Disparity Map Estimation Using Graph Cuts

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Abstract. The goal of the practical work is to analyse the performance of graph cuts for stereo disparity estimation on different image pairs. The effects of varying parameters are discussed.

1. Experiments & Results

The following experiments were performed with the graph cuts disparity estimation code:

1.1. Varying λ

I vary the λ parameter from 0 to 1 as shown in Fig.1 with $win = 3$. Increasing λ improved the smoothness of disparity maps, but too high values caused over-smoothing, an we lose

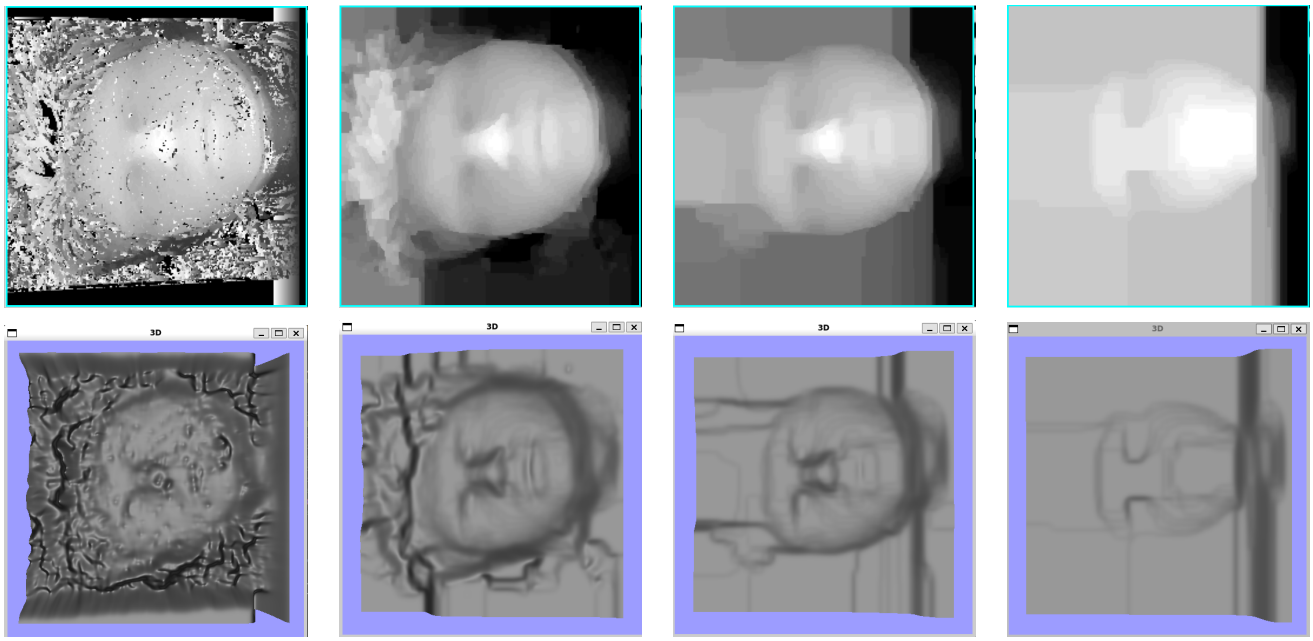

Figure 1. Varying the parameter λ. From left to right $\lambda = 0, 0.1, 0.5, 1$

1.2. Varying NCC neighbors size

I vary the win parameter from 1 to 9 as shown in Fig.2 with $\lambda = 0$. Similar to lambda larger NCC patch size improved smoothness and reduced noise. But too high can over-smooth. In terms for runtime , larger sizes slows down the NCC computation.

