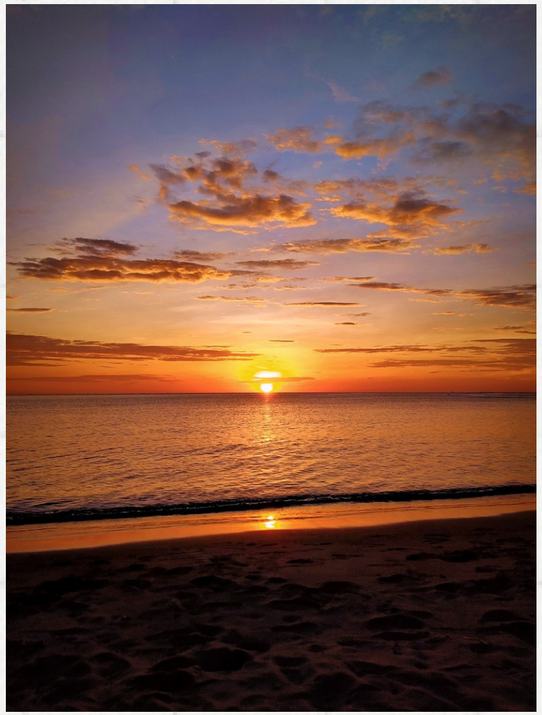
APLIKASI PADA ALJABAR LINEAR: KONVERSI CITRA RGB KE GRAYSCALE

Muhammad Aldi Alfatih - 2210111044
Nur Aini Sri Oktaviani Bahar - 2210111049
NurJamaliyah J. - 2210111109

