Deep Automatic Portrait Segmentation and Matting

Prof. JIA Jiaya Leo
Department of Computer Science and Engineering

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Project Description

Abstract:

Prevalence of smart phones makes self-portrait photography, i.e., selfie, possible whenever wanted. Accordingly image enhancement software gets popular for portrait beautification, stylization, etc. to meet various aesthetic requirements. One important technique for the software is image matting, which is widely employed in image composition and object extraction. However, tedious interaction is involved in existing systems to select foreground and background color samples using either strokes or regions. Such interaction could be difficult for nonprofessional users without image matting knowledge. A more serious problem is that even with user-drawn strokes or regions, the current system is still difficult to output satisfying results.

Thus, fully automatic portrait image matting is essential for large-scale image editing systems. To address this issue, we propose a convolutional neural networks (CNNs) based deep learning system for automatic portrait matting. Our network structure is novel on integrating two powerful functions. First, pixels are classified into
background, foreground and unknown labels based on fully convolutional networks with several new components. For the second part, we propose the novel matting layer with forward and backward image matting formation. These two functions are incorporated in the unified end-to-end system without user interaction.

To train such a deep learning system, we collect a large dataset with human labeled ground truth. Our method achieves decent performance for portrait image matting. Our approach produce the satisfying results without any interactions and only takes 0.6 seconds. Such high performance system makes many previous image beatification and stylization tasks to be fully automatic. These applications need several seconds to a few minute user interactions in previous systems while it only takes less than one second without any user interaction in our system.

**Problem to be solved:**

The deep automatic portrait matting algorithm makes previous matting system to be fully automatic.

**Uniqueness and Competitive Advantages:**

The first automatic portrait matting system.

**Applications:**

Mobile apps and image processing software.

**Target Users:**

Any smart phone users and image processing engineer.