

Hw 1

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GrabCut

Results for basic configuration (2 components, gamma = 10, lamda = 45)

Image name	Accuracy	Jaccard	Time to converge
Banana1	0.96	0.87	1.7
Banana2	0.98	0.92	1.5
Book	0.97	0.93	09
Bush	0.95	0.74	0.85
Cross	0.87	0.65	1.2
Flower	0.99	0.96	1.16
fullmoon	0.97	0.725	0.46
Grave	0.96	0.6	0.9
Llama	0.98	0.93	0.6
Memorial	0.976	0.88	1.4
Sheep	0.99	0.92	0.7
Stone2	0.99	0.98	1.05
teddy	0.983	0.94	0.65

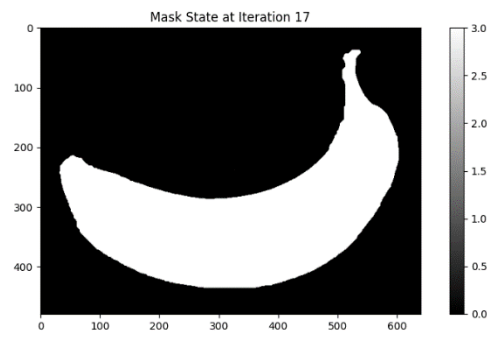

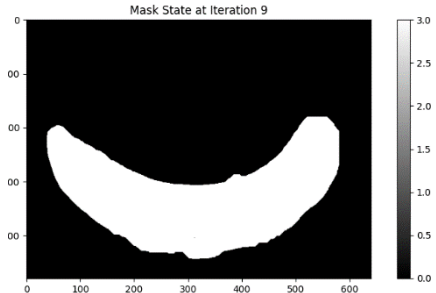

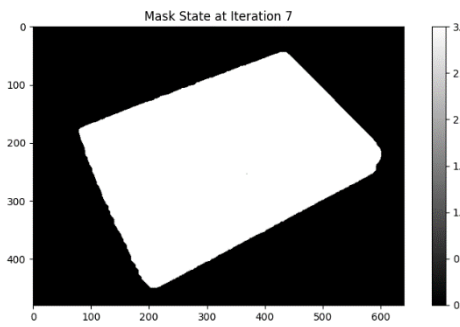
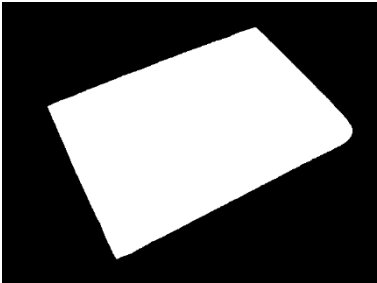
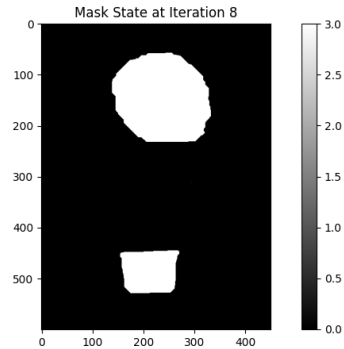
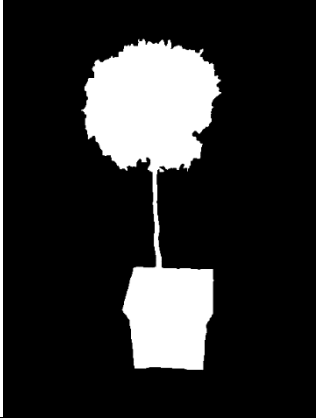
We choose a convergence threshold: stop iterating after 2 iterations that less than 10 pixels became foreground.

