Jurusan Teknologi Informasi Politeknik Negeri Malang

Tugas Minggu-07 : Histogram, Histogram Equalization, Dithering

Mata Kuliah Pengolahan Citra dan Visi Komputer

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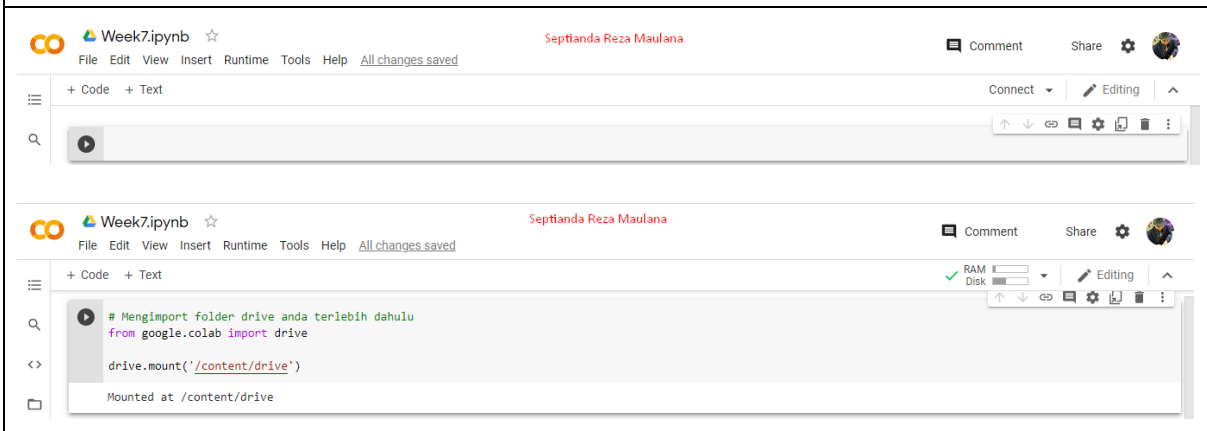
Maret 2021

Tujuan

1. Mahasiswa mampu memahami mengenai histogram citra dan menerapkannya dalam program Python.
2. Mahasiswa mampu memahami mengenai histogram equalization dan menerapkannya dalam program Python.
3. Mahasiswa mampu memahami mengenai dithering citra dan menerapkannya dalam program Python.

Tugas Praktikum

Langkah	Keterangan
1	Buka https://colab.research.google.com/. Setelah dipastikan bahwa google Colab terhubung dengan Github Anda, lanjutkan dengan memilih repository yang telah digunakan pada praktikum minggu lalu, rename file menjadi “Week7.ipynb”. Kemudian import folder yang ada di Drive Anda dengan cara sebagai berikut.



2	Import beberapa library berikut yang akan digunakan selama uji coba praktikum minggu ke-7 berikut.

Week7.ipynb

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```
# Mengimport beberapa library
import cv2 as cv
from google.colab.patches import cv2_imshow
from skimage import io
import matplotlib.pyplot as plt
import numpy as np
import math
import os
import glob
```

3	Buatlah histogram citra seperti output histogram berikut berdasarkan flowchart di bawah ini : (Gunakan gambar lena.jpg)

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```
# No 3. Membuat histogram citra berdasarkan flowchart
img = cv.imread('/content/drive/MyDrive/PCVK/Images/lena.jpg')
height, width, depth = np.shape(img)
names = np.arange(256)

blue = [0]*256
green = [0]*256
red = [0]*256

for y in range(0,height):
  for x in range(0,width):
    blue[img[y][x][0]] += 1
    green[img[y][x][1]] += 1
    red[img[y][x][2]] += 1

names = np.arange(256)
fig, axs = plt.subplots(1, 3, figsize=[20,5], sharex=True, sharey=True)
fig.suptitle('Histogram RGB plot')
fig.text(0.05, 0.5, 'Jumlah Kemunculan', va='center', rotation='vertical')
fig.text(0.5, 0.04, 'Intensitas Warna', ha='center')
axs[0].bar(names, red, color='red')
axs[1].bar(names, green, color='green')
axs[2].bar(names, blue, color='blue')
```

