KELOMPOK 1

FINAL PROJECT

ALJABAR LINEAR

ANGGOTA KELOMPOK:

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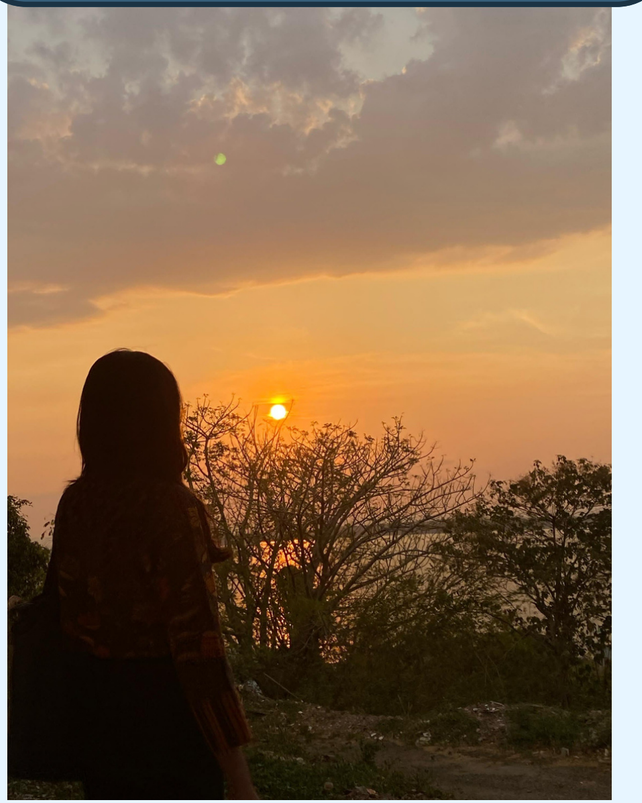


KONVERSI CITRA RGB KE GRAYSCALE

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

img_path = 'alpha.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))
```

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

img_path = 'Ari.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))
```

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

img_path = 'Jeslin.png'
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))
```

KONVERSI CITRA RGB KE GRAYSCALE

MATRIKS RGB ARI.JPG

OUTPUT:

```
(1280, 596, 3)
[[[182 195 201]
  [183 196 202]
  [185 198 204]
  ...
  [192 204 216]
  [193 205 217]
  [193 205 217]]

 [[182 195 201]
  [184 197 203]
  [185 198 204]
  ...
  [192 204 216]
  [192 204 216]
  [192 204 216]]

 [[183 196 202]
  [184 197 203]
  [186 199 205]
  ...
  [191 203 215]
  [191 203 215]
  [191 203 215]]

 ...
```

```
 [[178  99  58]
  [180 101  60]
  [183 104  63]
  ...
  [ 93  69  57]
  [ 94  70  58]
  [ 95  71  59]]

 [[175  96  55]
  [178  99  58]
  [181 102  61]
  ...
  [ 91  67  55]
  [ 91  67  55]
  [ 92  68  56]]

 [[173  94  53]
  [176  97  56]
  [180 101  60]
  ...
  [ 89  65  53]
  [ 89  65  53]
  [ 89  65  53]]]
```

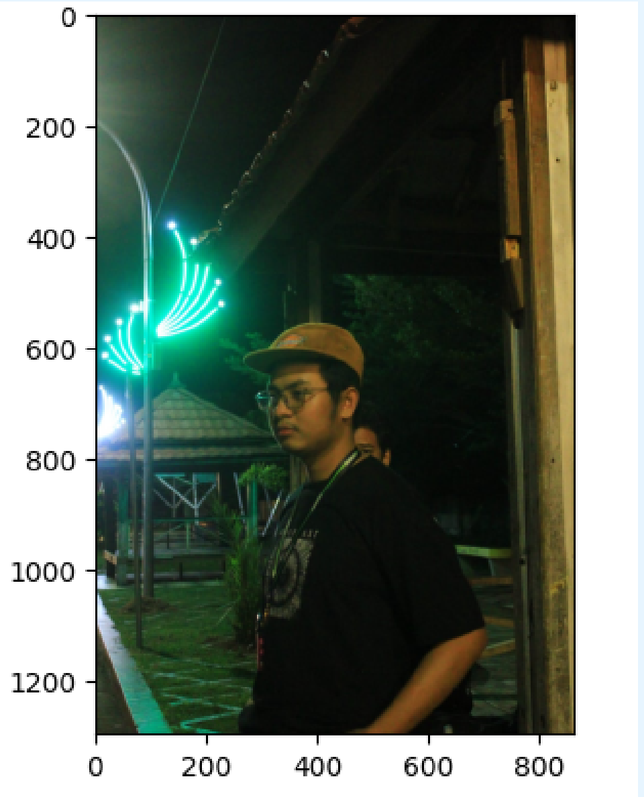
KONVERSI CITRA RGB KE GRAYSCALE

MATRIKS RGB ALPHA.JPG

OUTPUT:

```
(1296, 864, 3)
[[[ 67  80  62]
  [ 67  80  62]
  [ 66  81  62]
  ...
  [  6   8   5]
  [  6   8   5]
  [  7   9   6]]

 [[ 68  81  63]
  [ 68  81  63]
  [ 67  82  63]
  ...
  [  6   8   5]
  [  6   8   5]
  [  7   9   6]]

 [[ 70  83  65]
  [ 69  82  64]
  [ 68  83  64]
  ...
  [  6   8   5]
  [  6   8   5]
  [  7   9   6]]
```

```
[[ 57  56  35]
 [ 57  56  35]
 [ 57  56  36]
 ...
 [159 130  70]
 [162 132  72]
 [164 134  72]]

[[ 52  54  32]
 [ 52  54  32]
 [ 53  55  34]
 ...
 [159 130  70]
 [161 132  72]
 [164 135  75]]

[[ 50  52  30]
 [ 50  52  30]
 [ 51  53  32]
 ...
 [159 130  72]
 [161 132  72]
 [164 135  75]]]
```



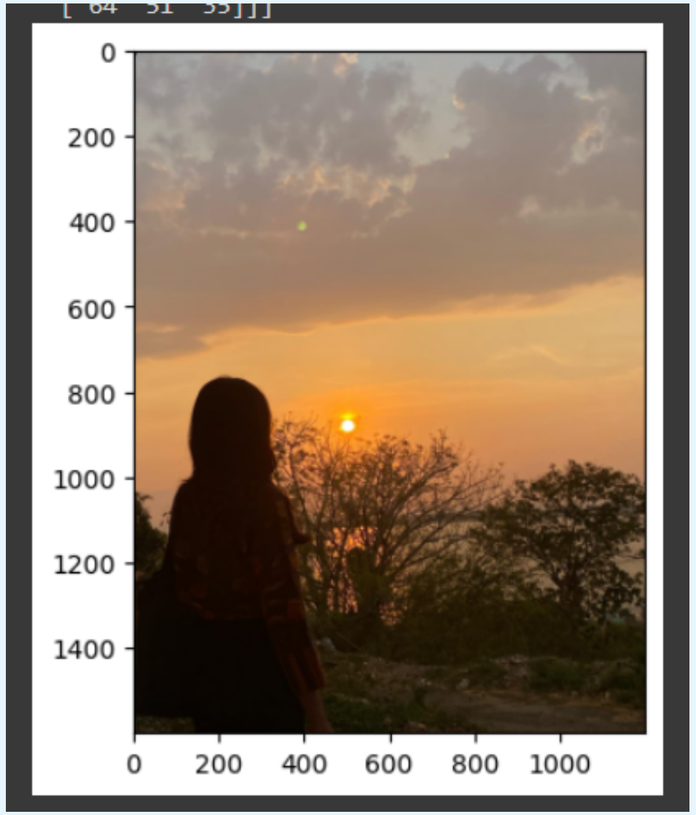
KONVERSI CITRA RGB KE GRAYSCALE

MATRIKS RGB JESLIN.JPG

OUTPUT:

```
(1600, 1200, 3)
[[[ 39  30  21]
  [ 44  35  26]
  [ 38  25  17]
  ...
  [141 136 133]
  [141 136 133]
  [141 136 133]]

 [[ 40  31  22]
  [ 45  36  27]
  [ 39  26  18]
  ...
  [141 136 133]
  [141 136 133]
  [141 136 133]]

 [[ 41  32  23]
  [ 44  35  26]
  [ 40  27  19]
  ...
  [141 136 133]
  [141 136 133]
  [141 136 133]]
```

```
[[ 30  20   8]
 [ 27  17   5]
 [ 23  13   1]
 ...
 [ 63  50  34]
 [ 64  51  35]
 [ 64  51  35]]

[[ 34  24  12]
 [ 31  21   9]
 [ 29  19   7]
 ...
 [ 63  50  34]
 [ 64  51  35]
 [ 64  51  35]]