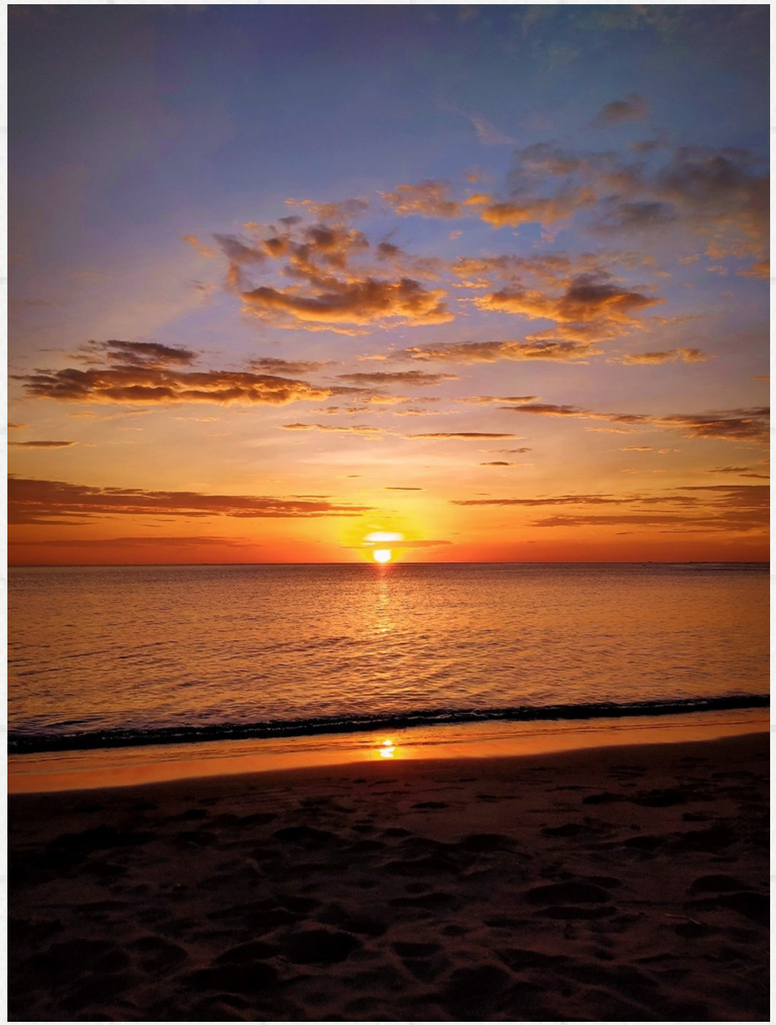


AldiAlfatih.jpg

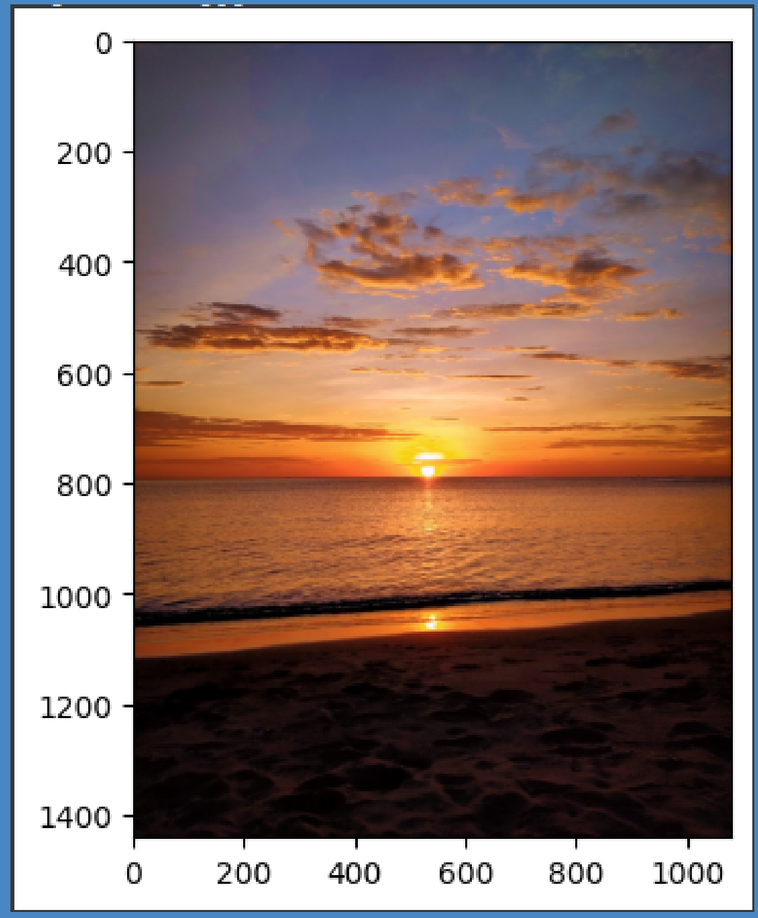
Aini.jpg

nur.jpg

```python
import cv2
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline

img_path = 'AldiAlfatih.jpg'
img = cv2.imread(img_path)
print(img.shape)
fix_img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
plt.imshow(fix_img)

R, G, B = fix_img[:,:,0], fix_img[:,:,1], fix_img[:,:,2]
print(np.array(fix_img))
```

