Assignment 1: Segmentation

for Video Analysis at TU Vienna 2016W

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a. Explain the overall concept of Guided filtering and name an example beyond smoothing images.

The guided filter is similar to a bilateral filter (which takes into account both euclidean and intensity distance for filter kernel / weighting lookup). however it uses a different and more efficient approach and takes a separate guidance image to determine the weights and thus the edges of smoothing.

Another application: To remove haze (e.g. from pollution) from a photograph, a rough haze map is taken that defines the level of attenuation from haze is present at each pixel. assumably this data is only available in a very rough approximation, we can use the guided filter to refine it, using the original hazy filter as guidance image so that we preserve the edges. we can then use the haze map to subtract the haze from the original image.

b. If your foreground object is a black circle with a white square in the middle, does it matter if the white square is marked by the scribbles so that it is recognized as part of the foreground, or does the algorithm assign it to the foreground because it is surrounded by the rest of the foreground object (which is marked by scribbles)?

If no guided filtering or other method is used the assignment is based on the color histogram only, thus we need the color information.

c. What assumption is used at Cost-Volume filtering for segmentation, and why?

For Cost-Volume filtering the assumption “Pixels with high counts in the foreground (background) histogram belong to the foreground (background).” is used for segmentation. We use this assumption rather than the “similar colors” one because its more precise when it comes to mark each pixel to the foreground or background. Similar pixels in a local neighborhood have similar costs, so the cost for each pixel that it belongs to the one of the labels.

d. When you calculate the Cost-Volume for a background, what does it mean when a certain pixel has high cost?

When a certain pixel has a high cost that means the color of the pixel is similar to the color of the foreground pixels. When this happens we need to smooth the Cost-Volume with the Guided Filter. This helps to smooth holes and remove flickering, reduce noise and align cost edges with color edges.