ALJABAR LINEAR

PENJELASAN PERHITUNGAN KONVERSI MATRIKS

Kelompok 5

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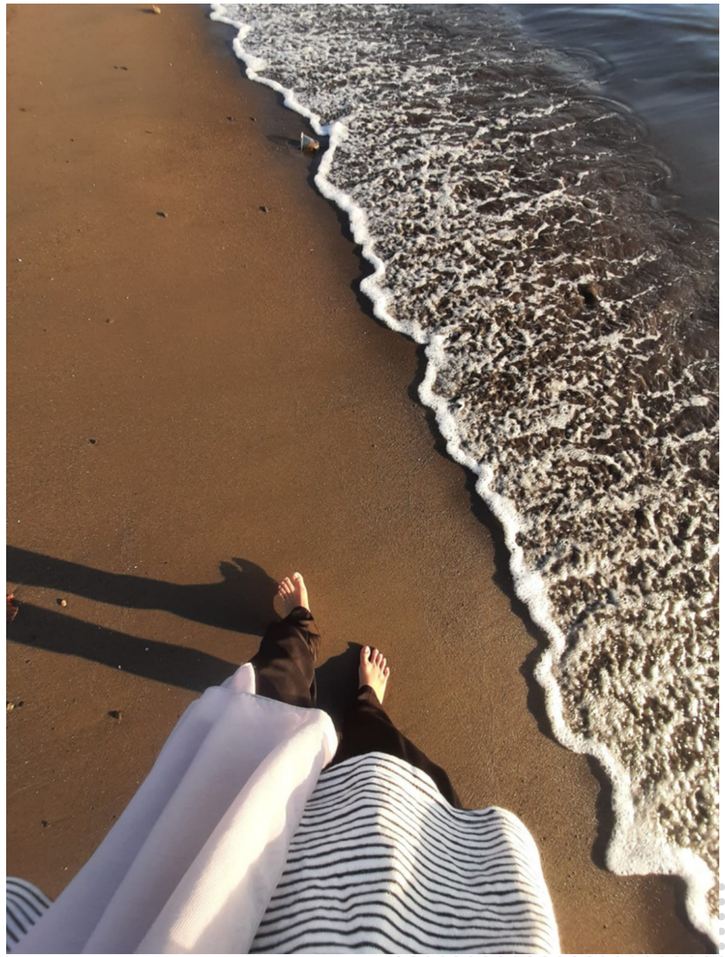
BACHARUDDIN JUSUF HABIBIE

