

Image Segmentation

Introduction

This lab is based on image segmentation.

Objectives

The purpose of this lab is to understand how to segment an image.

What is image segmentation?

In computer vision, segmentation is the process to divide, or segment an input digital image into a meaningful representation that is simpler to analyze.

Thresholding is the most simple form of segmentation. In today's task we use industry standard the Otsu's method to define threshold value. Basically the method assumes that there are two classes: the foreground and the background, the input has a bi-modal histogram. It varies the threshold to get minimal intraclass variance. The result is a binary image with background and foreground. Likewise, color image segmentation assumes that objects are distinctively colored. In this lab we extend simple segmentation using thresholding to select only particular objects with color homogeneity.

Today's tasks

Count the objects of some user defined color.

1. Read input image (RGB).
2. Use thresholding (Otsu's method) to segment foreground from background.
3. Clean the binary image using appropriate morphological operations.
4. Label the objects using different color values like, red, green, blue, etc. (yes, the image will be converted back to RGB). You might need bounding box and connected component analysis.
5. Ask the user to select some color out of those available in the processed image.
6. Count the objects with the specified color.

Note. For the sake of learning and simplicity we assume that, the objects are homogeneously colored, isolated; and the background is uniformly well lit. Yes, you can use any builtin functions you deem necessary. Consider the image provided along with this exercise.