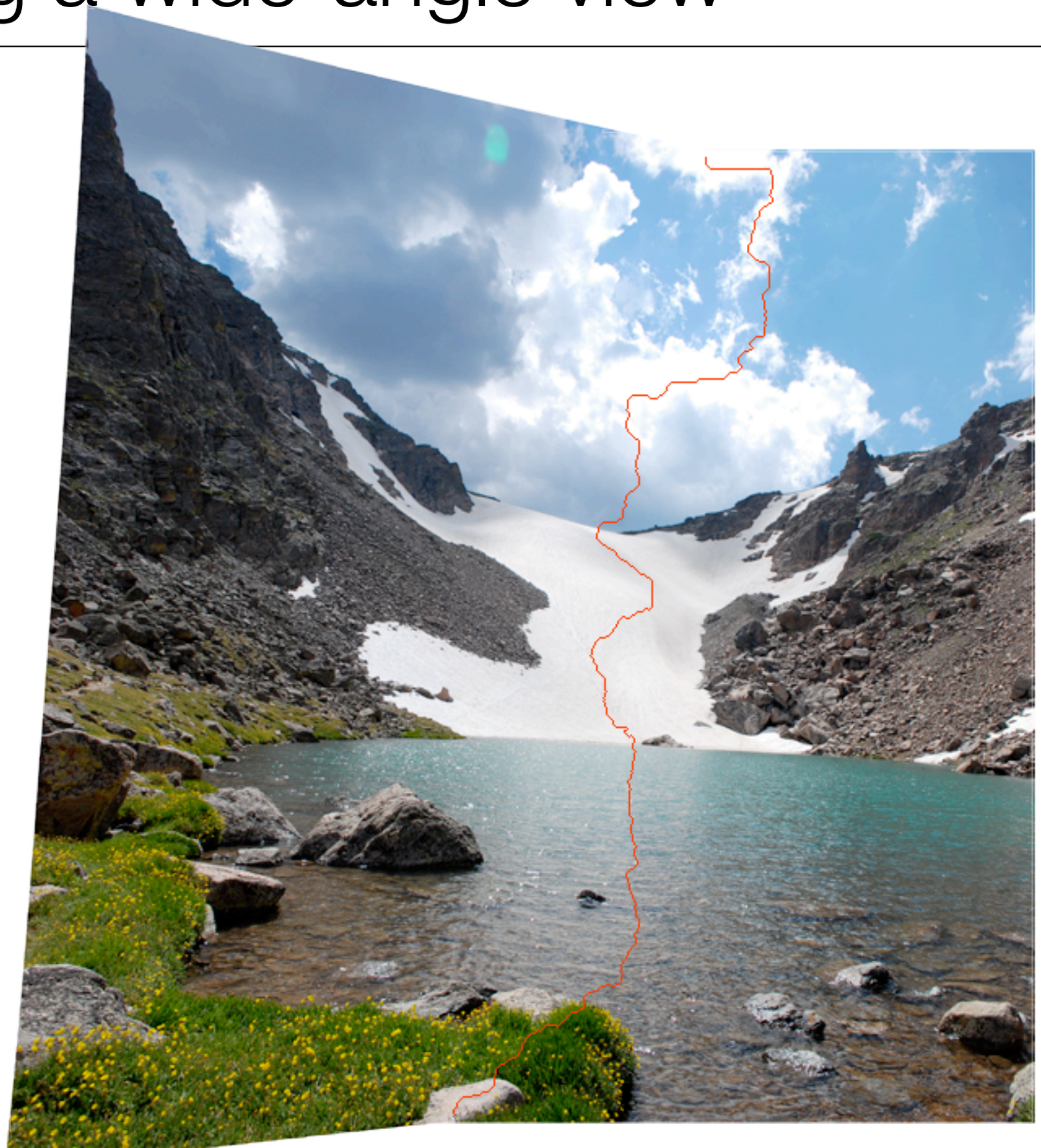