indah.jpg

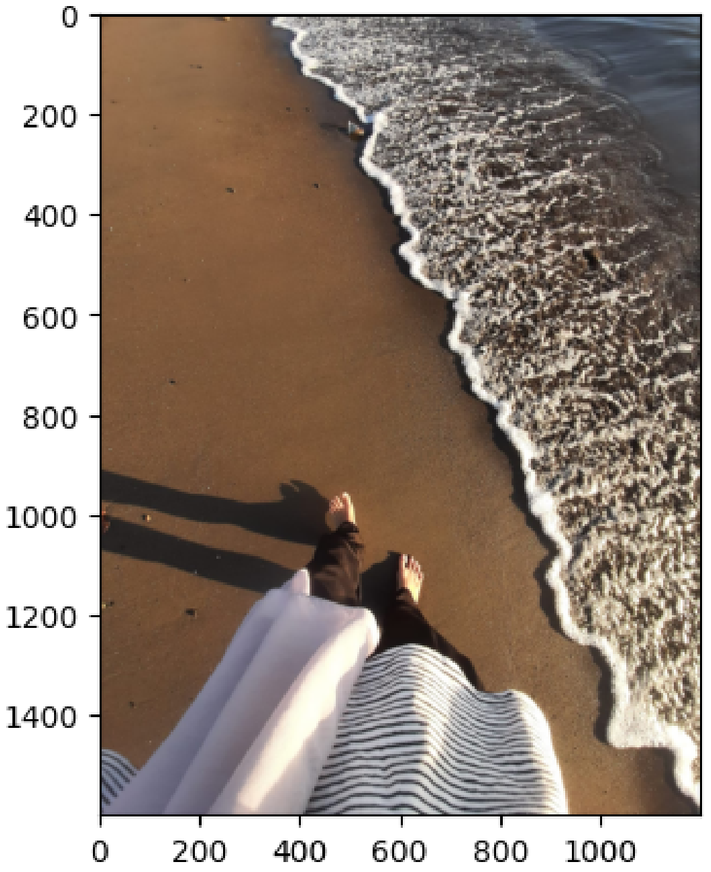


Mel.jpg

nisa.jpg

KELOMPOK 5

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

img_path = 'indah.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))
```



(1600, 1200, 3)
[[[162 119 85]
 [162 119 85]
 [161 118 84]
 ...
 [127 138 158]
 [129 137 156]
 [128 136 155]]

[[160 117 83]
 [160 117 83]
 [160 117 83]
 ...
 [127 140 159]
 [128 139 159]
 [127 138 156]]

[[156 116 81]
 [156 116 81]
 [156 116 81]
 ...
 [126 141 162]
 [126 141 162]
 [126 141 160]]
 ...
[[116 114 138]
 [110 108 130]
 [104 102 124]
 ...
 [130 131 126]
 [148 151 144]
 [163 166 159]]

[[118 115 142]
 [116 114 138]
 [112 110 134]
 ...
 [126 128 123]
 [144 146 141]
 [158 160 155]]

[[118 115 142]
 [120 117 144]
 [118 115 142]
 ...
 [124 126 121]
 [141 143 138]
 [155 157 152]]]

MATRIKS DARI GAMBAR INDAH.JPG

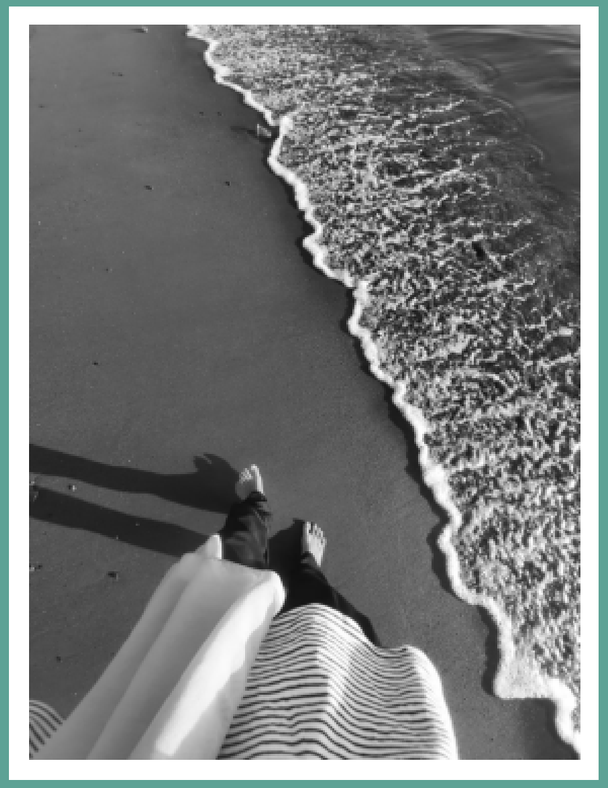
KELOMPOK 5

Metode Lightness

```
[[[123 123 123]
  [123 123 123]
  [122 122 122]
  ...
  [142 142 142]
  [142 142 142]
  [141 141 141]]

 [[121 121 121]
  [121 121 121]
  [121 121 121]
  ...
  [143 143 143]
  [143 143 143]
  [141 141 141]]

 [[118 118 118]
  [118 118 118]
  [118 118 118]
  ...
  [144 144 144]
  [144 144 144]
  [143 143 143]]
 ...
```

```
[[126 126 126]
 [119 119 119]
 [113 113 113]
 ...
 [128 128 128]
 [147 147 147]
 [162 162 162]]

[[128 128 128]
 [126 126 126]
 [122 122 122]
 ...
 [125 125 125]
 [143 143 143]
 [157 157 157]]

[[128 128 128]
 [130 130 130]
 [128 128 128]
 ...
 [123 123 123]
 [140 140 140]
 [154 154 154]]]
```

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

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



cara mendapatkan matriks metode lightness adalah dengan menambahkan nilai max dan nilai min dari nilai RGB dibagi 2.

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

= 162 + 85 = 247/2 = 123

KELOMPOK 5

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.jpg', bbox_inches = 'tight')
```

cara mendapatkan nilai matriks metode average adalah dengan menambahkan nilai tiap baris RGB dan dibagi 3.

