Tugas PCD Fourier dan Wavelet

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1. Ekstrak Penyakit pada citra penyakit ;

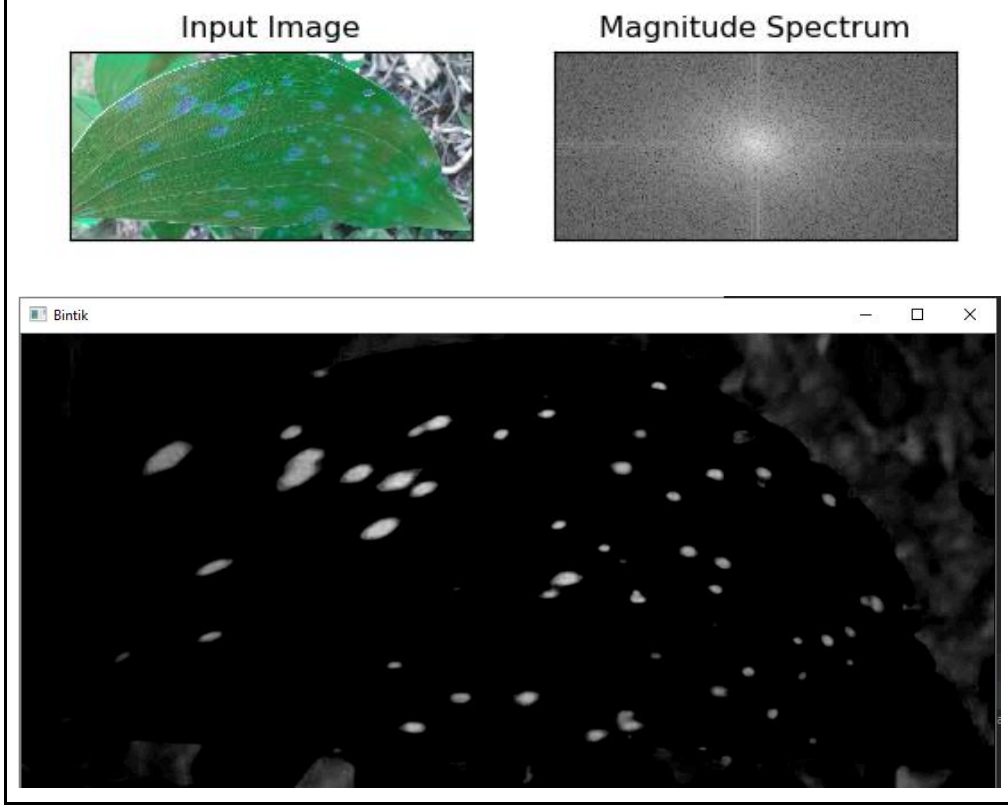
a. 

FOURIER

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

def segmentasi(img):
  row, col, ch = img.shape
  canvas = np.zeros((row, col), np.uint8)
  for i in range(0, row):
    for j in range(0, col):
      b, g, r = img[i, j]
      res = int(r) - int(g)
      if res < 0:
        canvas.itemset((i, j), 0)
      else:
        canvas.itemset((i, j), res)
  return canvas

def Up_Kontras(img):
  row, col = img.shape
  canvas = np.zeros((row, col), np.uint8)
  for i in range(0, row):
    for j in range(0, col):
      res = img[i, j]*3
      if res > 255:
        canvas.itemset((i, j), 255)
      else:
        canvas.itemset((i, j), res)
  return canvas

img = cv2.imread('Bercak Daun.PNG', 1)
hasil_segmentasi = segmentasi(img)
result = Up_Kontras(hasil_segmentasi)
```