[[ 40  30  18]
 [ 38  28  16]
 [ 36  26  14]
 ...
 [ 63  50  34]
 [ 64  51  35]
 [ 64  51  35]]]
```



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')
```

- 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

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks awal:
Grayscale = (max(R, G, B)) + (min(R, G, B)) * 0.5
Grayscale = (max(182, 195, 201)) + (min(182, 195, 201)) * 0.5
Grayscale = ((201)) + ((182)) * 0.5
Grayscale = 191.5 = 191

HASIL:

```
[[[191 191 191]
  [192 192 192]
  [194 194 194]
  ...
  [204 204 204]
  [205 205 205]
  [205 205 205]]

 [[191 191 191]
  [193 193 193]
  [194 194 194]
  ...
  [204 204 204]
  [204 204 204]
  [204 204 204]]

 [[192 192 192]
  [193 193 193]
  [195 195 195]
  ...
  [203 203 203]
  [203 203 203]
  [203 203 203]]

 ...
```

```
[[118 118 118]
 [120 120 120]
 [123 123 123]
 ...
 [ 75  75  75]
 [ 76  76  76]
 [ 77  77  77]]

[[115 115 115]
 [118 118 118]
 [121 121 121]
 ...
 [ 73  73  73]
 [ 73  73  73]
 [ 74  74  74]]

[[113 113 113]
 [116 116 116]
 [120 120 120]
 ...
 [ 71  71  71]
 [ 71  71  71]
 [ 71  71  71]]]
```

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')
```

- 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

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks awal:
Grayscale = (max(R, G, B)) + (min(R, G, B)) * 0.5
Grayscale = (max(67, 80, 62)) + (min(67, 80, 62)) * 0.5
Grayscale = ((80)) + ((62)) * 0.5
Grayscale = 71

HASIL:

```
[[[ 71  71  71]
  [ 71  71  71]
  [ 71  71  71]
  ...
  [  6   6   6]
  [  6   6   6]
  [  7   7   7]]

 [[ 72  72  72]
  [ 72  72  72]
  [ 72  72  72]
  ...
  [  6   6   6]
  [  6   6   6]
  [  7   7   7]]

 [[ 74  74  74]
  [ 73  73  73]
  [ 73  73  73]
  ...
  [  6   6   6]
  [  6   6   6]
  [  7   7   7]]]
```

```
[[ 46  46  46]
 [ 46  46  46]
 [ 46  46  46]
 ...
 [114 114 114]
 [117 117 117]
 [118 118 118]]

[[ 43  43  43]
 [ 43  43  43]
 [ 44  44  44]
 ...
 [114 114 114]
 [116 116 116]
 [119 119 119]]

[[ 41  41  41]
 [ 41  41  41]
 [ 42  42  42]
 ...
 [115 115 115]
 [116 116 116]
 [119 119 119]]]
```

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')
```

- 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

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks awal:
Grayscale = (max(R, G, B)) + (min(R, G, B)) * 0.5
Grayscale = (max(39, 30, 21)) + (min(39, 30, 21)) * 0.5
Grayscale = ((39)) + ((21) * 0.5
Grayscale = 30

HASIL:

```
[[[ 30  30  30]
  [ 35  35  35]
  [ 27  27  27]
  ...
  [137 137 137]
  [137 137 137]
  [137 137 137]]

 [[ 31  31  31]
  [ 36  36  36]
  [ 28  28  28]
  ...
  [137 137 137]
  [137 137 137]
  [137 137 137]]

 [[ 32  32  32]
  [ 35  35  35]
  [ 29  29  29]
  ...
  [137 137 137]
  [137 137 137]
  [137 137 137]]

 ...
```

```
[[ 19  19  19]
 [ 16  16  16]
 [ 12  12  12]
 ...
 [ 48  48  48]
 [ 49  49  49]
 [ 49  49  49]]

[[ 23  23  23]
 [ 20  20  20]
 [ 18  18  18]
 ...
 [ 48  48  48]
 [ 49  49  49]
 [ 49  49  49]]

[[ 29  29  29]
 [ 27  27  27]
 [ 25  25  25]
 ...
 [ 48  48  48]
 [ 49  49  49]
 [ 49  49  49]]]
```

METODE AVERAGE

- Average, mencari nilai rata-rata dari R, G, dan B. Nilai ratarata itulah yang dapat dikatakan sebagai grayscale. Rumus matematisnya adalah:

  Grayscale = (R + G + B)/3

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (R + G + B)/3
Grayscale = (191 + 191 + 191)/3
Grayscale = 191

Baris kedua:
Grayscale = (R + G + B)/3
Grayscale = (192 + 192 + 192)/3
Grayscale = 192
dst...