Rumus Grayscale = $\frac{(R + G + B)}{3}$

= 162 + 119 + 85 / 3

= 122

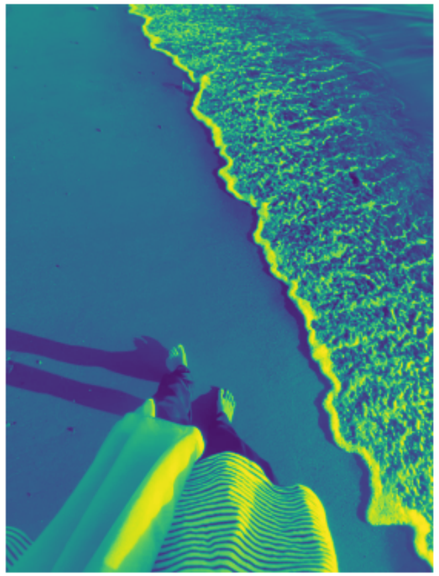
```
[[122.         122.         121.         ... 141.         140.66666667
  139.66666667]
 [120.         120.         120.         ... 142.         142.
  140.33333333]
 [117.66666667 117.66666667 117.66666667 ... 143.         143.
  142.33333333]
 ...
 [122.66666667 116.         110.         ... 129.         147.66666667
  162.66666667]
 [125.         122.66666667 118.66666667 ... 125.66666667 143.66666667
  157.66666667]
 [125.         127.         125.         ... 123.66666667 140.66666667
  154.66666667]]
```

KELOMPOK 5

Metode Luminosity

```
lumi_img = (0.21266*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')
```

```
[[125.687  125.687  124.687  ... 137.1054 136.671  135.671 ]
 [123.687  123.687  123.687  ... 138.608  138.1054 136.961 ]
 [121.977  121.977  121.977  ... 139.3272 139.3272 139.1828]
 ...
 [116.158  110.0136 104.0136 ... 130.4264 149.8568 164.8568]
 [117.5872 116.158  112.158  ... 127.2138 145.2138 159.2138]
 [117.5872 119.5872 117.5872 ... 125.2138 142.2138 156.2138]]
```



KELOMPOK 5

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.jpg', bbox_inches = 'tight')
```

```
[[127.981 127.981 126.981 ... 136.991 136.774 135.774]
 [125.981 125.981 125.981 ... 138.279 137.991 136.763]
 [123.97  123.97  123.97  ... 138.909 138.909 138.681]
 ...
 [117.334 111.106 105.106 ... 130.131 149.305 164.305]
 [118.975 117.334 113.334 ... 126.832 144.832 158.832]
 [118.975 120.975 118.975 ... 124.832 141.832 155.832]]
```

KELOMPOK 5

Metode Luminosity/Metode Weighted Average

Untuk menghitung Metode Luminosity/Weighted Average gunakan rumus

Grayscale Luminosity = (0.2126 × R) + (0.7152 × G) + (0.0722 × B)

= (0.2126 × 162) + (0.7152 × 119) + (0.0722 × 85) = 125. 687

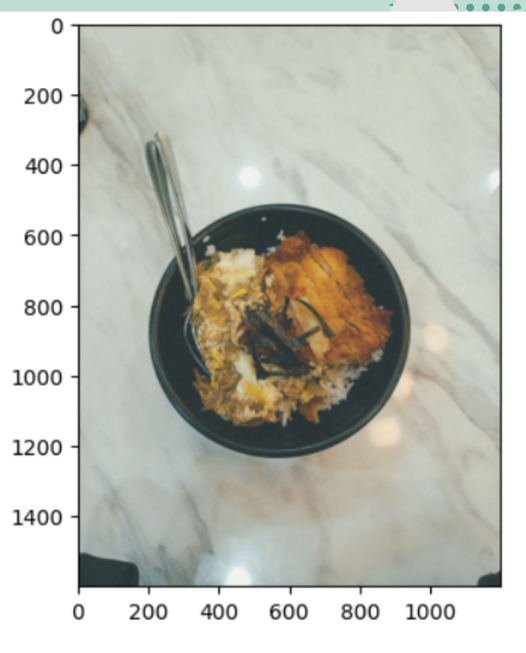
Grayscale Weighted Average = (0.299 × R) + (0.587 × G) + (0.114 × B)

= (0.299 × 162) + (0.587 × 119) + (0.114 × 85) = 127.981

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

img_path = 'Mel.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))
```

```
(3264, 2448, 3)
[[[197 199 185]
  [201 203 189]
  [203 205 192]
  ...
  [204 211 195]
  [204 211 193]
  [206 213 195]]

 [[189 191 177]
  [192 194 180]
  [193 195 182]
  ...
  [202 209 193]
  [201 208 190]
  [204 211 193]]

 [[188 192 177]
  [190 194 179]
  [190 194 180]
  ...
  [197 204 188]
  [197 204 186]
  [199 206 188]]
```

```
 ...

 [[ 32  42  43]
  [ 37  47  48]
  [ 44  54  55]
  ...
  [ 38  50  50]
  [ 37  49  49]
  [ 41  53  53]]

 [[ 35  45  46]
  [ 36  46  47]
  [ 41  51  52]
  ...
  [ 33  45  45]
  [ 29  41  41]
  [ 31  43  43]]

 [[ 43  53  54]
  [ 41  51  52]
  [ 43  53  54]
  ...
  [ 45  57  57]
  [ 41  53  53]
  [ 44  56  56]]]
```



