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#Matematyka Konkretna
#Laboratorium 1
#Szymon Białek https://github.com/NynyNoo/MK
#Warian 11

from matplotlib.image import imread
import matplotlib.pyplot as plt
import numpy as np
import os
plt.rcParams['figure.figsize'] = [16,8]

A = imread('11.webp')
X = np.mean(A, -1)

img = plt.imshow(X)
img.set_cmap('gray')
plt.axis('off')

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U, S, VT = np.linalg.svd(X,full_matrices=False) S = np.diag(S)

r=230 Xapprox = U[:,r:r+1]@S[0:r+1,0:r+1]@VT[0:r+1,:] plt.figure(0) img = plt.imshow(Xapprox)
img.set_cmap('gray') plt.axis('off') plt.title('r='+str(r)) plt.show()

plt.figure(1) plt.semilogy(np.diag(S)) plt.title('Singular Values') plt.show()

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plt.figure(2)
cumulative_sum_ratio = np.cumsum(np.diag(S)) / np.sum(np.diag(S))
plt.plot(cumulative_sum_ratio)
plt.title('Singular Values: Cumulative Sum')

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plt.show()  
index_x = np.argmax(cumulative_sum_ratio <= 0.9)
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