# Department of Computing

**EE433: Digital Image Processing**

# Lab 3 : Basic Image Processing 2

**CLO1: Acquire the fundamental concepts of a digital image processing system**

**CLO2: Identify and exploit analogies between the mathematical tools used for 1D and 2D image analysis and processing**

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# Lab 3: Basic Image Processing 2

**Introduction**

This lab is an introduction to basic image processing.

**Objectives**

This lab will provide the concepts of image processing to the students by doing various tasks.

**Tools/Software Requirement**

Python 2.7

**Description**

A binary image is a [digital image](https://en.wikipedia.org/wiki/Digital_image) that has only two possible values for each [pixel](https://en.wikipedia.org/wiki/Pixel). Typically, the two colors used for a binary image are black and white, though any two colors can be used. The color used for the object(s) in the image is the foreground color while the rest of the image is the background color.

The recursive X-Y cut is a top-down page segmentation technique that decomposes a document image recursively into a set of rectangular blocks. The [algorithm](https://en.wikipedia.org/wiki/Algorithm) works by projecting the document [bitmap](https://en.wikipedia.org/wiki/Bitmap) (i.e. summing up all the [pixels](https://en.wikipedia.org/wiki/Pixels) in a line) to the sides of the document page. By this method, a white space density graph is produced, with peaks for vertical or horizontal whitespace lines. These peaks define the cuts of the document and are used top-down to segment the document into smaller pieces.

**Lab Tasks**

**Task #1: Image Binarization using a predefined global threshold.**

Take an RGB image (preferably from the provided ones) and convert it to binarized form (in 0/1 form) by defining a single global threshold. Repeat the experiment with the three provided images and identify why a single global binarization threshold may not be applicable in a wide variety of application scenarios.

**Task #2: Create Intensity Histogram from a Greyscale image**

Hint: As discussed during the lab.

**Task #3: Recursive XY-cut algorithm**

Hint:

Hand in the source code from this lab at the appropriate location on the blackboard system at LMS. You should hand in a single compressed/archived file named Lab\_1\_<your reg. No. ABC without angle brackets>.zip that contains the following.

1. All resulting image files representing the work accomplished for this lab.
2. A plain text file named OUTPUT.txt that includes a) author information at the beginning, b) a brief explanation of the lab, c) any comments, or suggestions, d) your response to all the tasks.

To Receive Credit

1. By showing up on time for lab, working on the lab solution, and staying to the end of the class period, only then you can receive full credit for the lab assignment.

Comment your program heavily. Intelligent comments and a clean, readable formatting of your code account for 20% of your grade.

**Deliverable**

Hand in the source code from this lab at the appropriate location on the blackboard system at LMS.