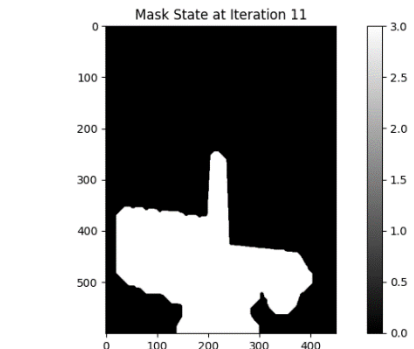

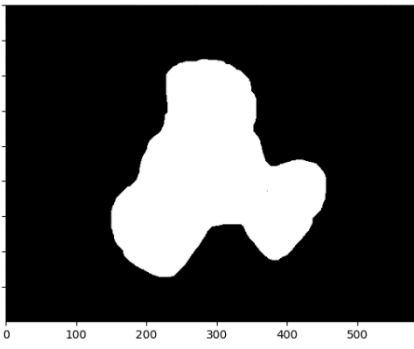

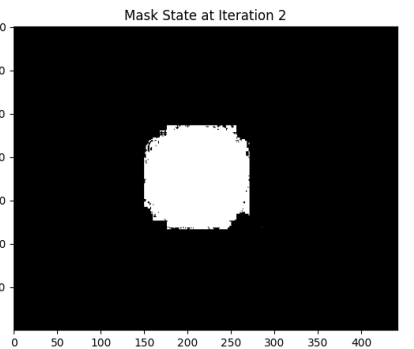
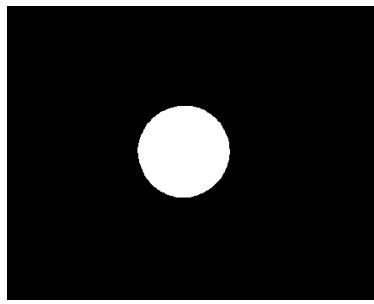
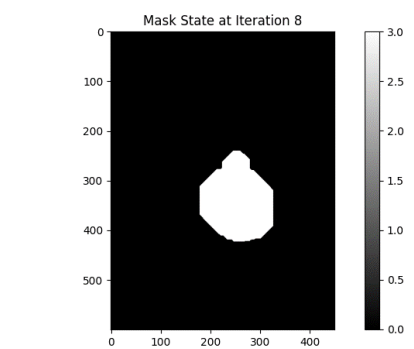

As we can see, the images that were the most difficult to process were Cross and Bush.

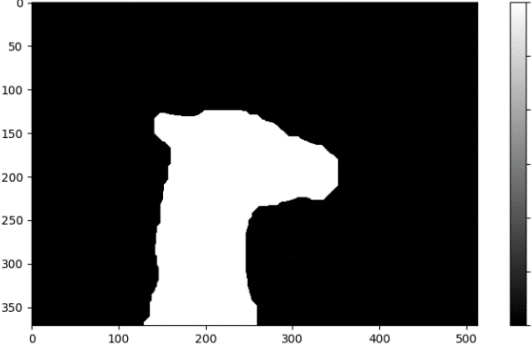

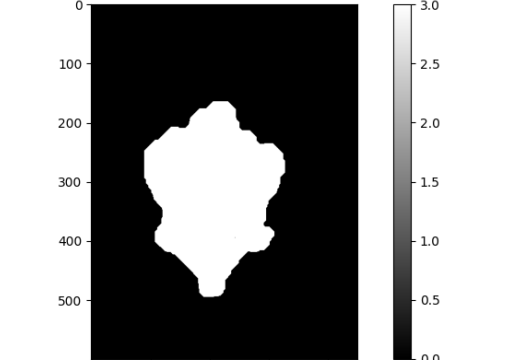

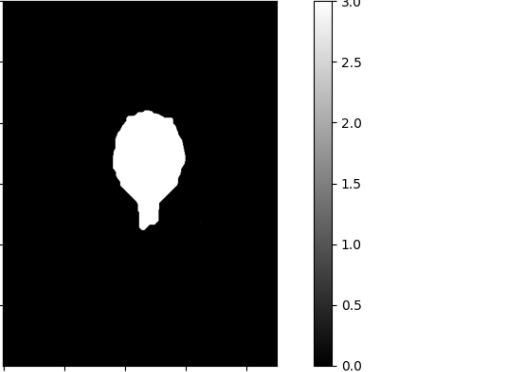
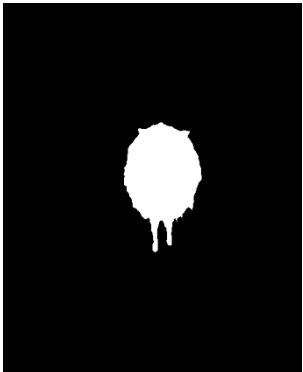
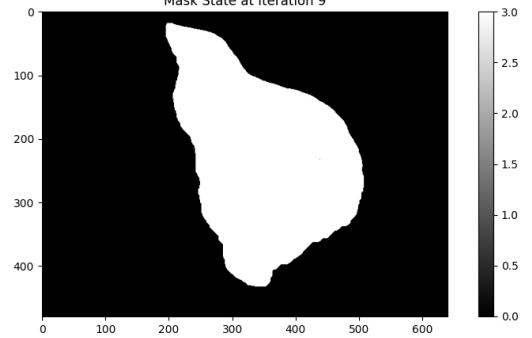

Cross image has a lot of similarity between the base of the cross and the background. Also, its post is thin, so it vanishes after one or two iterations because of the gamma and lambda values (which should be lower in this case and ensure the convergence is slower).

