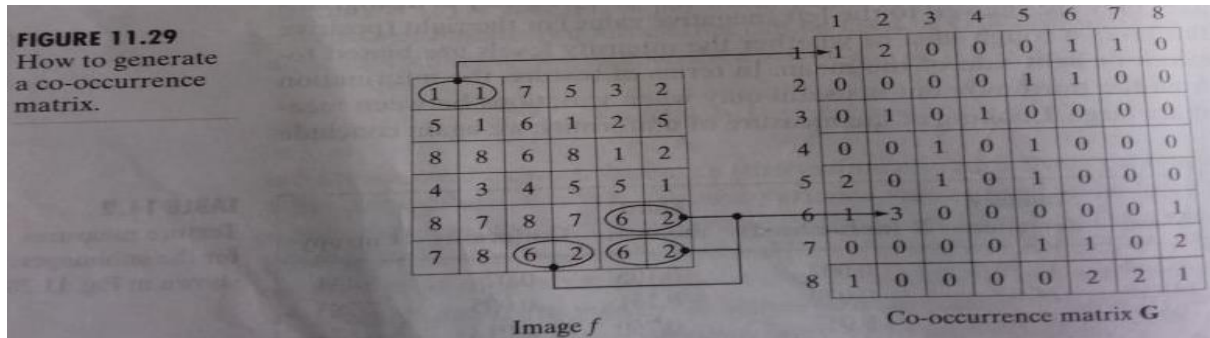


Project 3(b)

Similar Image Retrieval using Canberra Distance

Show the 10 most similar images of a given object for **Coil-80** dataset using *Canberra* distance and following *texture features*: Maximum probability, Correlation, Contrast, Uniformity (Energy), Homogeneity, and Entropy, of **gray-level co-occurrence matrix** of image.



832 Chapter 11 ■ Representation and Description

TABLE 11.3
Descriptors used for characterizing co-occurrence matrices of size $K \times K$. The term p_{ij} is the ij th term of *G* divided by the sum of the elements of *G*.

Descriptor	Explanation	Formula
Maximum probability	Measures the strongest response of <i>G</i> . The range of values is [0, 1].	$\max_{i,j} (p_{ij})$
Correlation	A measure of how correlated a pixel is to its neighbor over the entire image. Range of values is 1 to -1, corresponding to perfect positive and perfect negative correlations. This measure is not defined if either standard deviation is zero.	$\frac{\sum_{i=1}^K \sum_{j=1}^K (i - m_r)(j - m_c) p_{ij}}{\sigma_r \sigma_c}$ $\sigma_r \neq 0; \sigma_c \neq 0$
Contrast	A measure of intensity contrast between a pixel and its neighbor over the entire image. The range of values is 0 (when <i>G</i> is constant) to $(K - 1)^2$.	$\sum_{i=1}^K \sum_{j=1}^K (i - j)^2 p_{ij}$
Uniformity (also called Energy)	A measure of uniformity in the range [0, 1]. Uniformity is 1 for a constant image.	$\sum_{i=1}^K \sum_{j=1}^K p_{ij}^2$
Homogeneity	Measures the spatial closeness of the distribution of elements in <i>G</i> to the diagonal. The range of values is [0, 1], with the maximum being achieved when <i>G</i> is a diagonal matrix.	$\sum_{i=1}^K \sum_{j=1}^K \frac{p_{ij}}{1 + i - j }$
Entropy	Measures the randomness of the elements of <i>G</i> . The entropy is 0 when all p_{ij} 's are 0 and is maximum when all p_{ij} 's are equal. The maximum value is $2 \log_2 K$. (See Eq. (11.3-9) regarding entropy).	$-\sum_{i=1}^K \sum_{j=1}^K p_{ij} \log_2 p_{ij}$

The Canberra distance d between vectors **p** and **q** in an n -dimensional **real vector space** is given as follows:

$$d(\mathbf{p}, \mathbf{q}) = \sum_{i=1}^n \frac{|p_i - q_i|}{|p_i| + |q_i|}$$

Use **GUI**. A sample GUI is shown below:

Query Image

Show here the query image

Similar Images

Similar image1

Similar image6

Similar image5

Similar image10

Load Training images (Browse Training image folder)

Extract Feature and store in database

Load Feature Data (Browse Training feature Data file)

Load Query image (Browse Test image)

Display (Extract query image feature and show the similar images)