Hw 1

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GrabCut

Results for basic configuration ( 5 components, gamma = 5, lamda = 45):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Image name | Accuracy | Jaccard | Time to converge | # of components |
| Banana1 | 0.65 | 0.425 | 0.83 | 5 |
| Banana2 | 0.98 | 0.93 | 0.97 | 5 |
| Book | 0.96 | 0.902 | 1.9 | 5 |
| Bush | 0.846 | 0.46 | 1.7 | 5 |
| Cross | 0.77 | 0.52 | 1.34 | 5 |
| Flower | 0.99 | 0.96 | 0.46 | 5 |
| fullmoon | 0.97 | 0.725 | 0.28 | 5 |
| Grave | 0.97 | 0.79 | 0.6 | 5 |
| Llama | 0.99 | 0.944 | 0.9 | 5 |
| Memorial | 0.98 | 0.91 | 1.06 | 5 |
| Sheep | 0.99 | 0.92 | 0.47 | 5 |
| Stone2 | 0.99 | 0.98 | 0.85 | 5 |
| teddy | 0.983 | 0.92 | 0.32 | 5 |

We choose a convergence threshold: stop iterating after 2 iterations that less than 10 pixels became foreground.

As we can see, the images that were the most difficult to process were Banana1, Cross and Bush.Banana1 has a lot of similarity between the banana and the background, which might cause the algorithm to have trouble separating the rest of the background.Cross image has a lot of similarity between the base of the cross and the background. Also, its post is thin, so it vanishes after one or two iterations because of the gamma and lambda values (which should be lower in this case and ensure the convergence is slower).Bush image is doing well overall, but the trunk is too thin, so again, after a few iterations, we only have the bush itself with little of a flowerpot.

|  |  |  |
| --- | --- | --- |
| Image | Mask | GT Mask |
| Banana1 |  |  |
| Banana2 |  |  |
| Book |  |  |
| Bush |  |  |
| Cross |  |  |
| Flower |  |  |
| Fullmoon |  |  |
| Grave |  |  |
| Llama |  |  |
| Memorial |  |  |
| Sheep |  |  |
| Stone2 |  |  |
| Teddy |  |  |

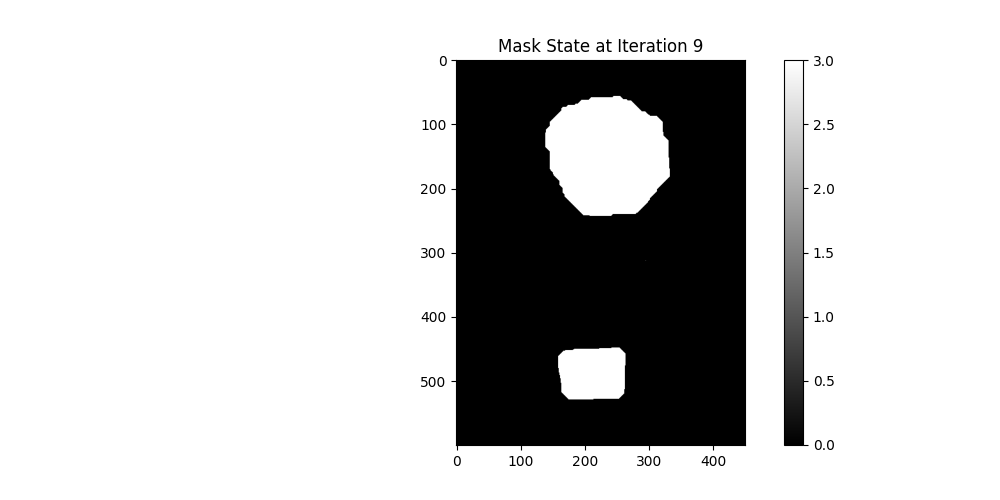
I’ll examine bush, cross and book images (and banana1 as a bonus).

Results with original configurations:

Bush: acc: 0.846 jacc: 0.46 time to converge: 1.7min

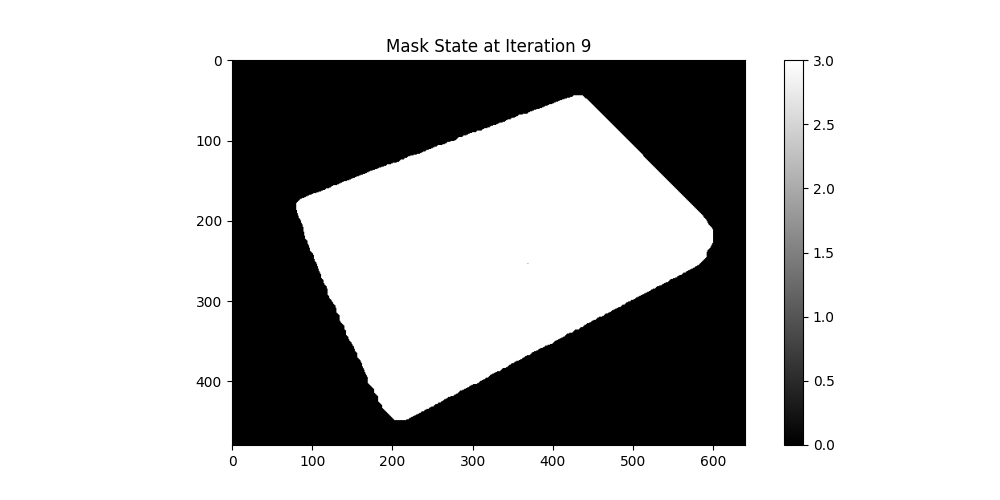
Book: acc: 0.96 jacc: 0.902 time to converge: 1.9min

Cross: acc: 0.77 jacc: 0.52 time to converge: 1.34min

Bush converged very slow, so we decided to increase gamma to get better results for the bush itself and ignore its trunk. These is the results for gamma = 10 (instead of 5):

9 iterations instead of 21. Accuracy of 0.957 and Jaccard of 0.751. Total running time of 0.97 minutes. Hugh differences. More components or higher gamma don’t generate better results unfortunately.

Book has good results overall, but its ground truth seems simple, and we believe that using some small adjustments we can do better. We increase gamma to 20 and changed to 3 components:



We got accuracy of 0.9742, Jaccard of 0.934 and it took 1.24 minutes. Great results!

We inspected the Cross, which has almost the worst results. We changed # of components to 3 :

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Now, the accuracy is 0.875, Jaccard is 0.66 and it took about 1.46 minutes. Great difference! It still hard to include the top part of the cross as part of the foreground because gamma is too high. After changing gamma to 2 we got this:  
תמונה שמכילה טקסט, שרטוט

התיאור נוצר באופן אוטומטי

Accuracy is 0.9 and Jaccard is 0.73 and running time of 1.4 minutes. We felt that we can achieve even better results with the Cross so we changed gamma to 0.5 and we got this:  
תמונה שמכילה טקסט, צילום מסך, עיצוב

התיאור נוצר באופן אוטומטי

Acc of 0.91!.

Lastly, as a bonus, we tried, and succeed to improve banana1 that has acc of 0.65, jaccard of 0.425 to accuracy of 0.96 (!) and Jaccard of 0.86 by changing gamma to 1 and # of components to 2:

