In [1]:

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############################## ASSIGNMENT -1 (Pattern Recognition) [ EDM18B055, EVD18I022]#######################

## Answer 1

import numpy as np
import math
def KL(a, b):
    a = np.asarray(a, dtype=float) #np.float if numpy error pops
    b = np.asarray(b, dtype=float)

    return np.sum(np.where(a != 0, a * np.log(a / b), 0))


H1 = [ 0.24, 0.2, 0.16, 0.12, 0.08, 0.04, 0.12, 0.04]
H2 = [ 0.22, 0.23, 0.16, 0.13, 0.11, 0.08, 0.05, 0.02]


def mean( hist ):
    mean = 0.0;
    for i in hist:
        mean += i;
    mean/= len(hist);
    return mean;


def bhattacharya ( hist1,  hist2):

    h1_ = mean(hist1); # calculate mean of H1

    h2_ = mean(hist2); # calculate mean of H2

    # calculation of score
    score = 0;
    for i in range(8):
        score += math.sqrt( hist1[i] * hist2[i] );
    # print h1_,h2_,score;
    score = math.sqrt( 1 - ( 1 / math.sqrt(h1_*h2_*8*8) ) * score );
    return score;

print("KL Distance(H1,H2) : ", KL(H1, H2) )
print("KL Distance(H2,H1) : ", KL(H2, H1) )
print("Bhattacharya Distance : ",bhattacharya(H1,H2))
```

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KL Distance(H1,H2) :  0.06290516707464022
KL Distance(H2,H1) :  0.056253600195068226
Bhattacharya Distance :  0.12132861332857958
```