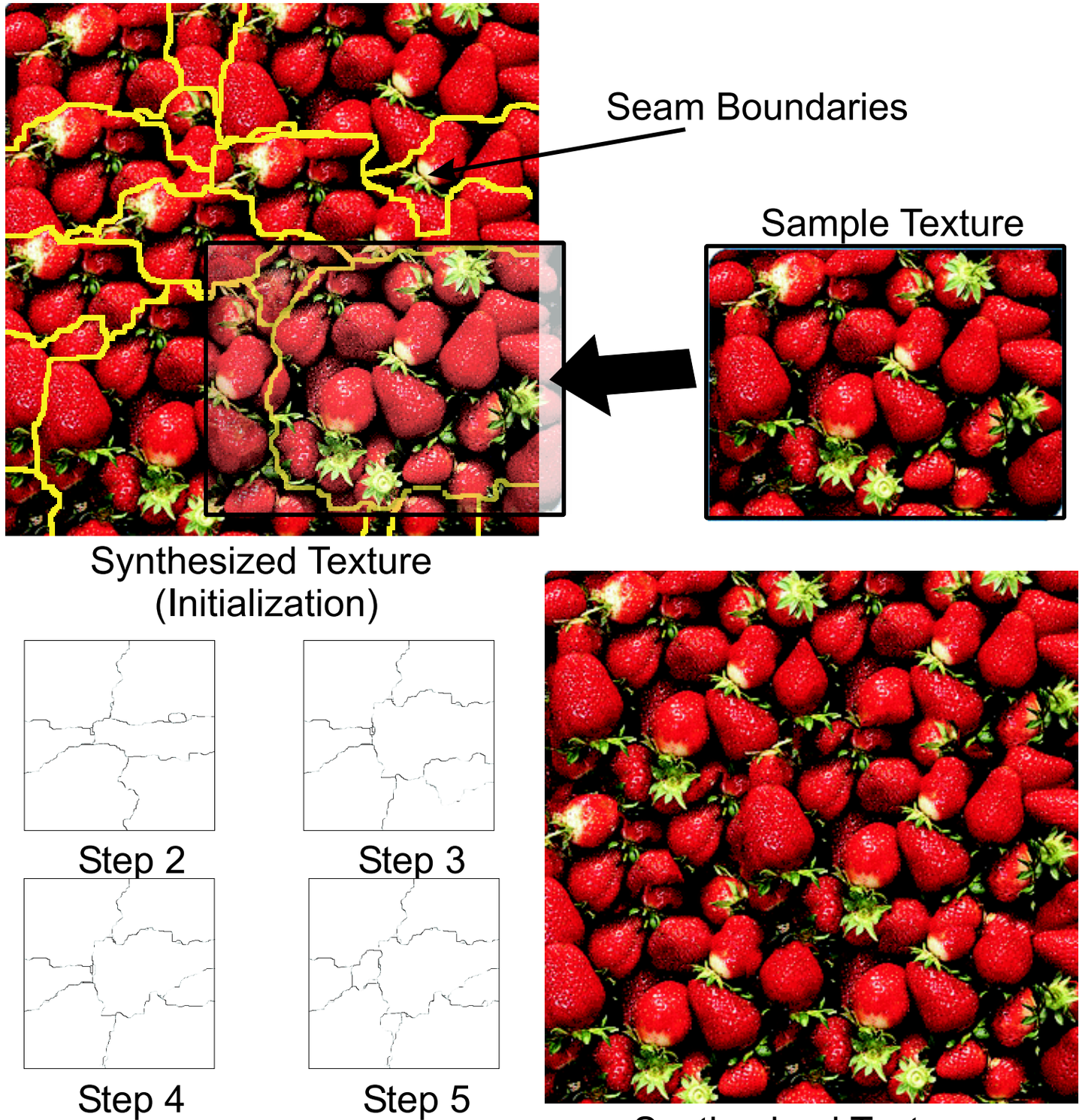
CS6640 Computational Photography