HASIL:

```
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')
```

```
[[191. 192. 194. ... 204. 205. 205.]
 [191. 193. 194. ... 204. 204. 204.]
 [192. 193. 195. ... 203. 203. 203.]
 ...
 [118. 120. 123. ...  75.  76.  77.]
 [115. 118. 121. ...  73.  73.  74.]
 [113. 116. 120. ...  71.  71.  71.]]
```

METODE AVERAGE

- Average, mencari nilai rata-rata dari R, G, dan B. Nilai ratarata itulah yang dapat dikatakan sebagai grayscale. Rumus matematisnya adalah:

  Grayscale = (R + G + B)/3

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (R + G + B)/3
Grayscale = (71 + 71 + 71)/3
Grayscale = 71

Baris kedua:
Grayscale = (R + G + B)/3
Grayscale = (72 + 72 + 72)/3
Grayscale = 72
dst...

HASIL:

```
[ ]  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')
```

```
[[ 71.  71.  71. ...   6.   6.   7.]
 [ 72.  72.  72. ...   6.   6.   7.]
 [ 74.  73.  73. ...   6.   6.   7.]
 ...
 [ 46.  46.  46. ... 114. 117. 118.]
 [ 43.  43.  44. ... 114. 116. 119.]
 [ 41.  41.  42. ... 115. 116. 119.]]
```

METODE AVERAGE

- Average, mencari nilai rata-rata dari R, G, dan B. Nilai ratarata itulah yang dapat dikatakan sebagai grayscale. Rumus matematisnya adalah:

  Grayscale = (R + G + B)/3

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (R + G + B)/3
Grayscale = (30 + 30 + 30)/3
Grayscale = 30

HASIL:

```
[18] 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')
```

```
[[ 30.  35.  27. ... 137. 137. 137.]
 [ 31.  36.  28. ... 137. 137. 137.]
 [ 32.  35.  29. ... 137. 137. 137.]
 ...
 [ 19.  16.  12. ...  48.  49.  49.]
 [ 23.  20.  18. ...  48.  49.  49.]
 [ 29.  27.  25. ...  48.  49.  49.]]
```

METODE LUMINOSITY/WEIGHTED AVERAGE

- Luminosity, mengalikan setiap nilai R, G, dan B dengan konstanta tertentu yang sudah ditetapkan nilainya, kemudian hasil perkalian seluruh nilai R, G, B dijumlahkan satu sama lain. Rumus matematisnya adalah:

Grayscale = (0.2126 × R) + (0.7152 × G) + (0.0722 × B)
Grayscale = (0.299 × R) + (0.587 × G) + (0.114 × B)

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (0.2126 × R) + (0.7152 × G) + (0.0722 × B)
Grayscale = (0.2126 × 191) + (0.7152 × 191) + (0.0722 × 191)
Grayscale = 40.6066 + 136.6032 + 13.7902
Grayscale = 191

HASIL:

```
[5] 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')
```

```
[[191. 192. 194. ... 204. 205. 205.]
 [191. 193. 194. ... 204. 204. 204.]
 [192. 193. 195. ... 203. 203. 203.]
 ...
 [118. 120. 123. ...  75.  76.  77.]
 [115. 118. 121. ...  73.  73.  74.]
 [113. 116. 120. ...  71.  71.  71.]]
```

METODE LUMINOSITY/WEIGHTED AVERAGE

- Luminosity, mengalikan setiap nilai R, G, dan B dengan konstanta tertentu yang sudah ditetapkan nilainya, kemudian hasil perkalian seluruh nilai R, G, B dijumlahkan satu sama lain. Rumus matematisnya adalah:

Grayscale = (0.2126 × R) + (0.7152 × G) + (0.0722 × B)
Grayscale = (0.299 × R) + (0.587 × G) + (0.114 × B)

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (0.2126 × R) + (0.7152 × G) + (0.0722 × B)
Grayscale = (0.2126 × 71) + (0.7152 × 71) + (0.0722 × 71)
Grayscale = 15,0946 + 50,7792 + 5.1262
Grayscale = 71

HASIL:

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

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

```
[[ 71.  71.  71. ...   6.   6.   7.]
 [ 72.  72.  72. ...   6.   6.   7.]
 [ 74.  73.  73. ...   6.   6.   7.]
 ...
 [ 46.  46.  46. ... 114. 117. 118.]
 [ 43.  43.  44. ... 114. 116. 119.]
 [ 41.  41.  42. ... 115. 116. 119.]]
```

METODE LUMINOSITY/WEIGHTED AVERAGE

- Luminosity, mengalikan setiap nilai R, G, dan B dengan konstanta tertentu yang sudah ditetapkan nilainya, kemudian hasil perkalian seluruh nilai R, G, B dijumlahkan satu sama lain. Rumus matematisnya adalah:

Grayscale = (0.2126 × R) + (0.7152 × G) + (0.0722 × B)
Grayscale = (0.299 × R) + (0.587 × G) + (0.114 × B)

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (0.2126 × R) + (0.7152 × G) + (0.0722 × B)
Grayscale = (0.2126 × 30) + (0.7152 × 30) + (0.0722 × 30)
Grayscale = 6,378 + 21,456 + 2,166
Grayscale = 30

HASIL:

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

```
[[ 30.  35.  27. ... 137. 137. 137.]
 [ 31.  36.  28. ... 137. 137. 137.]
 [ 32.  35.  29. ... 137. 137. 137.]
 ...
 [ 19.  16.  12. ...  48.  49.  49.]
 [ 23.  20.  18. ...  48.  49.  49.]
 [ 29.  27.  25. ...  48.  49.  49.]]
```

METODE WEIGHTED AVERAGE/LUMINOSITY

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (0.299 × R) + (0.587 × G) + (0.114 × B)
Grayscale = (0.299 × 191) + (0.587 × 191) + (0.114 × 191)
Grayscale = 57,109 + 112,117 + 21,774
Grayscale = 191

HASIL:

```
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')
```

```
[[191. 192. 194. ... 204. 205. 205.]
 [191. 193. 194. ... 204. 204. 204.]
 [192. 193. 195. ... 203. 203. 203.]
 ...
 [118. 120. 123. ...  75.  76.  77.]
 [115. 118. 121. ...  73.  73.  74.]
 [113. 116. 120. ...  71.  71.  71.]]
```

METODE WEIGHTED AVERAGE/LUMINOSITY

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (0.299 × R) + (0.587 × G) + (0.114 × B)
Grayscale = (0.299 × 71) + (0.587 × 71) + (0.114 × 71)
Grayscale = 21,229 + 41,677 + 8,094
Grayscale = 71

HASIL:

```
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')
```

```
[[ 71.  71.  71. ...   6.   6.   7.]
 [ 72.  72.  72. ...   6.   6.   7.]
 [ 74.  73.  73. ...   6.   6.   7.]
 ...
 [ 46.  46.  46. ... 114. 117. 118.]
 [ 43.  43.  44. ... 114. 116. 119.]
 [ 41.  41.  42. ... 115. 116. 119.]]
```

METODE WEIGHTED AVERAGE/LUMINOSITY

PENJELASAN PERHITUNGAN KONVERSI MATRIKS:

Misal Menggunakan Baris pertama pada matriks yang sudah di konversi pada metode lightness:

Grayscale = (0.299 × R) + (0.587 × G) + (0.114 × B)
Grayscale = (0.299 × 30) + (0.587 × 30) + (0.114 × 30)
Grayscale = 8,997 + 17,61 + 3,42
Grayscale = 30

HASIL:

```
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')
```

```
[[ 30.  35.  27. ... 137. 137. 137.]
 [ 31.  36.  28. ... 137. 137. 137.]
 [ 32.  35.  29. ... 137. 137. 137.]
 ...
 [ 19.  16.  12. ...  48.  49.  49.]
 [ 23.  20.  18. ...  48.  49.  49.]
 [ 29.  27.  25. ...  48.  49.  49.]]
```

KESIMPULAN

Dengan metode Lightness menggunakan rumus berikut :

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

Kesimpulan dari hasil tersebut:

Penekanan Perbedaan Warna: Metode ini menonjolkan perbedaan antara warna terang dan gelap pada piksel.

Kecerahan Rata-Rata: Hasil 191.5 mencerminkan intensitas kecerahan rata-rata pada piksel. Potensi

Kontras Visual: Metode ini dapat menciptakan kontras visual yang baik dengan perbedaan warna yang signifikan

Terima Kasih

Presentasi Oleh kelompok 1

ALJABAR LINEAR