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FACULTY OF EGINEERING

Digital Image Processing
LECTURE-37

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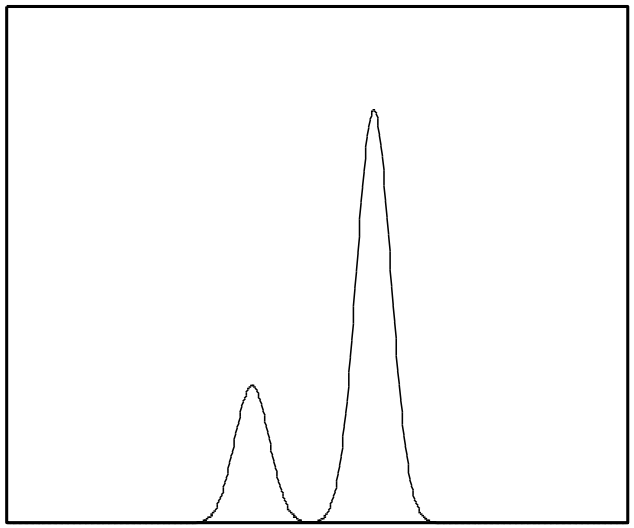
OUTLINE

- Greylevel clustering
- MCQ
- References

Greylevel clustering

- Clustering tries to separate the histogram into 2 groups
- Defined by two cluster centres c1 and c2
- Greylevels classified according to the nearest cluster centre



Greylevel clustering

- Clustering tries to separate the histogram into 2 groups
- Defined by two cluster centres c1 and c2
- Greylevels classified according to the nearest cluster centre

A nearest neighbour clustering algorithm allows us perform a greylevel segmentation using clustering

- A simple case of a more general and widely used K-means clustering
- A simple iterative algorithm which has known convergence properties

Greylevel clustering

•Given a set of greylevels

$$\{g(1), g(2) \ldots\ldots g(N)\}$$

•We can partition this set into two groups

$$\{g_1(1), g_1(2) \ldots\ldots g_1(N_1)\}$$

$$\{g_2(1), g_2(2) \ldots\ldots g_2(N_2)\}$$

Greylevel clustering

Compute the local means of each group

$$c_1 = \frac{1}{N_1} \sum_{i=1}^{N_1} g_1(i)$$

$$c_2 = \frac{1}{N_2} \sum_{i=1}^{N_2} g_2(i)$$

Greylevel clustering

Re-define the new groupings

$$|g_1(k)-c_1| < |g_1(k)-c_2| \quad k=1..N_1$$

$$|g_2(k)-c_2| < |g_2(k)-c_1| \quad k=1..N_2$$

In other words all grey levels in set 1 are nearer to cluster centre c_1 and all grey levels in set 2 are nearer to cluster centre c_2

Greylevel clustering

But, we have a chicken and egg situation

- The problem with the above definition is that each group mean is defined in terms of the partitions and vice versa
- The solution is to define an iterative algorithm and worry about the convergence of the algorithm later

Greylevel clustering

The iterative algorithm is as follows

Initialize the label of each pixel randomly

Repeat

c_1= mean of pixels assigned to object label

c_2= mean of pixels assigned to background label

Compute partition

Compute partition

Until none pixel labelling changes

MCQ

1. What is the basis for numerous spatial domain processing techniques?

   a) Transformations

   b) Scaling

   c) Histogram

   d) None of the Mentioned

2. In _____ image we notice that the components of histogram are concentrated on the low side on intensity scale.

   a) bright

   b) dark

   c) colourful

   d) All of the Mentioned

3. What is Histogram Equalisation also called as?

   a) Histogram Matching

   b) Image Enhancement

   c) Histogram linearisation

   d) None of the Mentioned

MCQ

4. What is Histogram Matching also called as?

a) Histogram Equalisation

b) Histogram Specification

c) Histogram linearisation

d) None of the Mentioned

5. Histogram Equalisation is mainly used for _____

a) Image enhancement

b) Blurring

c) Contrast adjustment

d) None of the Mentioned

References

•Dr. Mike Spann m.spann@bham.ac.uk http://www.eee.bham.ac.uk/spannm

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