13. Graph Cut Optimization

Stitching a wide-angle view

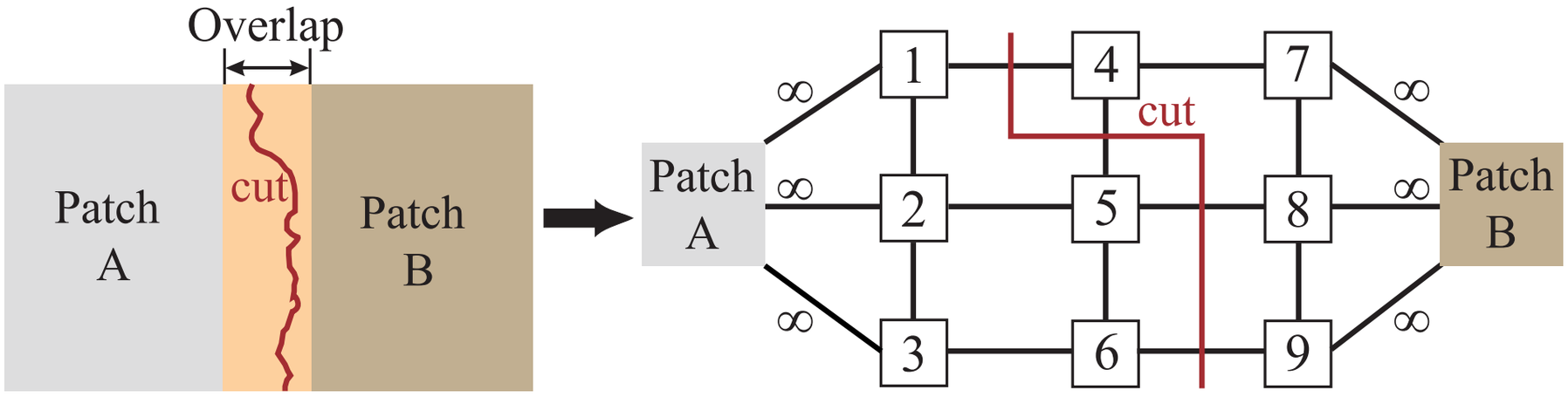


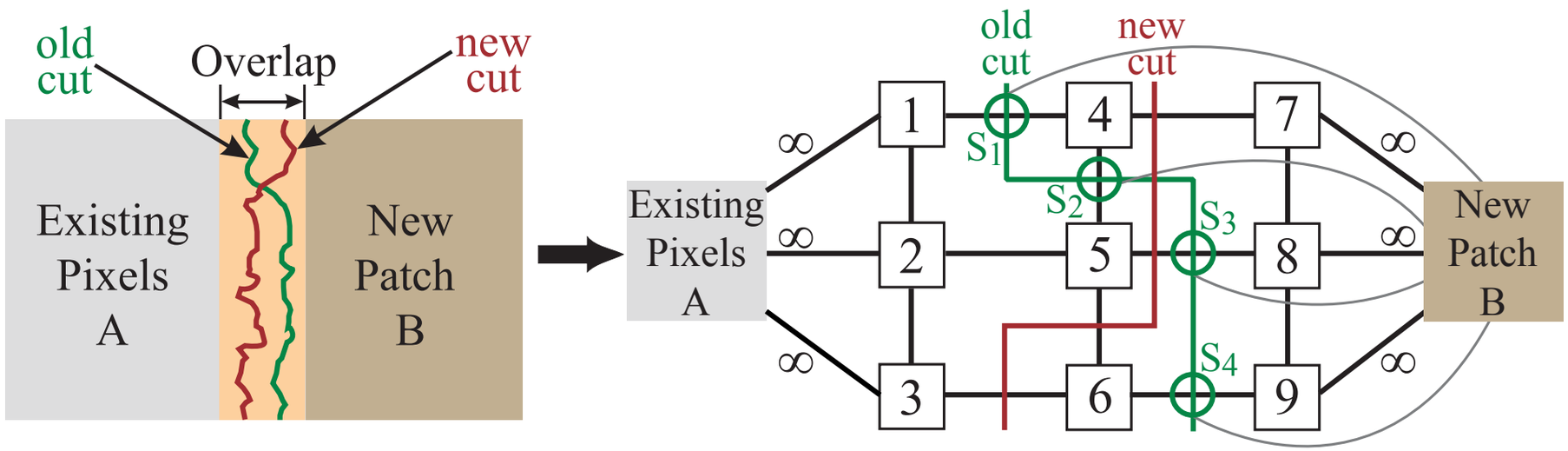
Texture synthesis with graph cuts



[Kwatra et al. 2005]

