INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

DIGITAL IMAGE PROCESSING LABORATORY

A REPORT ON

EXPERIMENT 3

Image Segmentation

13 August,2018

Group No. 1

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VISUAL INFORMATION AND EMBEDDED SYSTEMS

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1. Introduction

Segmentation involves partitioning an image into a set of homogeneous and meaningful regions, such that the pixels in each partitioned region possess an identical set of properties or attributes. Segmentation is achieved by using thresholding operation. Following were the 3 methods used in this experiment

1. Own method:

   when the intensity distributions of objects and background pixels are sufficiently distinct, it is possible to use a single (global) threshold applicable over the entire image.

   The following iterative algorithm was used for this purpose:

   1. Select an initial estimate for the global threshold, T.
   2. Segment the image using T in Eq. (10.3-1). This will produce two groups of pixels: G 1 consisting of all pixels with intensity values less than T, and G 2 consisting of pixels with values greater than T.
   3. Compute the average (mean) intensity values m 1 and m 2 for the pixels in G 1 and G 2 , respectively.
   4. Compute a new threshold value:

      T =1(m + m 2)/2
   5. Repeat Steps 2 through 4 until the difference between values of T in successive iterations is smaller than a predefined parameter ¢T.

2. Algorithm

1. Own method:{Function name:my_algo()}

   The following iterative algorithm was used for this purpose:

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2. Using Entropy:{Function name:entropy_algo()}

   In this method we calculate sum of within class entropy over all the threshold levels and select the threshold which yields maximum entropy. This result is directly taken from Communication theory that a threshold that maximizes entropy maximizes Information rate and reduces error rate.

3. Otsu method:{Function name:otsu_algo()}

   Otsu's method maximizes between class variance. Between class variance is calculated for each threshhold and which ever yields max. variance is taken as optimum threshold.

4. Fuzzy method:

   In this method, Histogram is fuzzied with given window size 5,weights as [0.5,0.75,1,0.75,0.5] before computing different thresholds. This can be used in conjunction with above threshold techniques,but doesn't reduce computation complexity for bi-modal histogram images.{Function name:fuzz_it_up()}

5. Patch based method: In this method an Image is subdivided into multiple image and then a threshold is computed on each such image,using one of above algos.

3. Results

4. Analysis

5. References