

# Métodos Numéricos Computacionais - APS-AV2 - 2022.2

- Aluno: João Pedro Espechit Silveira - 2019200901
- Professor: Sérgio Assunção Monteiro
- Turma: 145R

## Links

- [Notebook na íntegra](#)
- [GitHub](#)
- [Repositório da Atividade](#)

## Atividade

### ▼ Questão

Implemente um programa em Python no Google Colab que faça:

- Carregar uma imagem e transformá-la em uma matriz de valores reais.
- Aplicar a Decomposição da matriz por Valores Singulares.
- Manter apenas os valores que representam: 60%, 70% e 80% dos Valores Singulares.
- Apresentar a imagem transformada com a aplicação do item (c).

```
import numpy as np
import matplotlib.pyplot as plt
import cv2
from numpy.linalg import svd
from PIL import Image

def compress_image(img_name, img, k):
    print("processing...")

    r=img[:, :, 0]
    g=img[:, :, 1]
    b=img[:, :, 2]

    print("compressing...")

    ur, sr, vr=svd(r, full_matrices=False)
    ug, sg, vg=svd(g, full_matrices=False)
```

```

ub,sb,vb=svd(b,full_matrices=False)

print('Dimensions: {}'.format(r.shape))

rr=np.dot(ur[:,k],np.dot(np.diag(sr[k]),vr[k,:]))
rg=np.dot(ug[:,k],np.dot(np.diag(sg[k]),vg[k,:]))
rb=np.dot(ub[:,k],np.dot(np.diag(sb[k]),vb[k,:]))

print("arranging...")

ring=np.zeros(img.shape)

ring[:,0]=rr
ring[:,1]=rg
ring[:,2]=rb

for ind1, row in enumerate(ring):
    for ind2, col in enumerate(row):
        for ind3, value in enumerate(col):
            if value < 0:
                ring[ind1, ind2, ind3] = abs(value)
            if value > 255:
                ring[ind1, ind2, ind3] = 255

compressed_image=ring.astype(np.uint8)


plt.title("Figura Compactada: "+img_name+"\n")
plt.imshow(compressed_image)
plt.axis("off")
plt.show()
cv2.imwrite("Imagem/comp-"+str(img_name)+".jpg",compressed_image)

import numpy as np
import cv2
from matplotlib import pyplot as plt
import os
from skimage import io
from google.colab.patches import cv2_imshow

#imgLink="https://upload.wikimedia.org/wikipedia/en/7/7d/Lenna_%28test_image%29.png"
#imgLink="https://external-preview.redd.it/zODRwouzi5Li-mL_Mf6dhMQfL7hKWEi0-lFEZO8CRjc.jpg?au
imgLink="https://precious-palmier-3c3ac0.netlify.app/E-Hero-Sunrise-512x512.png"
image=io.imread(imgLink)
RGB_img = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
img=cv2.cvtColor(image, cv2.COLOR_RGB2GRAY)
alt_img=cv2.cvtColor(image,cv2.COLOR_BGRA2BGR )

print("Original")
cv2_imshow(RGB_img)

```

 Original

```
print("Inverted")  
cv2_imshow(image)
```

Inverted



```
print("Grayscale")  
cv2_imshow(img)
```

Grayscale



```
img.shape
```

```
(512, 512)
```

```
k=512
```

```
compress_image("Elemental HERO Sunrise - 100%",alt_img,k)
```



```
processing...  
compressing...  
Dimensions: (512, 512)  
arranging...
```

**Figura Compactada: Elemental HERO Sunrise - 100%**



```
k=int(np.ceil(0.8*512)) #k=410  
compress_image("Elemental HERO Sunrise - 80%",alt_img,k)
```

```
processing...  
compressing...  
Dimensions: (512, 512)  
arranging...
```

**Figura Compactada: Elemental HERO Sunrise - 80%**



```
k=int(np.ceil(0.7*512)) #k=359  
compress_image("Elemental HERO Sunrise - 70%",alt_img,k)
```

```
processing...  
compressing...  
Dimensions: (512, 512)  
arranging...
```

**Figura Compactada: Elemental HERO Sunrise - 70%**



```
k=int(np.ceil(0.6*512)) #k=308  
compress_image("Elemental HERO Sunrise - 60%",alt_img,k)
```

```
processing...  
compressing...  
Dimensions: (512, 512)  
arranging...
```

**Figura Compactada: Elemental HERO Sunrise - 60%**



Colab paid products - [Cancel contracts here](#)

---

|   |    |                      |   |   |
|---|----|----------------------|---|---|
| ✓ | 1s | completed at 8:14 AM | ● | ✕ |
|---|----|----------------------|---|---|