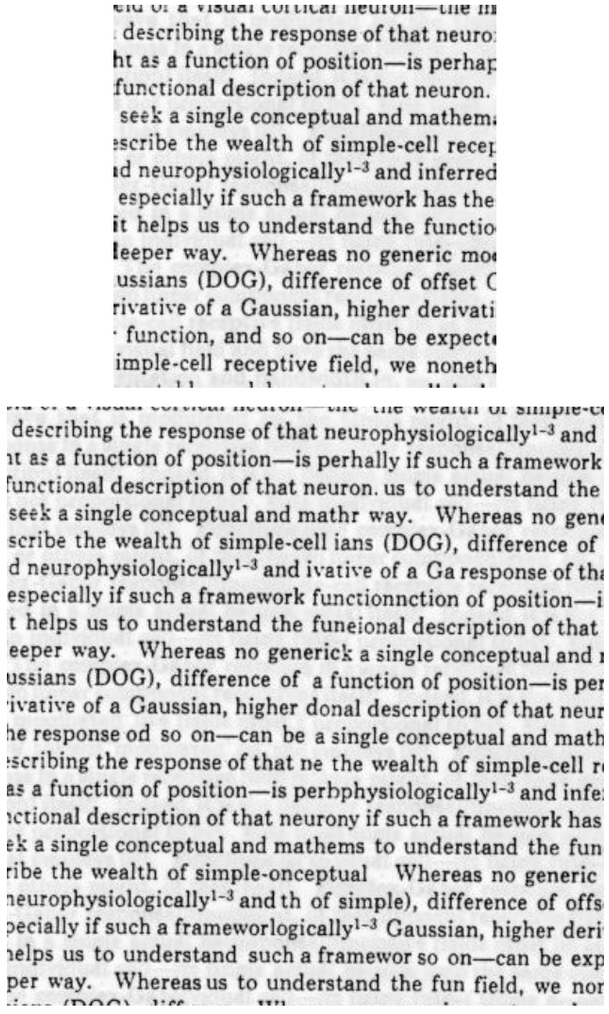
Accounting for existing seams

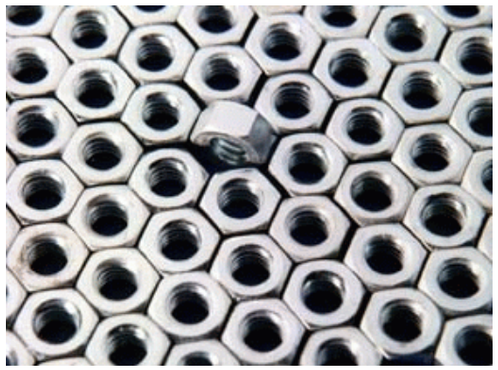


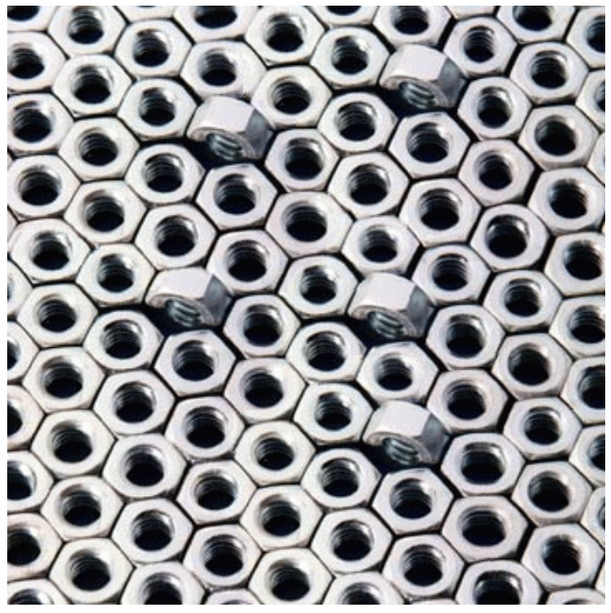


[Kwatra et al. 2005]

