Interactive Foreground Extraction using Iterated Graph Cuts

Sasank Chilamkurthy
Tharun Kumar Reddy
Rajeev Puppala

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1 Introduction

In this paper, we describe a method to extract foreground out of a image with help of a very simple interaction from user. This is based on the papers [1] and [2].

2 Image Segmentation by Graph Cut

General segmentation framework we used is detailed in this section. Denote the given input image as an array $\bar{z} = (z_1, z_2, \dots z_N)$. The segmentation of the image is expressed as an array of "opacity" values $\bar{\alpha} = (\alpha_1, \alpha_2, \dots \alpha_N)$. Generally for soft segmentation $\alpha_n \in [0, 1]$ and for hard segmentation $\alpha_n \in \{0, 1\}$. In this paper, we deal with hard segmentation with 0 representing background and 1 representing foreground.

Let the model parameters for color/intensity model of the background and foreground be denoted by θ_α for α equal to 0 and 1 respectively. Under this model, let likelihood function be given by $f(z|\theta_\alpha)$. Let us denote all the parameters of the model with $\bar{\theta}$. So, our objective is to find $\bar{\alpha}$ given model parameters $\bar{\theta}$.

This can be achieved by considering the following problem :

$$E(\bar{\alpha}|\bar{\theta}, \bar{z})$$

References

[1] Rother, Carsten, Vladimir Kolmogorov, and Andrew Blake. "Grabcut: Interactive foreground extraction using iterated graph cuts." ACM Transactions on Graphics (TOG) 23.3 (2004): 309-314.

[2] Boykov, Yuri Y., and M-P. Jolly. "Interactive graph cuts for optimal boundary & region segmentation of objects in ND images." Computer Vision, 2001. ICCV 2001. Proceedings. Eighth IEEE International Conference on. Vol. 1. IEEE, 2001.