```
cv2.imshow("Bintik", result)

f = np.fft.fft2(result)
fshift = np.fft.fftshift(f)
magnitude_spectrum = 20*np.log(np.abs(fshift))

plt.subplot(121), plt.imshow(img, cmap = 'gray')
plt.title('Input Image'), plt.xticks([]), plt.yticks([])
plt.subplot(122), plt.imshow(magnitude_spectrum, cmap = 'gray')
plt.title('Magnitude Spectrum'), plt.xticks([]), plt.yticks([])

plt.show()

plt.plot(result.ravel())
plt.show()
```

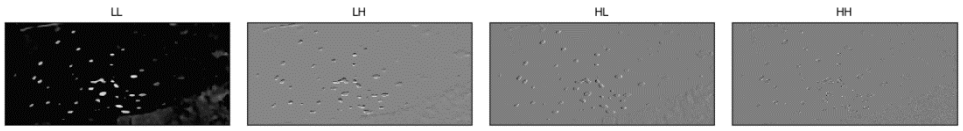
Hasil



Wavelet

```
import matplotlib.pyplot as plt
import cv2
import pywt
import numpy as np

def segmentasi(img):
   row, col, ch = img.shape
   canvas = np.zeros((row, col), np.uint8)
   for i in range(0, row):
      for j in range(0, col):
         b, g, r = img[i, j]
         res = int(r) - int(g)
         if res < 0:
            canvas.itemset((i, j), 0)
         else:
            canvas.itemset((i, j), res)
   return canvas
# Load image
original = cv2.imread('Penyakit Daun.PNG',1)
result = segmentasi(original)
titles = ['LL', 'LH',
        'HL', 'HH']
coeffs2 = pywt.dwt2(result, 'bior1.3')
LL, (LH, HL, HH) = coeffs2

fig = plt.figure(figsize=(12, 3))
for i, a in enumerate([LL, LH, HL, HH]):
   ax = fig.add_subplot(1, 4, i + 1)
   ax.imshow(a, interpolation="nearest", cmap=plt.cm.gray)
   ax.set_title(titles[i], fontsize=10)
   ax.set_xticks([])
   ax.set_yticks([])

fig.tight_layout()
plt.show()

plt.subplot(221)