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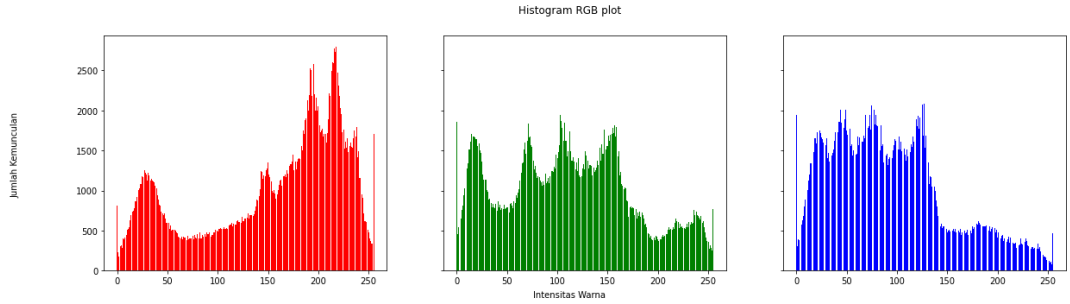
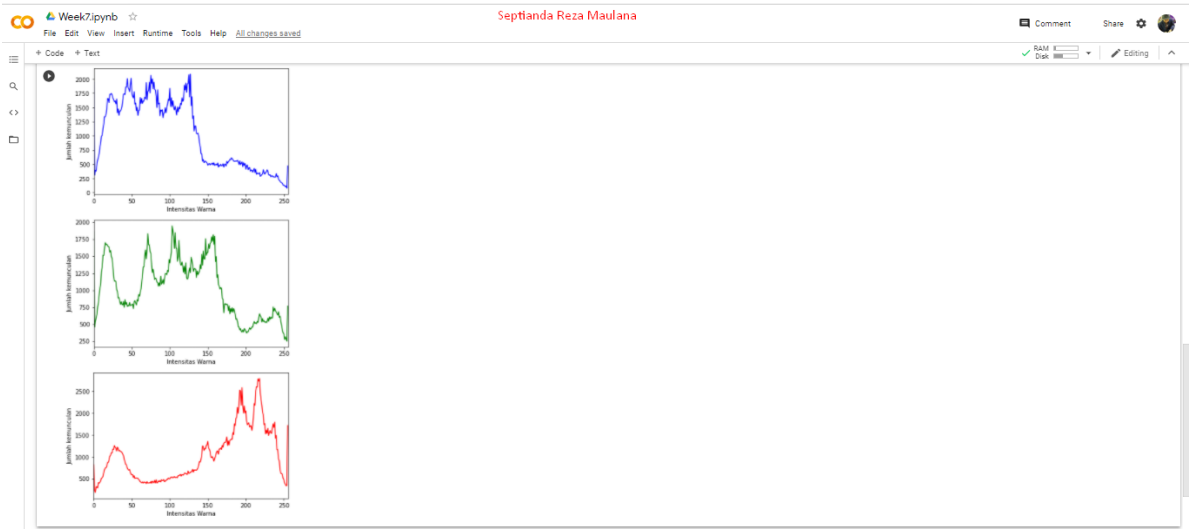
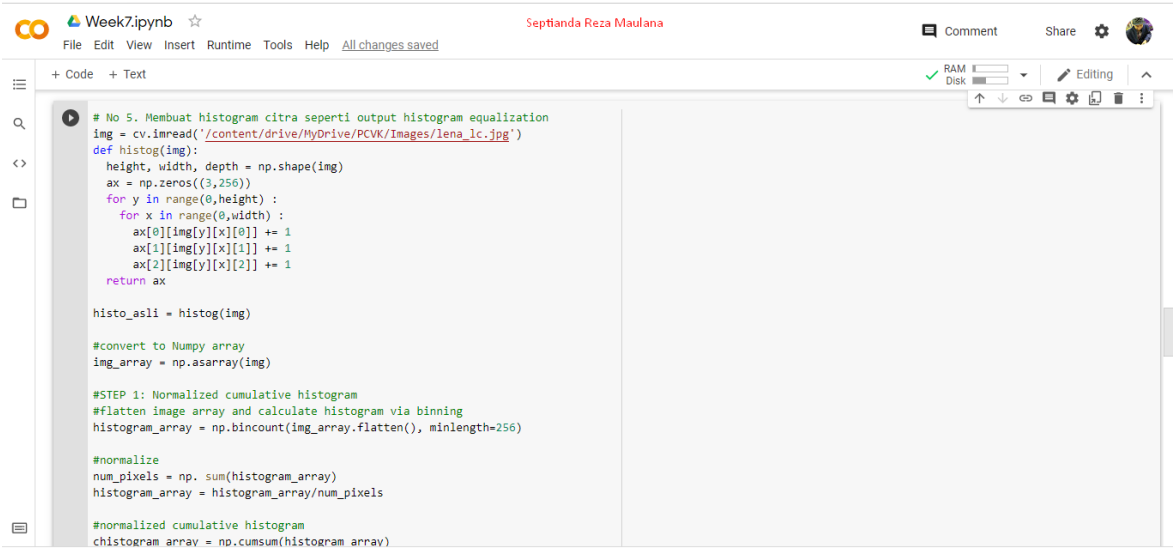
```
<BarContainer object of 256 artists>
```