Graph cut texture results

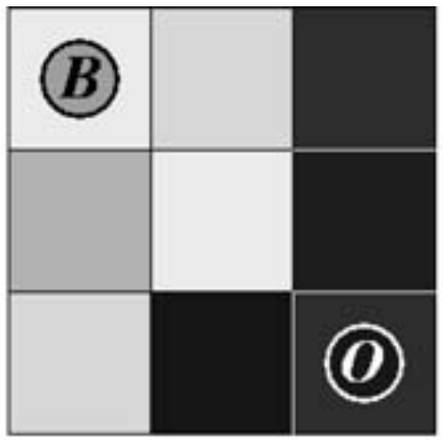






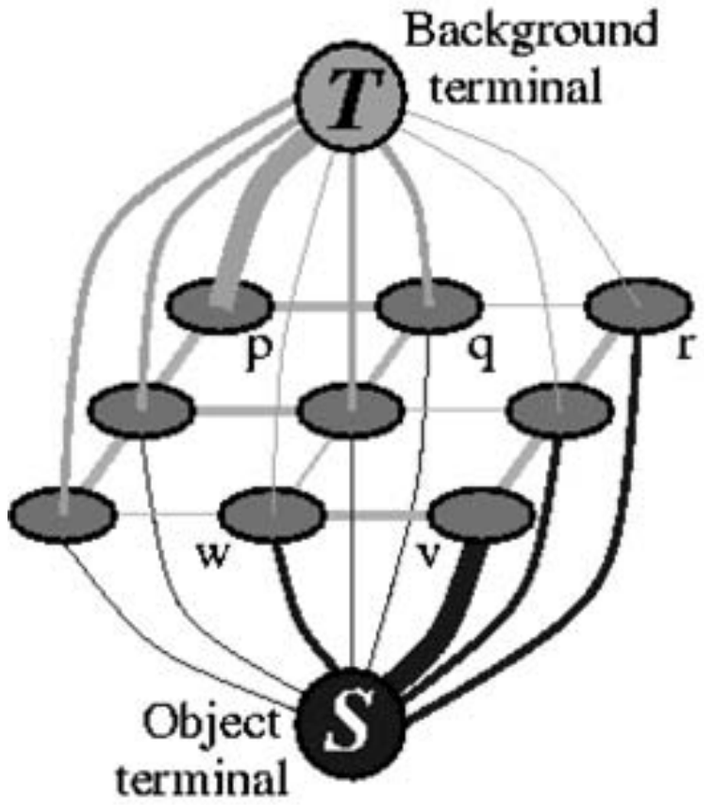
[Kwatra et al. 2005]

Segmentation with graph cuts

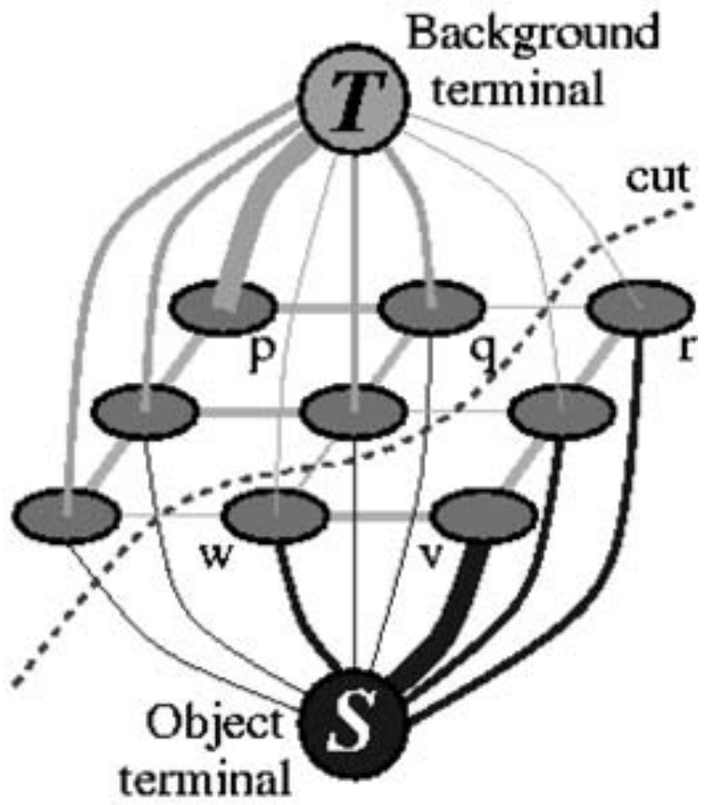


(a) Image with seeds.

(d) Segmentation results.



