import numpy as np

from scipy.spatial import distance

from scipy.spatial.distance import mahalanobis

from numpy.linalg import inv

ranges = [(0, 1), (1, 10), (10, 100), (100, 1000), (1000, 10000)]

data\_matrix = np.zeros((10, 5))

for i in range(5):

    low, high = ranges[i]

    data\_matrix[:, i] = np.random.uniform(low, high, 10)

print("Data Matrix:")

for row in data\_matrix:

    for element in row:

        print(element, end=" ")

    print()

for i in range(data\_matrix.shape[1]):

    feature = data\_matrix[:, i]

    mean = np.mean(feature)

    std\_dev = np.std(feature)

    variance = np.var(feature)

    print(f"Öznitelik {i+1}: Ortalama = {mean}, Standart Sapma = {std\_dev}, Varyans = {variance}")

cov\_matrix = np.cov(data\_matrix, rowvar=False)

print("Ko-varyans Matrisi:")

print(cov\_matrix)

cov\_matrix\_inv = inv(np.cov(data\_matrix.T))

pairs = [(0, 1), (1, 2), (2, 3)]

for pair in pairs:

    sample1, sample2 = data\_matrix[pair[0]], data\_matrix[pair[1]]

    # Euclidean Uzaklığı

    euclidean\_dist = distance.euclidean(sample1, sample2)

    # Cosine Uzaklığı

    cosine\_dist = distance.cosine(sample1, sample2)

    # Manhattan Uzaklığı

    manhattan\_dist = distance.cityblock(sample1, sample2)

    # Mahalanobis Uzaklığı

    mahalanobis\_dist = mahalanobis(sample1, sample2, cov\_matrix\_inv)

    print(f"Örnek Çifti {pair}:")

    print(f"  Euclidean Uzaklık: {euclidean\_dist}")

    print(f"  Cosine Uzaklık: {cosine\_dist}")

    print(f"  Manhattan Uzaklık: {manhattan\_dist}")

    print(f"  Mahalanobis Uzaklık: {mahalanobis\_dist}\n")