	Setelah mengerjakan soal no. 3, buatlah histogram citra yang sama akan tetapi menggunakan library yang dimiliki oleh NumPy yaitu “histogram”. Bandingkan hasilnya. Apakah output muncul sama?
4	 **JAWAB :** Untuk output Histogram Plot tidak sama. 
5	Buatlah histogram citra seperti *output histogram equalization* dan juga tampilan gambar sebelum dan sesudah proses *histogram equalization* berikut berdasarkan flowchart di bawah ini : (Gunakan gambar lena_lc.jpg) 

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```
#normalized cumulative histogram
chistogram_array = np.cumsum(histogram_array)

#STEP 2: Pixel mapping lookup table
transform_map = np.floor(255 * chistogram_array). astype (np.uint8)

#STEP 3: Transformation
# flatten image array into 10 list
img_list = list(img_array.flatten())

# transform pixel values to equalize
eq_img_list = [transform_map[p] for p in img_list]

# reshape and write back into img_array
eq_img_array = np.reshape(np.asarray(eq_img_list), img_array.shape)
img2 = eq_img_array

equal_histo = histog(img2)

final_frame = cv.hconcat((img, img2)) #concatenate image
cv2_imshow(final_frame)

names = np.arange (256)
isgrayimg = np.array_equal(blue, green, red)
if (isgrayimg == False):
  fig, axs = plt.subplots(2, 3, figsize=[20,5], sharex=True, sharey=True)
  fig.suptitle('Histogram RGB plot')
  fig.text(0.09, 0.5, 'Jumlah Kemunculan', va='center', rotation='vertical')
```

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```
  fig.text(0.5, 0.04, 'Intensitas Warna', ha='center')
  axs[0,0].bar(names, histo_asli[2], color='red')
  axs[0,1].bar(names, histo_asli[1], color='green')
  axs[0,2].bar(names, histo_asli[0], color='blue')
  axs[1,0].bar(names, equal_histo[2], color='red')
  axs[1,1].bar(names, equal_histo[1], color='green')
  axs[1,2].bar(names, equal_histo[0], color='blue')
else:
  fig, axs = plt. subplots(1, 2, figsize=[20,5], sharex=Trbe, sharey=True)
  fig. suptitle('Histogram RGB plot')
  fig.text(0.09, 0.5, 'Jumlah Kemunculan', va='center', rotation='vertical')
  fig.text(0.5, 0.94, 'Intensitas Warna', ha='center')
  axs[0,0].bar(names, histo_asli[2], color='gray')
  axs[0,1].bar(names, equal_histo[2], color='gray')
```