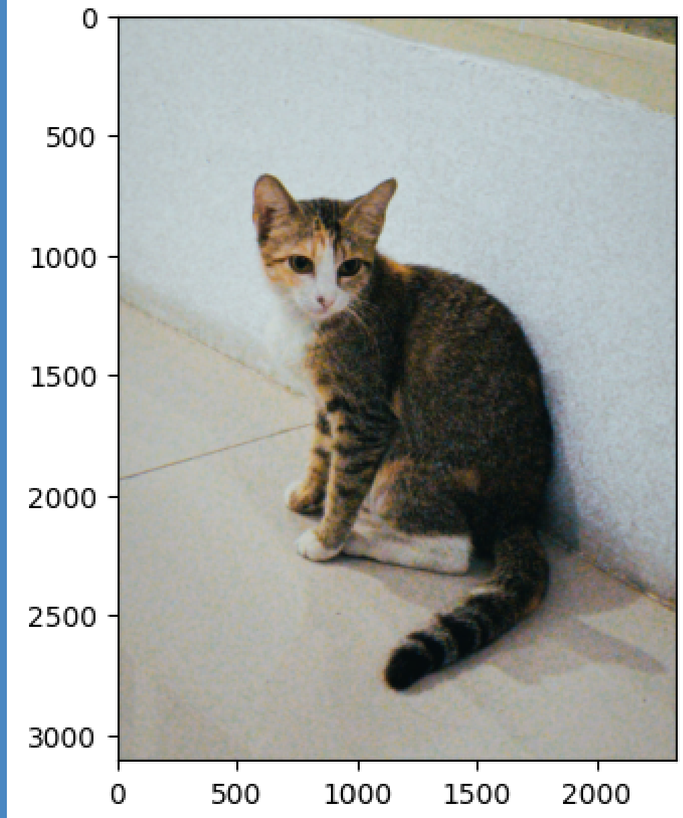


```
(1440, 1080, 3)
[[[61 54 72]
  [57 50 66]
  [54 50 65]
  ...
  [55 55 65]
  [57 55 68]
  [60 58 71]]

 [[62 55 73]
  [60 53 69]
  [56 52 66]
  ...
  [59 59 69]
  [59 57 70]
  [59 57 70]]
```



```python
import cv2
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline

img_path = 'Aini.jpg'
img = cv2.imread(img_path)
print(img.shape)

plt.imshow(img)

fix_img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
plt.imshow(fix_img)

R, G, B = fix_img[:,:,0], fix_img[:,:,1], fix_img[:,:,2]
print (np.array(fix_img))
```

```
(3106, 2330, 3)
[[[180 199 197]
  [180 199 197]
  [182 198 197]
  ...
  [ 87 103  76]
  [ 91 107  78]
  [ 91 107  78]]

 [[180 199 197]
  [180 199 197]
  [182 198 197]
```



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

img_path = 'Nurjamaliyah.jpeg'
img = cv2.imread(img_path)
print(img.shape)

plt.imshow(img)

fix_img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
plt.imshow(fix_img)

R, G, B = fix_img[:,:,0], fix_img[:,:,1], fix_img[:,:,2]
print(np.array(fix_img))
```

```
Shape gambar: (720, 812, 3)
[[[227 231 232]
  [227 231 232]
  [227 231 232]
  ...
```

METODE LIGHTNESS

Lightness, mencari nilai tertinggi dan terendah dari nilai R, G, dan B, kemudian hasil penjumlahan nilai tertinggi dan terendah tersebut dikalikan dengan 0,5. Secara matematis dapat dirumuskan:

$$Grayscale = (max(R, G, B)) + (min(R, G, B)) * 0.5$$

METODE LIGHTNESS

```
fix_img[:] = np.max(fix_img, axis = -1, keepdims = 1) + np.min(fix_img, axis = -1, keepdims = 1) / 2

print(np.array(fix_img[:]))
plt.axis('off')
plt.imshow(fix_img[:])
plt.savefig('metode lightness.jpg', bbox_inches = 'tight')
```

```
(1440, 1080, 3)
[[[61 54 72]
  [57 50 66]
  [54 50 65]
  ...
  [55 55 65]
  [57 55 68]
  [60 58 71]]

 [[62 55 73]
  [60 53 69]
  [56 52 66]
  ...
  [59 59 69]
  [59 57 70]
  [59 57 70]]
```

METODE LIGHTNESS

```
fix_img[:] = np.max(fix_img, axis = -1, keepdims = 1)/2 + np.min(fix_img, axis = -1, keepdims = 1)/2
print(np.array(fix_img[:]))

plt.axis('off')
plt.imshow(fix_img[:])
plt.savefig('Mode Lightness.jpg', bbox_inches='tight')
```

```
[[[189 189 189]
  [189 189 189]
  [190 190 190]
  ...
  [ 89  89  89]
  [ 92  92  92]
  [ 92  92  92]]