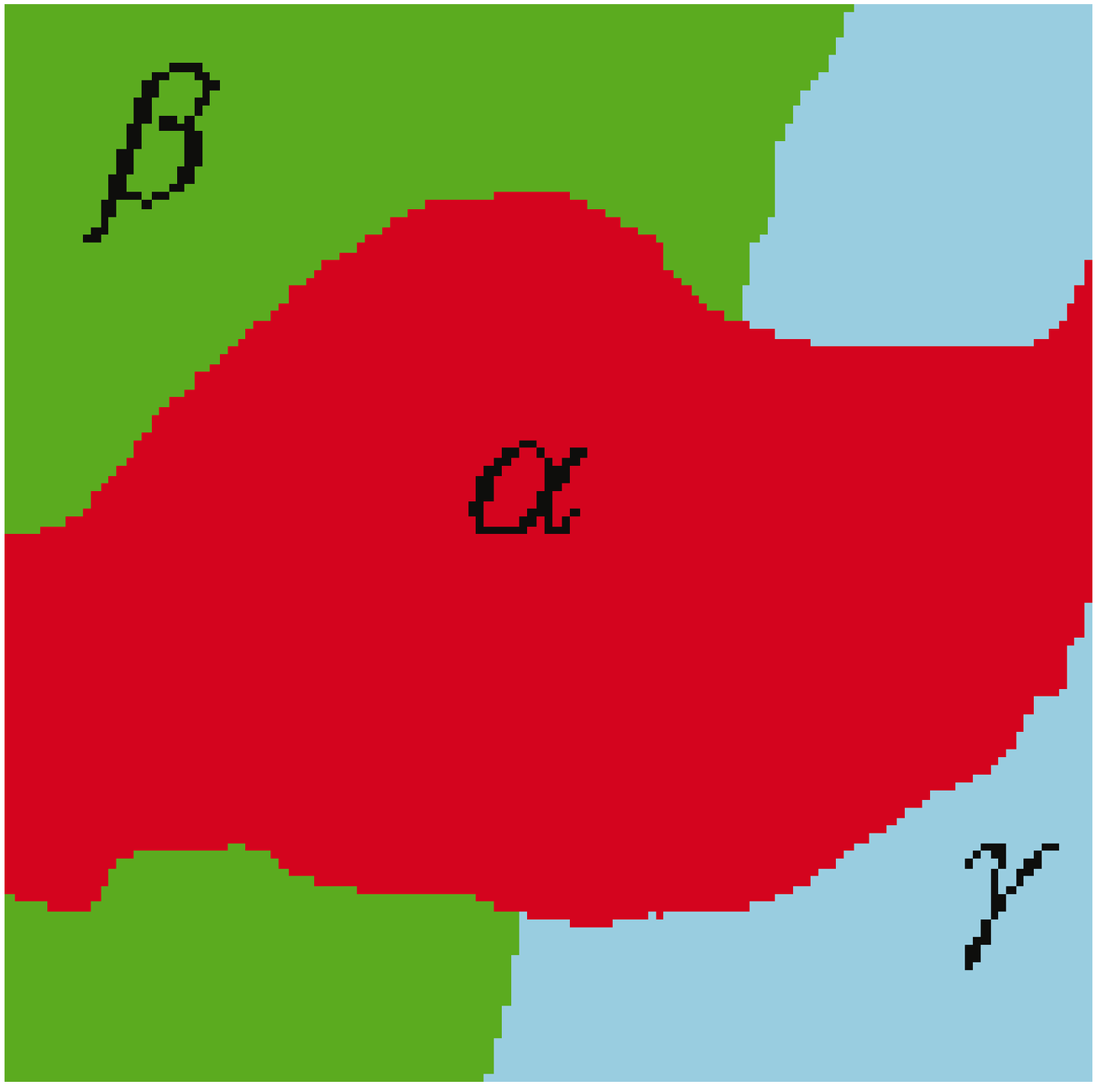
(b) Graph.



(c) Cut.

[Boykov & Funka-Lea 2006]

α-Expansion



[Boykov et al. 2001]

α-Expansion algorithm

1. Start with an arbitrary labeling f
2. Set success := 0
3. For each label $\alpha \in \mathcal{L}$
   - 3.1. Find $\hat{f} = \arg\min E(f')$ among f' within one α-expansion of f
   - 3.2. If $E(\hat{f}) < E(f)$, set $f := \hat{f}$ and success := 1
4. If success = 1 goto 2
5. Return f