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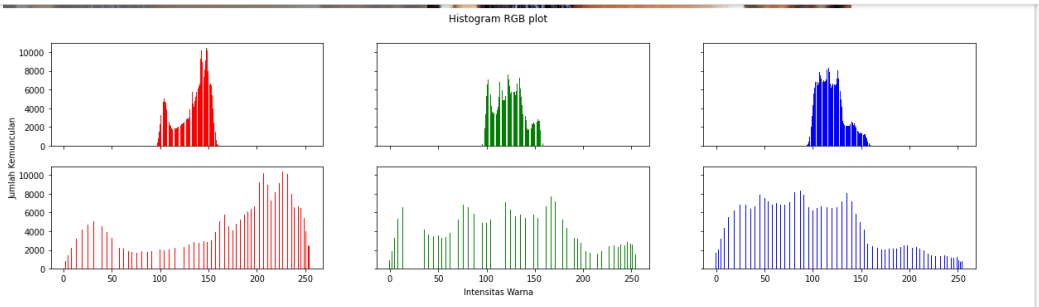
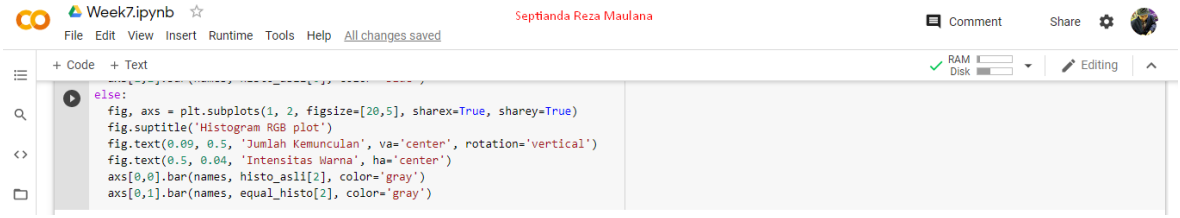
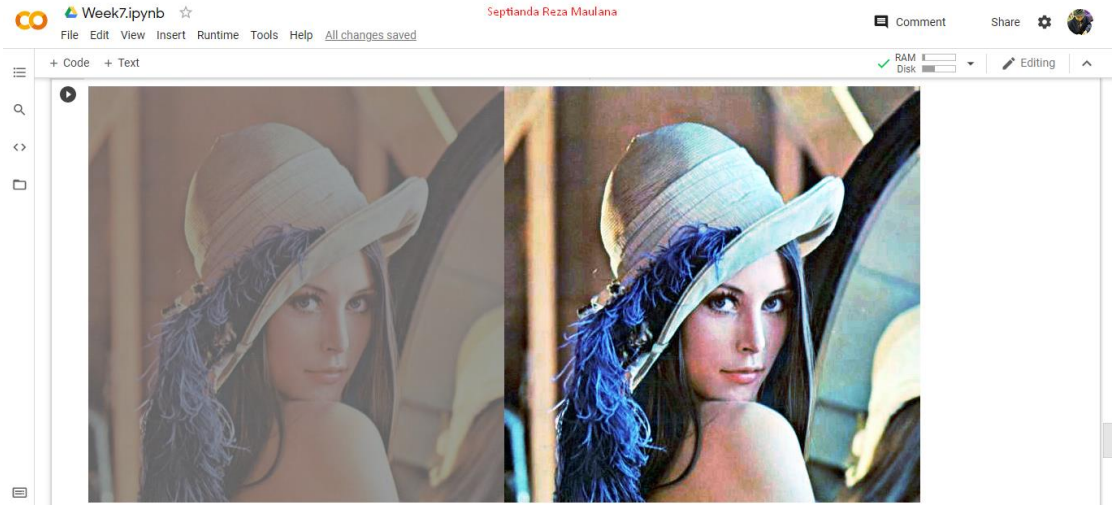


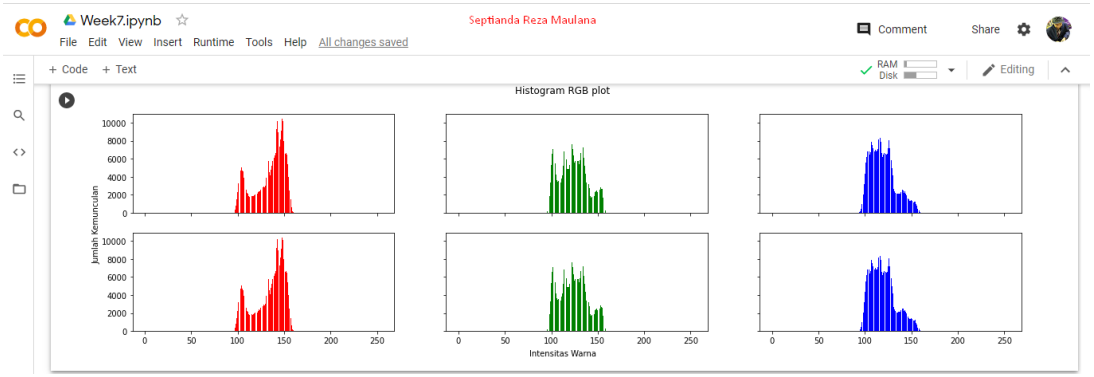
Setelah mengerjakan soal no. 5, buatlah histogram citra yang sama akan tetapi menggunakan library yang dimiliki oleh CV2 yaitu “equalizeHist”. Bandingkan hasilnya. Apakah output muncul sama?

6



JAWAB : Terdapat perbedaan citra pada rambut foto dan histogram RGB plot.





7	Lakukanlah proses pemetaan 16 juta warna RGB ke dalam 8 warna saja, yaitu hitam, hijau, kuning, biru, cyan, magenta, putih seperti output berikut berdasarkan flowchart di bawah ini! (Gunakan gambar lena.jpg)

8

Lakukanlah proses dithering Floyd and Steinberg seperti output berikut (tampilan image awal, dan tampilan setelah dithering) berdasarkan flowchart di bawah ini! (Gunakan gambar wiki.jpg)

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```
# No 8. Melakukan proses dithering Floyd dan Steinberg
from PIL import Image
import cv2
import numpy as np

imageConvert = Image.open('/content/drive/MyDrive/PCVK/Images/wiki.jpg').convert(mode='1',dither=Image.FLOYDSTEINBERG)
imageConvert.save('/content/drive/MyDrive/PCVK/Images/wiki2.jpg') # Menyimpan hasil convertan image