 [[189 189 189]
  [189 189 189]
  [190 190 190]
```

METODE LIGHTNESS

```
fix_img[:] = np.max(fix_img, axis = -1, keepdims = 1) + np.min(fix_img, axis = -1, keepdims = 1) / 2

print(np.array(fix_img[:]))
plt.axis('off')
plt.imshow(fix_img[:])
plt.savefig('metode lightness.jpg', bbox_inches = 'tight')
```

RUMUS : Max (R,G,B) + Min (R,G,B) : 2 8

Misal : 237 + 227 : 2 =229,5

```
[[229.5 229.5 229.5 ... 128.  127.  125. ]
 [229.5 229.5 229.5 ... 126.  125.  123. ]
 [229.5 229.5 229.5 ... 123.  122.  121. ]
 ...
```

METODE AVERAGE

Average, mencari nilai rata-rata dari R, G, dan B. Nilai rata□rata itulah yang dapat dikatakan sebagai grayscale. Rumus matematisnya adalah: Grayscale = (R + G + B) /3

METODE AVERAGE

```
gray_img = np.mean(fix_img, axis = 2)
print(np.array(gray_img))

plt.axis('off')
plt.imshow(gray_img, cmap = 'gray')
plt.savefig('Metode Average (box).jpg', bbox_inches = 'tight')
```

```
[[62.33333333 57.66666667 56.33333333 ... 58.33333333 60.
  63.        ]
 [63.33333333 60.66666667 58.         ... 62.33333333 62.
  62.        ]
 [62.66666667 61.66666667 61.66666667 ... 66.33333333 62.33333333
  60.33333333]
 ...
 [13.          9.         12.         ...  8.         11.
  12.        ]
 [12.33333333  5.33333333 12.         ... 10.          9.66666667
   9.66666667]
 [13.33333333  6.33333333 12.         ... 13.66666667 10.66666667
   8.66666667]]
```

METODE AVERAGE

```
gray_img = np.mean(fix_img, axis = -1)
print(np.array(gray_img))

plt.axis('off')
plt.imshow(gray_img, cmap='gray')
plt.savefig('Metode Average.jpg' , bbox_inches='tight')
```

```
[[192.         192.         192.33333333 ...  88.66666667  92.
   92.        ]
 [192.         192.         192.33333333 ...  86.66666667  87.33333333
   87.33333333]
 [192.33333333 192.33333333 192.33333333 ...  85.          85.
   85.        ]
 ...
 [156.66666667 156.         157.66666667 ... 157.66666667 157.33333333
  157.33333333]
 [157.66666667 156.         156.66666667 ... 158.66666667 158.33333333
  158.33333333]
 [157.         156.         156.33333333 ... 158.66666667 158.33333333
  158.33333333]]
```

METODE AVERAGE

```
gray_img = np.mean(fix_img,axis = 2)
print(np.array(gray_img))

plt.axis('off')
plt.imshow(gray_img,cmap = 'gray')
plt.savefig('Metode Avarage.jpg', bbox_inches = 'tight')
```

RUMUS : R + G + B : 3

Misalnya : 227 + 231 + 232 : 3

Hasilnya yaitu : 230