KELOMPOK 5

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('metode lightness.jpg', bbox_inches = 'tight')
```

```
[[[192 192 192]
  [196 196 196]
  [198 198 198]
  ...
  [203 203 203]
  [202 202 202]
  [204 204 204]]

 [[184 184 184]
  [187 187 187]
  [188 188 188]
  ...
  [201 201 201]
  [199 199 199]
  [202 202 202]]

 [[184 184 184]
  [186 186 186]
  [187 187 187]
  ...
  [196 196 196]
  [195 195 195]
  [197 197 197]]

 ...
```

```
[[ 37  37  37]
 [ 42  42  42]
 [ 49  49  49]
 ...
 [ 44  44  44]
 [ 43  43  43]
 [ 47  47  47]]

[[ 40  40  40]
 [ 41  41  41]
 [ 46  46  46]
 ...
 [ 39  39  39]
 [ 35  35  35]
 [ 37  37  37]]

[[ 48  48  48]
 [ 46  46  46]
 [ 48  48  48]
 ...
 [ 51  51  51]
 [ 47  47  47]
 [ 50  50  50]]]
```

Cara mendapatkan matriks metode lightness adalah dengan menambahkan nilai max dan nilai min dari nilai RGB dibagi 2.

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

Contoh:

nilai max = 199

nilai min = 185

jadi,

199 + 185 = 384

384 / 2 = 192

Jadi, hasil dari matriks yang saya tampilkan pada Metode Lightness berada pada baris 1, kolom ke 1, 2, dan 3.

KELOMPOK 5

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.jpg', bbox_inches = 'tight')
```

```
[[193.66666667 197.66666667 200.         ... 203.33333333 202.66666667
  204.66666667]
 [185.66666667 188.66666667 190.         ... 201.33333333 199.66666667
  202.66666667]
 [185.66666667 187.66666667 188.         ... 196.33333333 195.66666667
  197.66666667]
 ...
 [ 39.          44.          51.         ...  46.          45.
   49.        ]
 [ 42.          43.          48.         ...  41.          37.
   39.        ]
 [ 50.          48.          50.         ...  53.          49.
   52.        ]]
```

Cara mendapatkan nilai matriks metode average adalah dengan menambahkan nilai tiap baris RGB dan dibagi 3.

Rumus Grayscale = $\frac{(R + G + B)}{3}$

Contoh yang saya ambil pada baris kedua

201 + 203 + 189 = 593

593 / 3 = 197

Jadi, hasil dari matriks yang saya gunakan pada Metode Average berada pada baris 1 kolom ke 2