plt.plot(LL.ravel())
plt.subplot(222)
plt.plot(LH.ravel())
plt.subplot(223)
plt.plot(HL.ravel())
plt.subplot(224)
plt.plot(HH.ravel())
plt.show()
```

Hasil



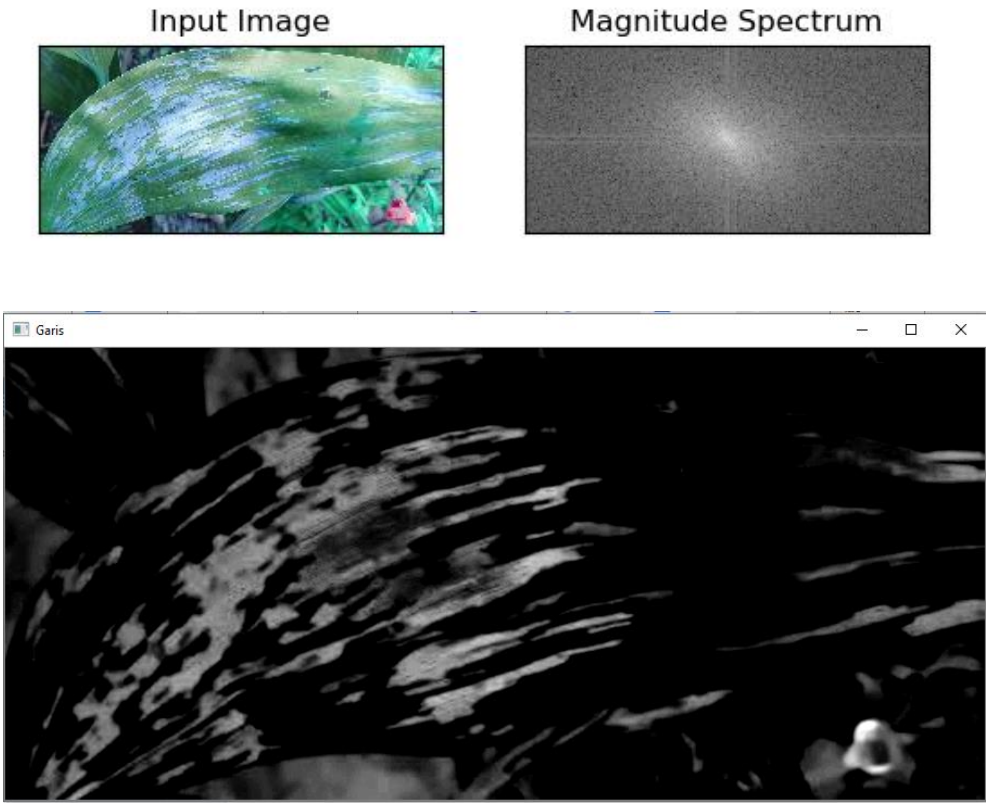
b.

FOURIER

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

def segmentasi(img):
  row, col, ch = img.shape
  canvas = np.zeros((row, col), np.uint8)
  for i in range(0, row):
    for j in range(0, col):
      b, g, r = img[i, j]
      res = int(r) - int(g)
      if res < 0:
        canvas.itemset((i, j), 0)
      else:
        canvas.itemset((i, j), res)
  return canvas

def Up_Kontras(img):
  row, col = img.shape
  canvas = np.zeros((row, col), np.uint8)
  for i in range(0, row):
    for j in range(0, col):
      res = img[i, j]*3
      if res > 255:
        canvas.itemset((i, j), 255)
      else:
        canvas.itemset((i, j), res)
```

```
    return canvas

img = cv2.imread('Bercak Bergaris.PNG')
hasil_segmentasi = segmentasi(img)
result = Up_Kontras(hasil_segmentasi)

cv2.imshow("Garis", result)

f = np.fft.fft2(result)
fshift = np.fft.fftshift(f)
magnitude_spectrum = 20*np.log(np.abs(fshift))

plt.subplot(121), plt.imshow(img, cmap = 'gray')
plt.title('Input Image'), plt.xticks([]), plt.yticks([])
plt.subplot(122), plt.imshow(magnitude_spectrum, cmap = 'gray')
plt.title('Magnitude Spectrum'), plt.xticks([]), plt.yticks([])

plt.show()
plt.plot(result.ravel())
plt.show()
```