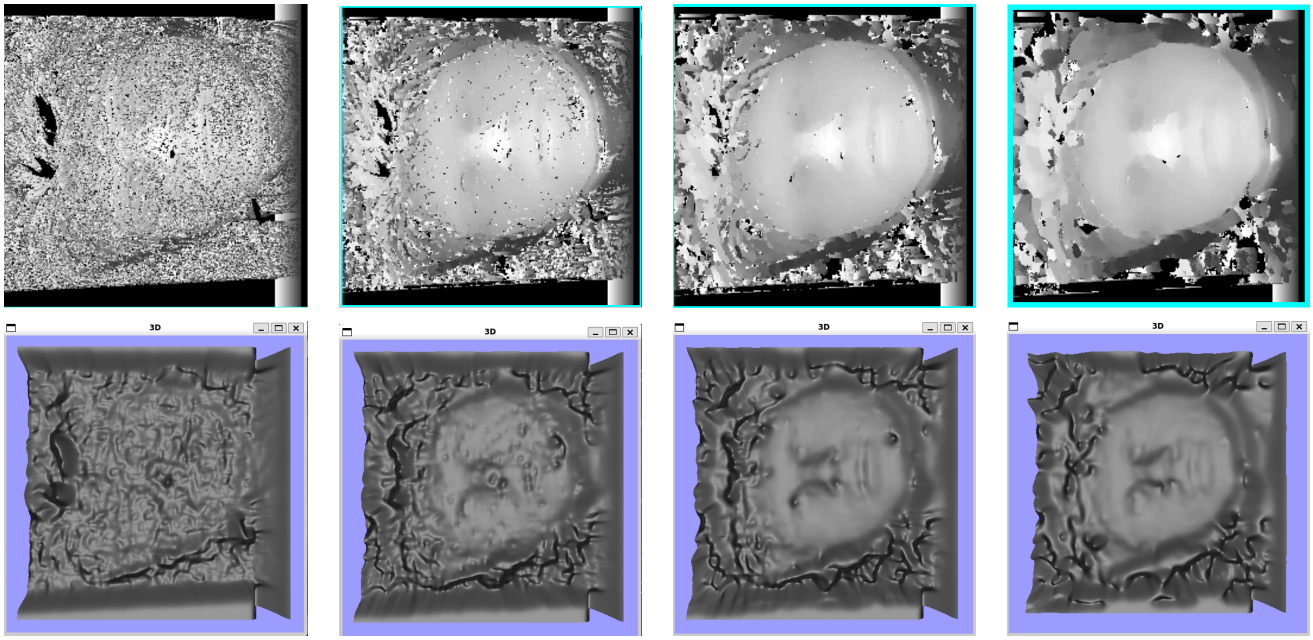

Figure 2. Varying the parameter NCC neighborhood size. From left to right $win = 1, 3, 5, 9$

1.3. Comparing with region-growing algorithm

Graph cuts produces smooth and accurate disparity maps with proper parameter tuning, than region growing. Also, graph cuts here is faster than region growing algorithm. However, for some parameters, it can become significantly slower.

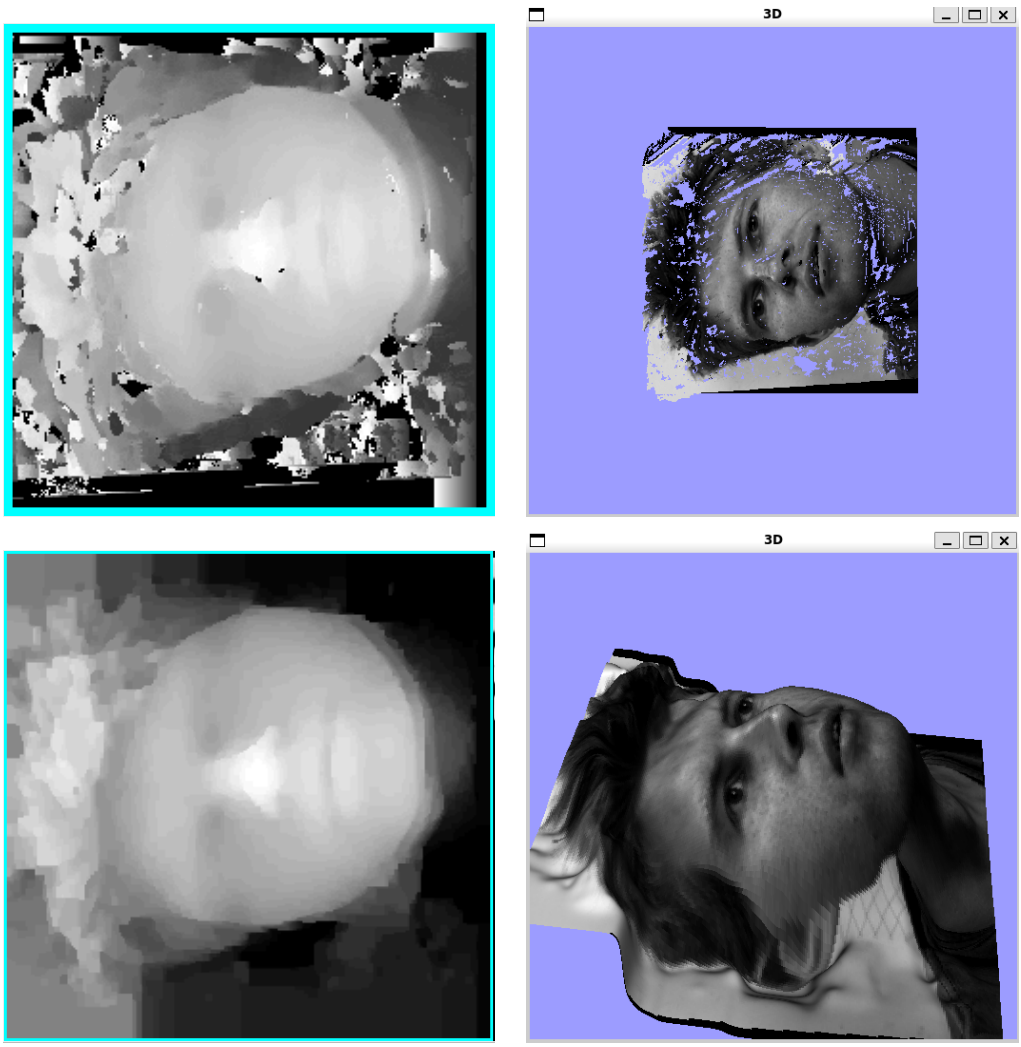

Figure 3. Comparing region growing(first row) to graph cut method(second row).