KELOMPOK 5

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')
```

```
[[197.564  201.564  203.6362 ... 208.3566 208.2122 210.2122]
 [189.564  192.564  193.6362 ... 206.3566 205.2122 208.2122]
 [190.0666 192.0666 192.1388 ... 201.3566 201.2122 203.2122]
 ...
 [ 39.9462  44.9462  51.9462 ...  47.4488  46.4488  50.4488]
 [ 42.9462  43.9462  48.9462 ...  42.4488  38.4488  40.4488]
 [ 50.9462  48.9462  50.9462 ...  54.4488  50.4488  53.4488]]
```

Cara mendapatkan nilai matriks pada Metode Luminosity /Weighted Average gunakan rumus

Grayscale Luminosity :

$(0.2126 \times R) + (0.7152 \times G) + (0.0722 \times B)$

Contoh:

$(0.2126 \times 201) + (0.7152 \times 203) + (0.0722 \times 185) = 201{,}2752$

KELOMPOK 5

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.jpg', bbox_inches = 'tight')
```

```
[[196.806 200.806 202.92  ... 207.083 206.855 208.855]
 [188.806 191.806 192.92  ... 205.083 203.855 206.855]
 [189.094 191.094 191.208 ... 200.083 199.855 201.855]
 ...
 [ 39.124  44.124  51.124 ...  46.412  45.412  49.412]
 [ 42.124  43.124  48.124 ...  41.412  37.412  39.412]
 [ 50.124  48.124  50.124 ...  53.412  49.412  52.412]]
```

Cara mendapatkan nilai matriks pada Metode Luminosity/Weighted Average gunakan rumus Grayscale Weighted Average = (0.299 × R) + (0.587 × G) + (0.114 × B)

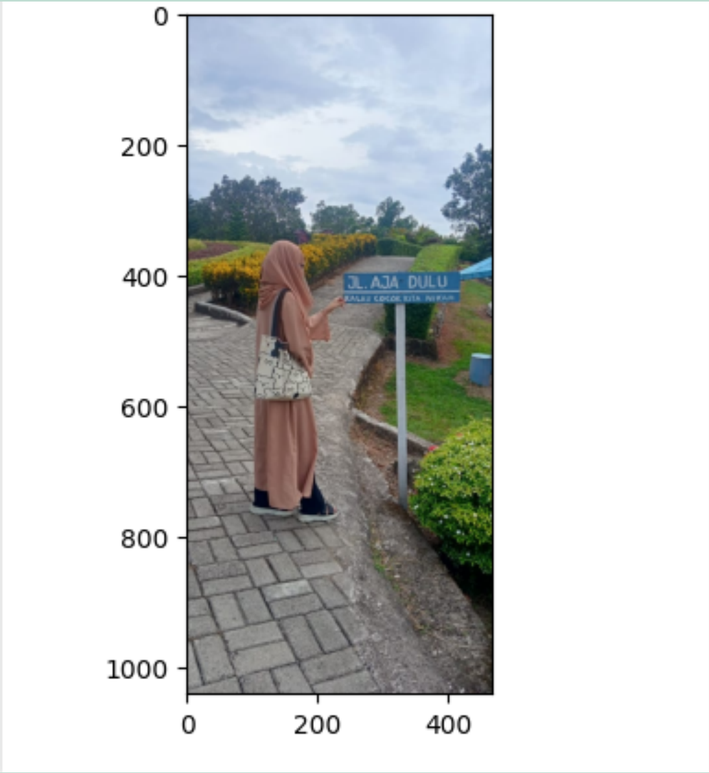
Contoh:
(0.299 × 201) + (0.587 × 203) + (0.114 × 189) = 200,35

KELOMPOK 5

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

img_path = 'nisa.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))
```

```
(1040, 468, 3)
[[[172 189 217]
  [172 189 217]
  [171 188 216]
  ...
  [205 220 241]
  [205 220 241]
  [205 220 241]]

 [[172 189 217]
  [172 189 217]
  [171 188 216]
  ...
  [206 221 242]
  [206 221 242]
  [206 221 242]]

 [[172 189 217]
  [172 189 217]
  [171 188 216]
  ...
  [206 221 242]
  [206 221 242]
  [206 221 242]]

 ...
```

```
[[148 148 148]
 [163 163 163]
 [156 156 156]
 ...
 [ 80  79  74]
 [ 70  69  64]
 [ 55  54  49]]

[[137 137 137]
 [149 149 149]
 [145 145 145]
 ...
 [ 65  65  57]
 [ 50  50  42]
 [ 37  37  29]]