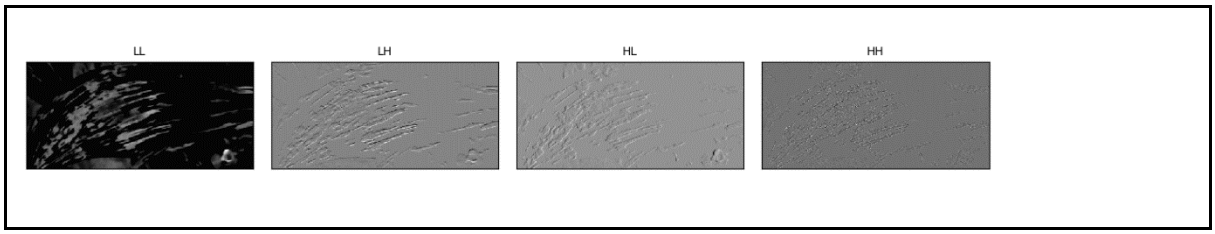
Hasil



Wavelet

```
import matplotlib.pyplot as plt
import cv2
import pywt
import numpy as np

def segmentasi(img):
  row, col, ch = img.shape
  canvas = np.zeros((row, col), np.uint8)
  for i in range(0, row):
     for j in range(0, col):
        b, g, r = img[i, j]
        res = int(r) - int(g)
        if res < 0:
           canvas.itemset((i, j), 0)
        else:
           canvas.itemset((i, j), res)
  return canvas

# Load image
original = cv2.imread('Bercak Bergaris.PNG',1)
result = segmentasi(original)

# Wavelet transform of image, and plot approximation and details
titles = ['LL', 'LH',
       'HL', 'HH']
coeffs2 = pywt.dwt2(result, 'bior1.3')
LL, (LH, HL, HH) = coeffs2

fig = plt.figure(figsize=(12, 3))
for i, a in enumerate([LL, LH, HL, HH]):
  ax = fig.add_subplot(1, 4, i + 1)
  ax.imshow(a, interpolation="nearest", cmap=plt.cm.gray)
  ax.set_title(titles[i], fontsize=10)
  ax.set_xticks([])
  ax.set_yticks([])

fig.tight_layout()
plt.show()

plt.subplot(221)
plt.plot(LL.ravel())
plt.subplot(222)
plt.plot(LL.ravel())
plt.subplot(223)
plt.plot(HL.ravel())
plt.subplot(224)
plt.plot(HH.ravel())
plt.show()
```