Image = cv2.imread('/content/drive/MyDrive/PCVK/Images/wiki.jpg') # Membaca image

GrayImage = cv2.cvtColor(Image, cv2.COLOR_BGR2GRAY)
cv2.imwrite('/content/drive/MyDrive/PCVK/Images/wiki2.jpg', GrayImage) # Menulis image yang mana disini saya membuat nama file gambar baru

Height = GrayImage.shape[0]
Width = GrayImage.shape[1]

for y in range(0, Height):
    for x in range(0, Width):

        old_value = GrayImage[y, x]
        new_value = 0
        if (old_value > 128) :
            new_value = 255

        GrayImage[y, x] = new_value
```

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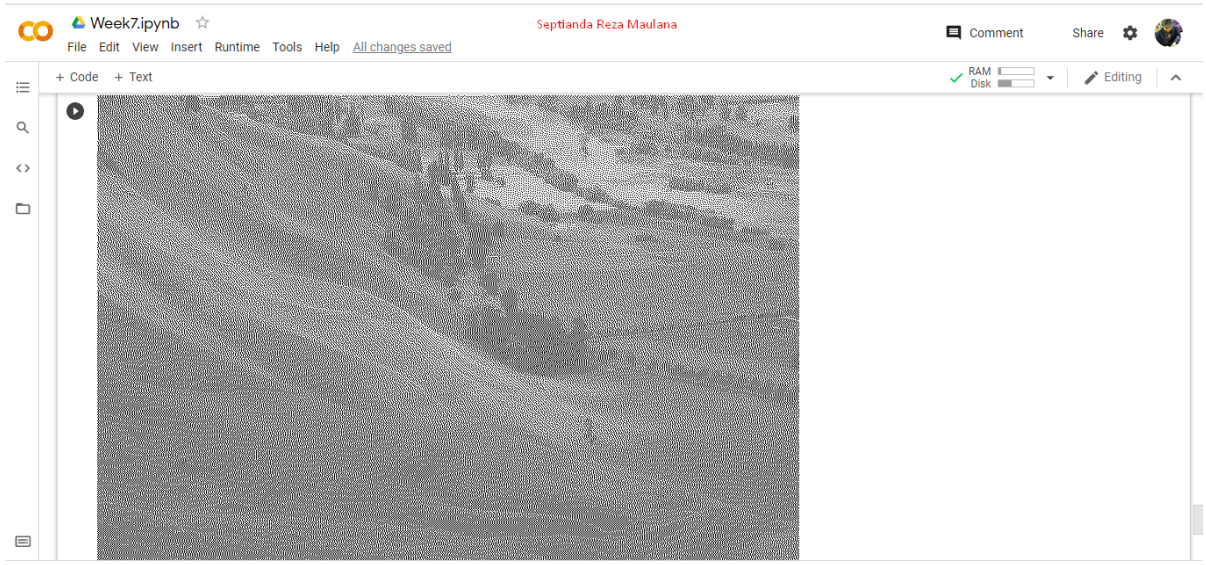
```
        Error = old_value - new_value

        if (x<Width-1):
            NewNumber = GrayImage[y, x+1] + Error * 7 / 16
            if (NewNumber>255) : NewNumber=255
            elif (NewNumber<0) : NewNumber=0
            GrayImage[y, x+1] = NewNumber

        if (x>0 and y<Height-1):
            NewNumber = GrayImage[y+1, x-1] + Error * 3 / 16
            if (NewNumber>255) : NewNumber=255
            elif (NewNumber<0) : NewNumber=0
            GrayImage[y+1, x-1] = NewNumber

        if (y<Height-1):
            NewNumber= GrayImage[y+1, x] + Error * 5 / 16
            if (NewNumber>255) : NewNumber=255
            elif (NewNumber<0) : NewNumber=0
            GrayImage[y+1, x] = NewNumber

        if (y<Height-1 and x<Width-1):
            NewNumber = GrayImage[y+1, x+1] + Error * 1 / 16
            if (NewNumber>255) : NewNumber=255
            elif (NewNumber<0) : NewNumber=0
            GrayImage[y+1, x+1] = NewNumber

cv2.imwrite('/content/drive/MyDrive/PCVK/Images/wiki2.jpg', GrayImage)
cv2.imshow(GrayImage)
```

Gambar wiki Asli



Gambar Hasil Dithering

NB : Ketika gambar ini tidak di zoom maka akan menghasilkan titik-titik pada gambar & ketika gambar tersebut di zoom, maka yang terjadi gambar tersebut akan terlihat warna sedikit kuning.