```
[[229.5 229.5 229.5 ... 128.  127.  125. ]
 [229.5 229.5 229.5 ... 126.  125.  123. ]
 [229.5 229.5 229.5 ... 123.  122.  121. ]
 ...
 [214.  211.  214.  ...  46.   46.   46. ]
 [203.  206.  216.  ...  46.   46.   46. ]
 [197.  202.  216.  ...  48.   48.   48. ]]
```

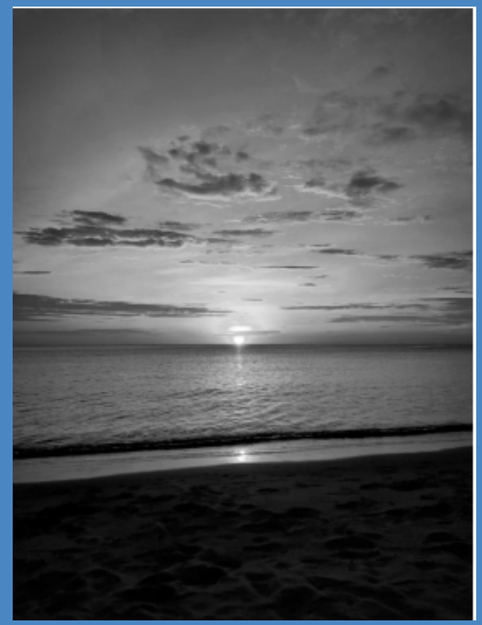
METODE LUMINOSITY

Average, mencari nilai rata-rata dari R, G, dan B. Nilai rata□rata itulah yang dapat dikatakan sebagai grayscale. Rumus matematisnya adalah: Grayscale = (R + G + B) /3

METODE LUMINOSITY

```
lumi_img = (0.2126*R) + (0.7152*G) + (0.0722*B)
print(lumi_img)
plt.axis('off')
plt.imshow(lumi_img, cmap = 'gray')
plt.savefig('Metode Luminosity.png', bbox_inches = 'tight')
```

```
[[56.7878 52.6434 51.9334 ... 55.722  56.3638 59.3638]
 [57.7878 55.6434 53.8612 ... 59.722  58.3638 58.3638]
 [57.6434 57.2864 57.2864 ... 63.722  59.722  57.722 ]
 ...
 [11.13    7.13   10.13   ...  7.1942 10.0538 11.0538]
 [10.9856  3.9856 10.13   ...  9.1942  8.9816  9.4842]
 [11.9856  4.9856 10.13   ... 12.9816  9.9816  8.4842]]
```



METODE LUMINOSITY

```
lumi_img = (0.2126*R) + (0.7152*G) + (0.0722*B)
print(lumi_img)

plt.axis('off')
plt.imshow(lumi_img, cmap = 'gray')
plt.savefig('Metode Luminosity.jpg' , bbox_inches='tight')
```

```
[[194.8162 194.8162 194.5262 ...  97.649  101.5046 101.5046]
 [194.8162 194.8162 194.5262 ...  95.1464  96.7172  96.7172]
 [194.5262 194.5262 194.5262 ...  93.359   93.359   93.359 ]
 ...
 [161.909  161.7646 162.909  ... 160.0562 159.2006 159.2006]
 [162.6872 161.5428 161.1846 ... 159.9106 159.055  159.055 ]
 [162.0402 161.0402 160.7502 ... 159.408  159.055  159.055 ]]
```

METODE LUMINOSITY

```
[ ]  lumi_img = (0.2126*R) + (0.7152*G) + (0.0722*B)
     print(lumi_img)

     plt.axis('off')
     plt.imshow(lumi_img)
     plt.savefig('Metode Luminosity.jpg', bbox_inches = 'tight')
```

Rumus :

0,2126 X R + 0,7152 X G + 0,0722 X B

Misalnya :

0,2126 X 214 + 0,7152 X 211 + 0,0722 X 214

Hasilnya adalah : 211