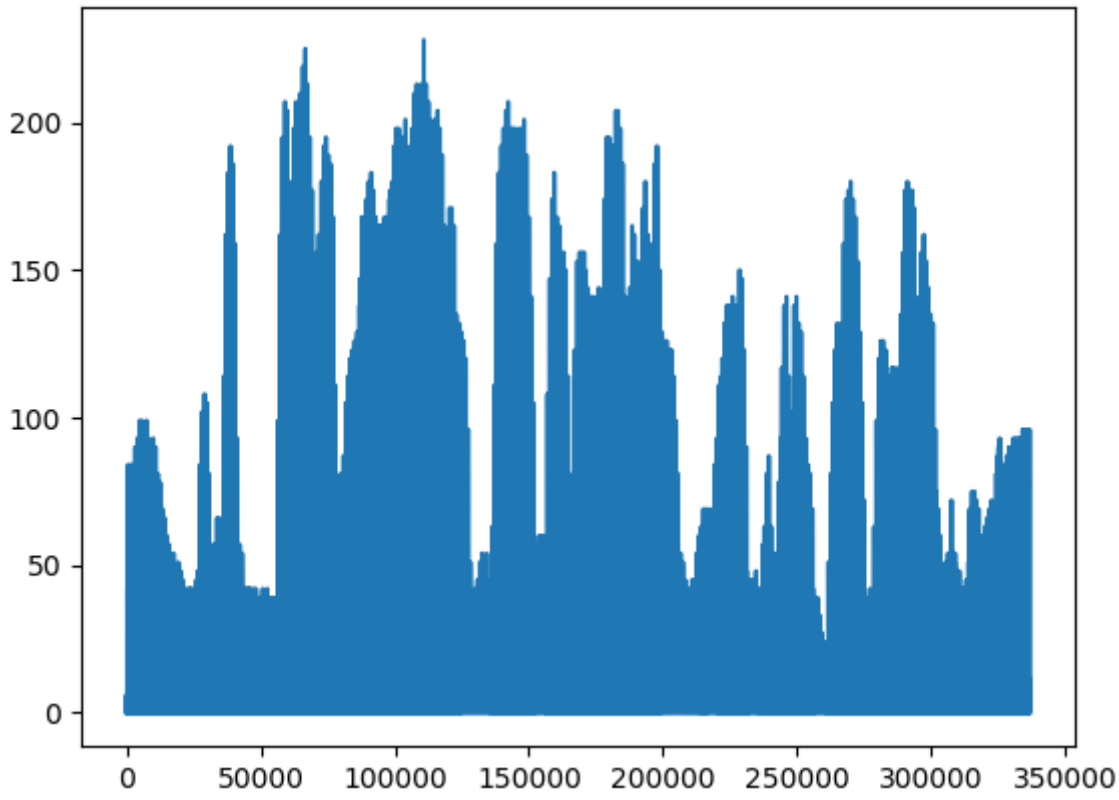
Hasil



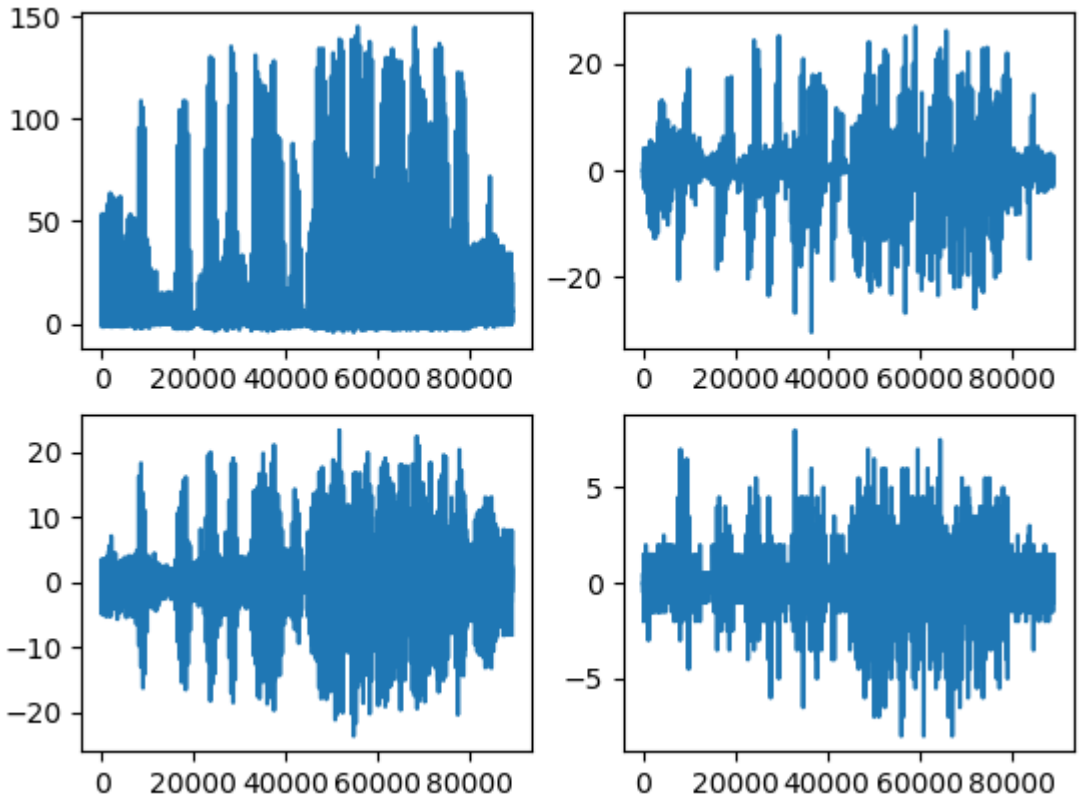
2. Perbandingan Spektrum pada metode setiap Citra

