

### Lecture No: 8 Image quantization (reduce size)

Image quantization is the process of reducing the image data by removing some of the detail information by mapping group of data points to a single point. This can be done by:

1. Gray\_Level reduction (reduce pixel values themselves  $I(r, c)$ ).
2. Spatial reduction (reduce the spatial coordinate  $(r, c)$ ).

The simplest method of gray-level reduction is **Thresholding**. We select a threshold gray\_level and set everything above that value equal to "1" and everything below the threshold equal to "0". This effectively turns a gray level image into a binary (two level) image and is often used as a preprocessing step in the extraction of object features, such as shape, area, or perimeter. A more versatile method of gray\_level reduction is the process of taking the data and reducing the number of bits per pixel. This can be done very efficiency by masking the lower bits via an AND operation. Within this method, the numbers of bits that are masked determine the number of gray levels available.

#### **Example:**

We want to reduce 8\_bit information containing 256 possible gray level values down to 32 possible values.

Each pixel in a gray level contain 1 byte with 256 possible gray level

If we like to decrease it into 32 possible value.

0 ----- 31 = 32 possible value.

So take the maximum value 31 convert it into binary will be  $(11111)_2$

This can be done by ANDing each pixel value with  $(11111\ 000)$

Corresponding to the lower three bits that we are masking and then shifting the result left three times.

If we have the following sub gray image

200	26
140	100

200 = 11001000

26 = 00011010

140 = 10001100

100 = 01100100

And operation with 11111000

11001000

11111000

-----

11001000 shifted three times so will get 11001 = 25 means 200 become 25

And do same way to other ....



Original 8-bit image,  
256 gray levels



Quantized to 6 bits,  
64 gray levels



Quantized to 3 bits,  
8 gray levels



Quantized to 1 bits,  
2 gray levels