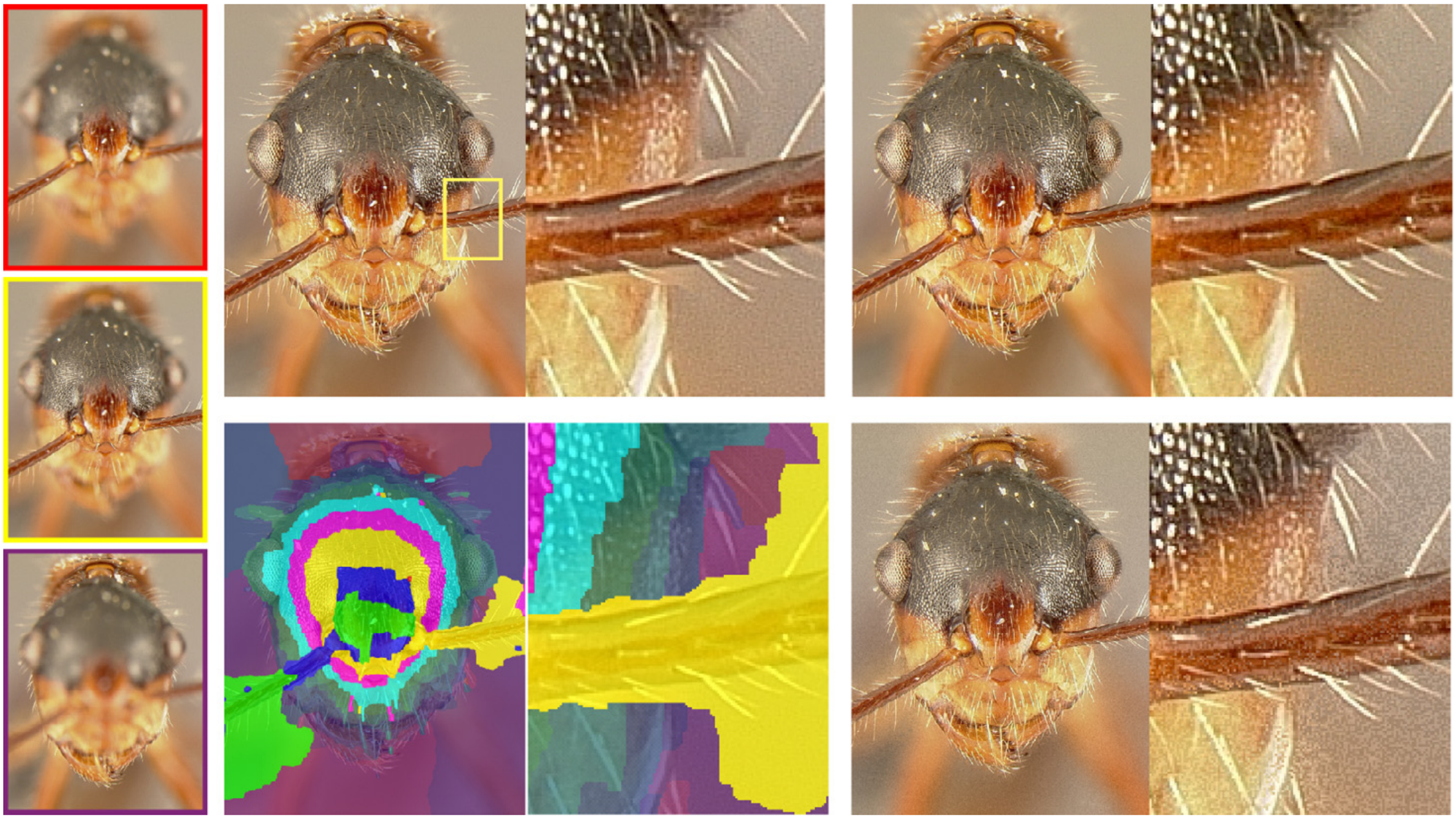
[Boykov et al. 2001]

Multi-way cuts: Photomontage

Figure 1 From a set of five source images (of which four are shown on the left), we quickly create a composite family portrait in which everyone is smiling and looking at the camera (right). We simply flip through the stack and coarsely draw strokes using the *designated source* image objective over the people we wish to add to the composite. The user-applied strokes and computed regions are color-coded by the borders of the source images on the left (middle).

[Agarwala et al. 2004]

Multi-way cuts: Photomontage



[Agarwala et al. 2004]