Department of Electrical Engineering and Computer Science

Adaptive Histogram Thresholding

In many applications of image processing, the gray levels of pixels belonging to the object are substantially different from the gray levels of the pixels belonging to the background. Therefore, image thresholding technique is instrumental to the success of many image processing applications. As the input images might be taken at different times of the day, a fixed threshold may not work for different illumination conditions. For this reason, an adaptive thresholding method needs to be incorporated automatically. Otsu has developed a comprehensive statistical technique to find the best threshold for an image. He proposed a criterion for maximizing the between-class variance of pixel intensity to perform image thresholding. This method is accurate for images which contain two distinct classes. On the other hand, to efficiently find the optimal threshold the adaptive progressive thresholding (APT) approach is used as an extension of the Otsu's technique.

1. **Write** a program to implement the Otsu's adaptive thresholding technique. Obtain the optimum threshold for segmenting the region of interest (dark object region with respect to a bright background) and create a binary image. Test and evaluate the algorithm on sample images of different types (single object, multiple objects, different lighting and backgrounds etc., see **Project-Data**)

2. **Write** a program to implement the adaptive progressive thresholding (APT) technique. Obtain the optimum final threshold for segmenting the region of interest (dark object region with respect to a bright background) and create a binary image. Test and evaluate the algorithm on sample images of different types (single object, multiple objects, different lighting and backgrounds etc., see **Project-Data**)

3. **Prepare** the Term Project report based on the IEEE format. The report must include:

   a. Introduction (background of the method)
   b. Methodology (includes equations, figures, program outline with flow chart and/or illustrations).
   c. Implementation results with sample images, and detailed discussions on the obtained results.
   d. Conclusion.
   e. Appropriate technical references.
   f. Report format: single column, single space, 11-point Times New Roman font.

Due Date: 12/02/19

CIS 465 Multimedia

Fall 2019

Term Project
12/02/19

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Project Grading Strategy

- 75 Points for code files.
- 25 Points for the report.

What to turn in: Submit your work through **Blackboard** including:

- An HTML document called `index.html` that has the project report contents table that links to each item of those contents separately.
- The program codes along with the dataset needed to reproduce your code.

Notes:

- The Project should be implemented in Python.
- Before submission, make sure that your program codes run without any error.
- Late submissions will not be accepted. No two days late policy.

Due Date: 12/02/19