxesSubplot at 0x7f2e898c6a50>,
 <matplotlib.image.AxesImage at 0x7f2e89895310>,
 Text(0.5, 1.0, 'Citra Hasil Opening'))
```
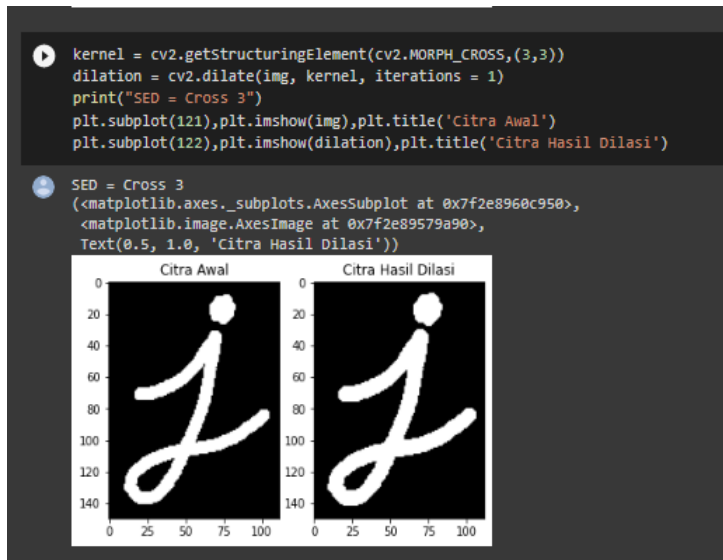

7. Make the Opening operation and show the results on the image of the Structuring Element shaped 7 x 7 square with and without using the OpenCV morphology library,this generating the results shows in the figure (Use image "j.png")


```python
            imgDilate[i,j] = np.max(product)

img8_2 = imgDilate

m, n= img8_2.shape

plt.imshow(img8_2, cmap="gray")

k = 7
SE = np.ones((k,k), dtype=np.uint8)
constant = (k-1)//2

imgErode = np.zeros((m,n), dtype=np.uint8)

for i in range(constant, m-constant):
  for j in range(constant,n-constant):
    temp = img8_2[i-constant:i+constant+1, j-constant:j+constant+1]
    product = temp * SE
    imgErode[i,j] = np.min(product)

plt.subplot(131),plt.imshow(img8, cmap="gray"),plt.title('Citra Awal')
plt.subplot(133),plt.imshow(imgDilate, cmap="gray"),plt.title('Citra Hasil Dilasi')
plt.subplot(132),plt.imshow(imgErode, cmap="gray"),plt.title('Citra Hasil Erosi')
```

```
(<matplotlib.axes._subplots.AxesSubplot at 0x7f2e897accd0>,
 <matplotlib.image.AxesImage at 0x7f2e89836610>,
 Text(0.5, 1.0, 'Citra Hasil Erosi'))
```
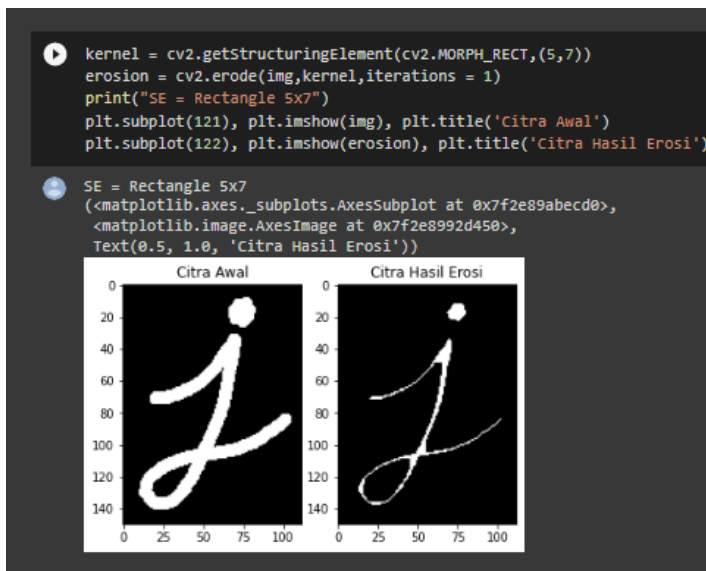

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8. Make the Dilation operation and show the results on the image of the Structuring Element shaped 3x3 and 5x5 Cross using the OpenCV morphology library, thus generating the results shows in the figure (Use image "j.png")
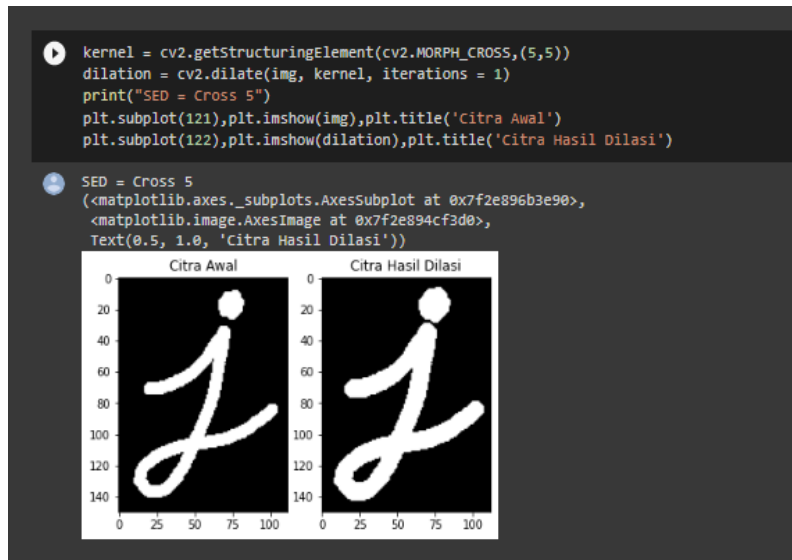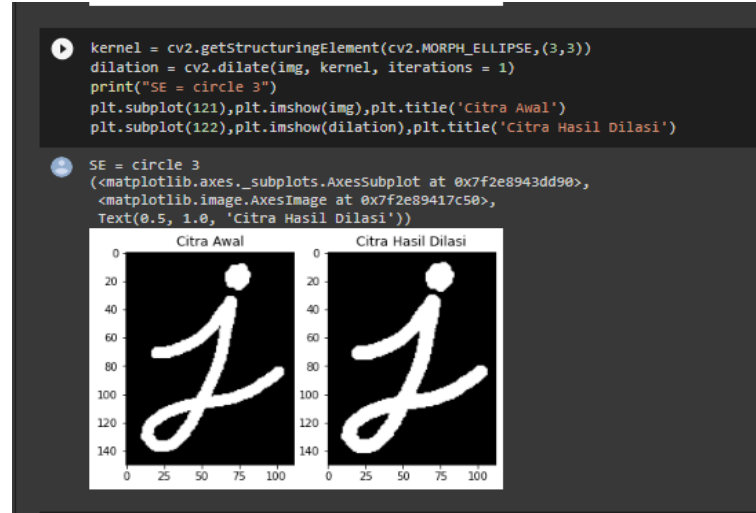

9. Make the Dilation operation and show the results on the image of the Structuring Element shaped 3x3 and 5x5 Circular using the OpenCV morphology library, this generating the results shows in the figure (Use image "j.png")

10. Make the Erotion operation and show the results on the image of the Structuring Element shaped 3x3 and 5x5 Rectangle using the OpenCV morphology library, this generating the results shows in the figure (Use image "j.png")

11. Make the Dilation operation and show the results on the image of the Structuring Element shaped 3 and 5 Line Vertical using the OpenCV morphology library, this generating the results shows in the figure (Use image "j.png")