Report on “GrabCut” — Interactive Foreground Extraction using Iterated Graph Cuts

Rishabh Malik
Mtech (CSE)
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In this report, we have showed the various results obtained and the effect of various parameters on image segmentation using grab cut algorithm.

Number of iterations
As observed, with increae in the number of iterations , the results of segmentation become more and more better untill convergence. Results for the same are shown in Fig. 1,Fig. 2 and Fig. 3. For all these 3 inputs number og GMM components is 5, gamma = 50 and number of neighbours = 4.

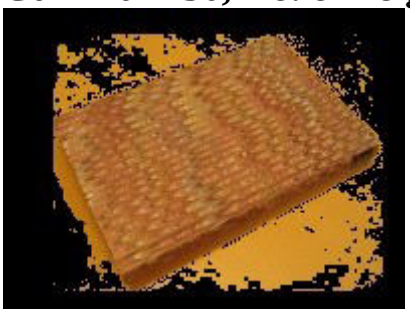
Number of neighbours
Mathematically, the results for 8 neighbourhood are better than 4 neighbourhood. This is because the 8 neighbourhood produce better foreground boundry as each pixel has impact of more nearby pixels and the image boundry would turn out to be comparitively smoother.

Number of Gaussian Mixture Components
Varying number of gaussian mixture components can be useful when we have multiple objects in the image along with object to be segmented inside the bounding box. As more GMM components can handle the more different objects. This hyperparameter cannot be fixed as it will vary for different images. Although if the value is set to very low, model might not be able to learn the different objects in the image and hence won’t be able to segment image properly due to poor formation of mixtures. This has to be set experimentally based on the input.

Size of bounding Box
While giving input, user should try to make a tight bounding while trying not to miss out any portion of target segmented object. Tight bounding box provides better estimation of foreground and covers majority of the foreground. Together with good number of GMM components this can prove to give decent results.

Gamma
The value of gamma used in the assignment during various eperiments ar 0.5, 50, 100 and 500. It is one of the hyparameters that has to be chosen experimentally and cannot be fixed. It impacts the categorization of a pixel as foreground or background so very low or very large value might not give expected results.

Gamma = 50, No. of neighbours = 4 for below Book image


Iteration - 1


Iteration - 2


Iteration - 3


Iteration - 4


Iteration - 5

Fig. 1

Gamma = 50, No. of neighbours = 4 for below Person image


Iteration - 1


Iteration - 2

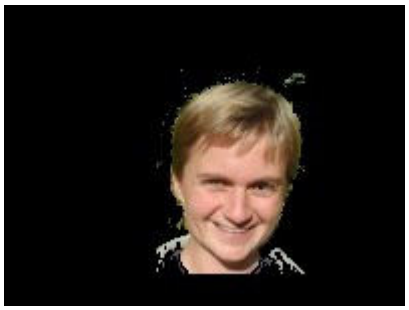

Iteration - 3


Iteration - 4

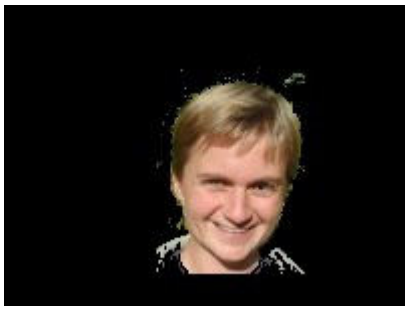

Iteration – 5

Fig. 2

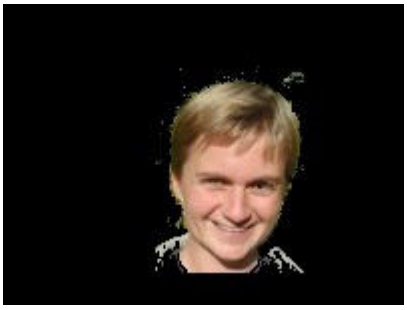
Gamma = 50, No. of neighbours = 4 of below Face image



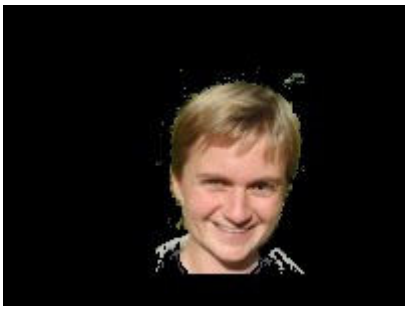
Iteration - 1



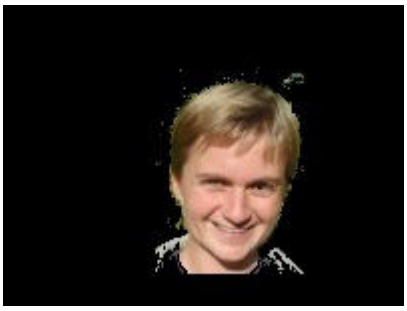
Iteration - 2



Iteration - 3



Iteration - 4



Iteration – 5

Fig. 3

Gamma = 500, No. of neighbours = 8 of below Banana image

Iteration - 1

Iteration - 2

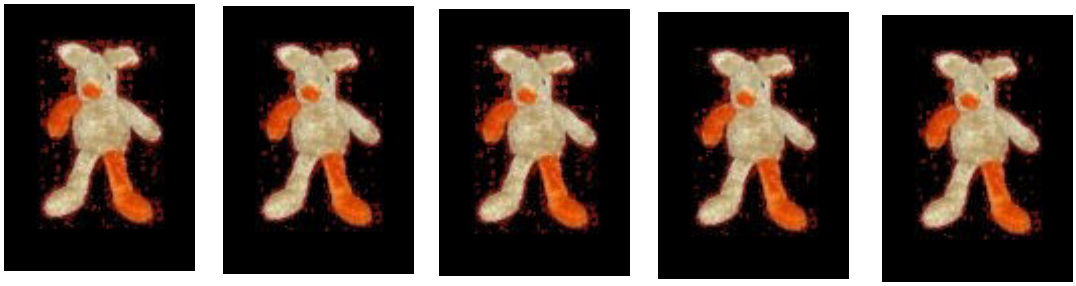
Iteration - 3

Iteration - 4

Iteration - 5

Fig. 6

Gamma = 500, No. of neighbours = 8, No. Of GMM components = 2



Iter – 1 **Iter – 2** **Iter – 3** **Iter – 4** **Iter – 5**

Fig. 7

Other results