[[134 134 134]
 [138 138 138]
 [140 140 140]
 ...
 [ 51  51  43]
 [ 40  40  32]
 [ 36  36  28]]]
```



KELOMPOK 5

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('metode lightness.jpg', bbox_inches = 'tight')
```

```
[[[194 194 194]
  [194 194 194]
  [193 193 193]
  ...
  [223 223 223]
  [223 223 223]
  [223 223 223]]

 [[194 194 194]
  [194 194 194]
  [193 193 193]
  ...
  [224 224 224]
  [224 224 224]
  [224 224 224]]

 [[194 194 194]
  [194 194 194]
  [193 193 193]
  ...
  [224 224 224]
  [224 224 224]
  [224 224 224]]
```

```
[[148 148 148]
 [163 163 163]
 [156 156 156]
 ...
 [ 77  77  77]
 [ 67  67  67]
 [ 52  52  52]]

[[137 137 137]
 [149 149 149]
 [145 145 145]
 ...
 [ 61  61  61]
 [ 46  46  46]
 [ 33  33  33]]

[[134 134 134]
 [138 138 138]
 [140 140 140]
 ...
 [ 47  47  47]
 [ 36  36  36]
 [ 32  32  32]]]
```

Metode lightness menambahkan nilai max dan nilai min dari nilai RGB dibagi 2.
Grayscale = (max(R, G , B)) + (min(R, G , B)) ⋆ 0.5 = 162 + 85 = 247/2 = 123

Contoh: baris pertama
Nilai Max= 217
Nilai Min= 171
Jadi, (217+171)*1/2 = 194

Jadi Jadi, hasil dari matriks yang saya tampilkan pada Metode Lightness berada pada baris 1, kolom ke 1,2,3

KELOMPOK 5

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')
```

```
[[192.66666667 192.66666667 191.66666667 ... 222.         222.
  222.        ]
 [192.66666667 192.66666667 191.66666667 ... 223.         223.
  223.        ]
 [192.66666667 192.66666667 191.66666667 ... 223.         223.
  223.        ]
 ...
 [148.         163.         156.         ...  77.66666667  67.66666667
   52.66666667]
 [137.         149.         145.         ...  62.33333333  47.33333333
   34.33333333]
 [134.         138.         140.         ...  48.33333333  37.33333333
   33.33333333]]
```

Cara mendapatkan nilai matriks metode average adalah dengan menambahkan nilai tiap baris RGB dan dibagi 3.

Rumus Grayscale = (R + G + B)
3

Contoh yang saya ambil pada baris pertama
172 + 189 + 217= 578/ 3= 192,666667

Jadi, hasil dari matriks yang saya gunakan pada Metode Average berada pada baris 1 kolom ke 1

KELOMPOK 5

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')
```

```
[[187.4074 187.4074 186.4074 ... 218.3272 218.3272 218.3272]
 [187.4074 187.4074 186.4074 ... 219.3272 219.3272 219.3272]
 [187.4074 187.4074 186.4074 ... 219.3272 219.3272 219.3272]
 ...
 [148.     163.     156.     ...  78.8516  68.8516  53.8516]
 [137.     149.     145.     ...  64.4224  49.4224  36.4224]
 [134.     138.     140.     ...  50.4224  39.4224  35.4224]]
```

Cara mendapatkan nilai matriks pada Metode Luminosity /Weighted Average gunakan rumus Grayscale Luminosity :

(0.2126 × R) + (0.7152 × G) + (0.0722 × B)

Contoh:

(0.2126 × 172) + (0.7152 × 189) + (0.0722 × 217) = 187,4074

Jadi, hasil dari matriks yang saya gunakan pada Metode Luminosity berada pada baris 1 kolom ke 1

KELOMPOK 5

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 Avarage.jpg', bbox_inches = 'tight')
```

```
[[187.109 187.109 186.109 ... 217.909 217.909 217.909]
 [187.109 187.109 186.109 ... 218.909 218.909 218.909]
 [187.109 187.109 186.109 ... 218.909 218.909 218.909]
 ...
 [148.    163.    156.    ...  78.729  68.729  53.729]
 [137.    149.    145.    ...  64.088  49.088  36.088]
 [134.    138.    140.    ...  50.088  39.088  35.088]]
```

Cara mendapatkan nilai matriks pada Metode Luminosity/Weighted Average gunakan rumus Grayscale Weighted Average = (0.299 × R) + (0.587 × G) + (0.114 × B)

Contoh:

(0.299 ×172) + (0.587 × 189) + (0.114 ×217)

= 187,109

KELOMPOK 5

KESIMPULAN

Metode yang kelompok kami pilih yaitu Metode Average

Terima Kasih