```
[[230.2218 230.2218 230.2218 ... 129.3164 128.3164 126.3164]
 [230.2218 230.2218 230.2218 ... 127.3164 126.3164 124.3164]
 [230.2218 230.2218 230.2218 ... 124.3164 123.3164 122.3164]
 ...
 [211.0864 208.0864 211.0864 ...  45.1444  45.1444  45.1444]
 [200.0864 203.0864 213.0864 ...  45.1444  45.1444  45.1444]
 [194.0864 199.0864 213.0864 ...  47.1444  47.1444  47.1444]]
```

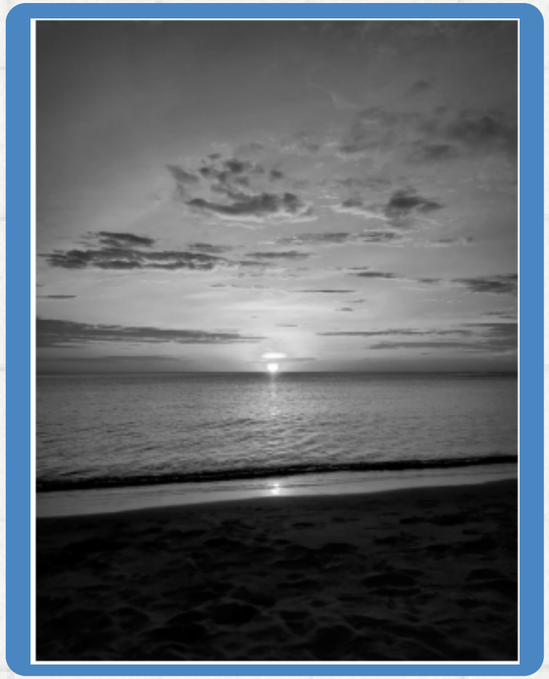
METODE WEIGHTED AVERAGE

Average, mencari nilai rata-rata dari R, G, dan B. Nilai rata□rata itulah yang dapat dikatakan sebagai grayscale. Rumus matematisnya adalah: Grayscale = (R + G + B) /3

METODE WEIGHTED AVERAGE

```
wavr_img = (0.299*R) + (0.587*G) + (0.114*B)
print(wavr_img)
plt.axis('off')
plt.imshow(wavr_img, cmap = 'gray')
plt.savefig('Metode Weighted Average.png', bbox_inches = 'tight')
```

```
[[58.145 53.917 52.906 ... 56.14  57.08  60.08 ]
 [59.145 56.917 54.792 ... 60.14  59.08  59.08 ]
 [58.917 58.39  58.39  ... 64.14  60.14  58.14 ]
 ...
 [12.033  8.033 11.033 ...  8.061 10.876 11.876]
 [11.805  4.805 11.033 ... 10.061  9.762 10.05 ]
 [12.805  5.805 11.033 ... 13.762 10.762  9.05 ]]
```



METODE WEIGHTED AVERAGE

```
warv_img = (0.299*R) + (0.587*G) + (0.114*B)
print(warv_img)

plt.axis('off')
plt.imshow(warv_img, cmap = 'gray')
plt.savefig('Metode Weighted Average.jpg' , bbox_inches='tight')
```

```
[[193.091 193.091 193.102 ...  95.138  98.91   98.91 ]
 [193.091 193.091 193.102 ...  92.85   94.209  94.209]
 [193.102 193.102 193.102 ...  91.149  91.149  91.149]
 ...
 [161.204 160.976 162.204 ... 159.942 159.17  159.17 ]
 [162.286 161.058 160.998 ... 160.181 159.409 159.409]
 [161.77  160.77  160.781 ... 159.893 159.409 159.409]]
```

METODE WEIGHTED AVERAGE

Rumus : 0,299 X R + 0,587 X G + 0,114

Misalnya : 0,299 X 234 + 0,587 X 206
+ 0,114 X 194

Hasilnya adalah : 213.004

```
wavr_img = (0.299*R) + (0.587*G) + (0.114*B)
print(wavr_img)

plt.axis('off')
plt.imshow(wavr_img, cmap = 'gray')
plt.savefig('Metode weighted Avarage.jpg', bbox_inches = 'tight')
```

```
[[229.918 229.918 229.918 ... 128.313 127.313 125.313]
 [229.918 229.918 229.918 ... 126.313 125.313 123.313]
 [229.918 229.918 229.918 ... 123.313 122.313 121.313]
 ...
 [213.004 210.004 213.004 ...  45.228  45.228  45.228]
 [202.004 205.004 215.004 ...  45.228  45.228  45.228]
 [196.004 201.004 215.004 ...  47.228  47.228  47.228]]
```

HASIL DISKUSI KELOMPOK

Hasil konversi yang memiliki hasil terbaik yakni metode average pada gambar berikut ini:

Terima Kasih