a. Citra Penyakit Bintik

Fourier

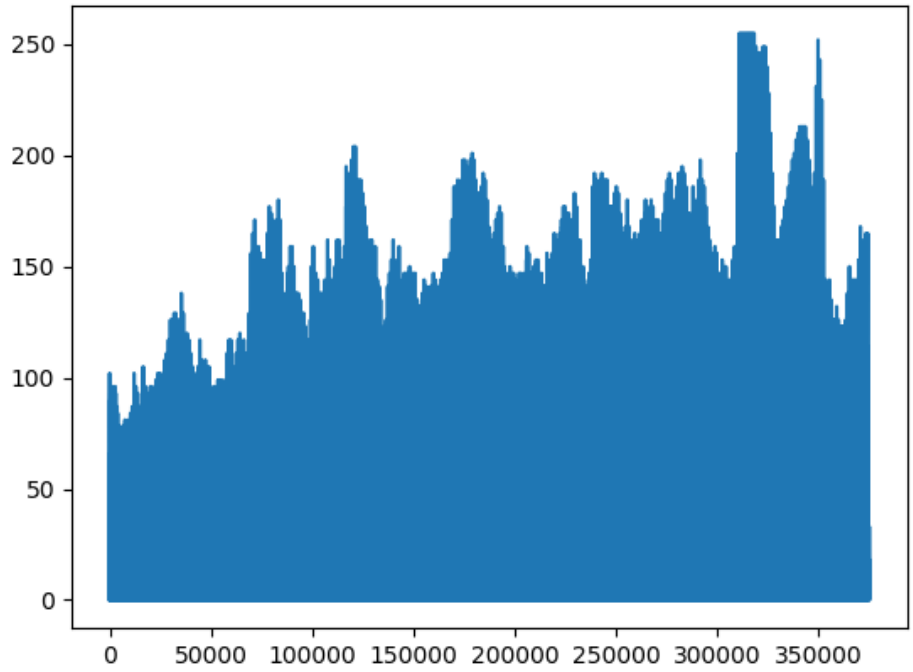


Wavelet

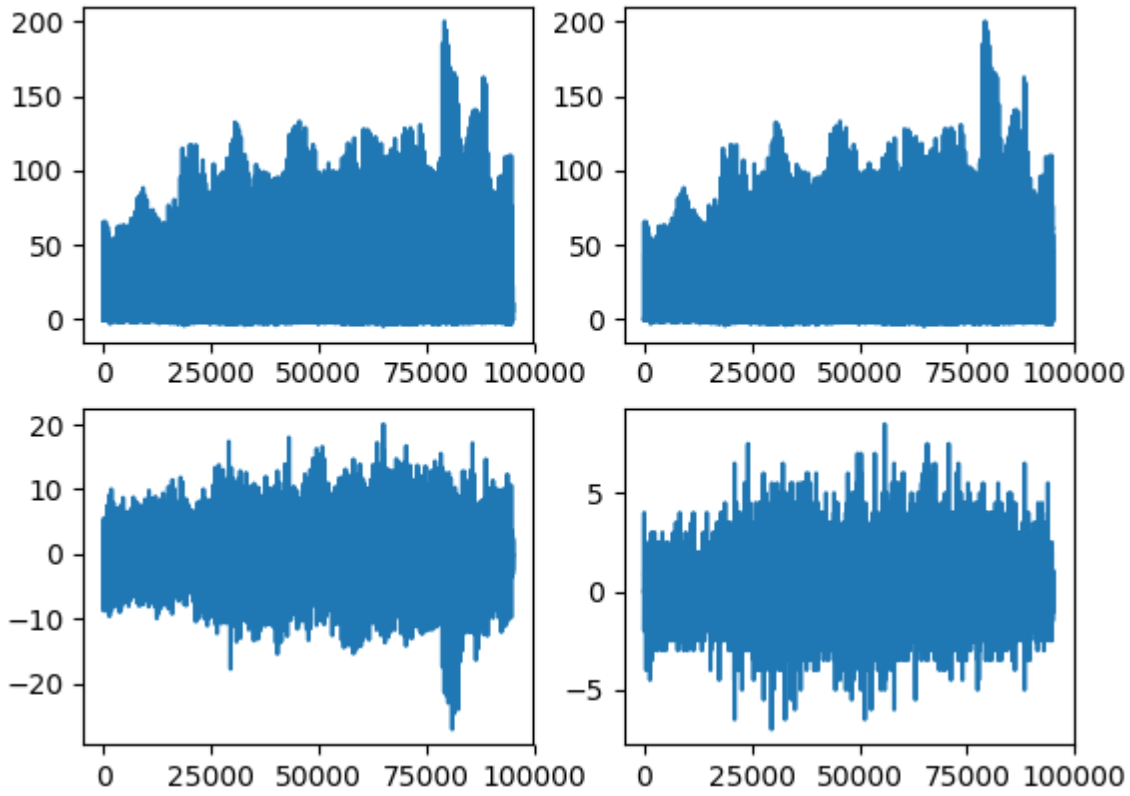


b. Citra Penyakit Bergaris

Fourier



Wavelet



Pada Spektrum yang ada di atas menunjukan bahwa penyakit bintik pada daun dan penyakit garis pada daun. Pada penyakit bintik spektrum yang diperoleh ada banyak high frequensi atau low scale yang banyak dan kadang-kadang terjadi, sedangkan pada penyakit garis spektrum menunjukan banyak low frequensi dan sedikit terjadi high frequensi pada spektrumnya.

3. Identifikasi Penyakit