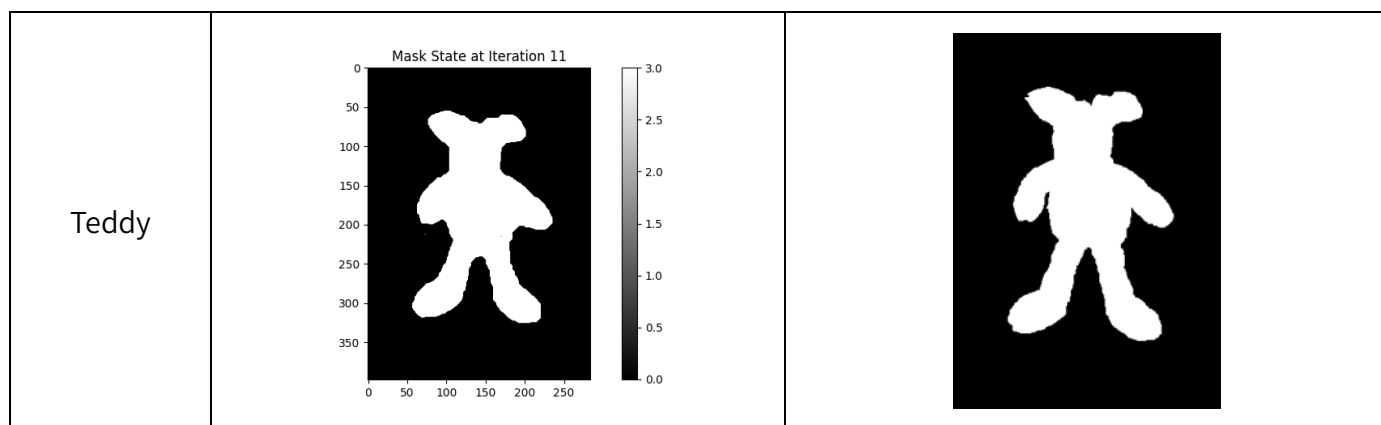
Bush image is doing well overall, but the trunk is too thin, so again, after a few iterations, we only have the bush itself with little of a flowerpot.

We chose 2 components because most of images has noticeable background so 2 colors make sense more then 5 (regards similarity).

Image	Mask	GT Mask
Banana1		
Banana2		
Book		
Bush		

Cross	 <p>Mask State at Iteration 11</p> <p>A heatmap showing the mask state at iteration 11. The x-axis ranges from 0 to 400, and the y-axis ranges from 0 to 500. A color bar on the right indicates values from 0.0 to 3.0. The mask is mostly black, with a white cross shape in the center.</p>	 <p>A binary mask showing a white cross shape on a black background.</p>
Flower	 <p>Mask State at Iteration 4</p> <p>A heatmap showing the mask state at iteration 4. The x-axis ranges from 0 to 500, and the y-axis ranges from 0 to 400. A color bar on the right indicates values from 0.0 to 3.0. The mask is mostly black, with a white flower shape in the center.</p>	 <p>A binary mask showing a white flower shape on a black background.</p>
Fullmoon	 <p>Mask State at Iteration 2</p> <p>A heatmap showing the mask state at iteration 2. The x-axis ranges from 0 to 400, and the y-axis ranges from 0 to 300. A color bar on the right indicates values from 0.0 to 3.0. The mask is mostly black, with a white circular shape in the center.</p>	 <p>A binary mask showing a white circular shape on a black background.</p>
Grave	 <p>Mask State at Iteration 8</p> <p>A heatmap showing the mask state at iteration 8. The x-axis ranges from 0 to 400, and the y-axis ranges from 0 to 500. A color bar on the right indicates values from 0.0 to 3.0. The mask is mostly black, with a white cross shape in the center.</p>	 <p>A binary mask showing a white cross shape on a black background.</p>

Llama	<p>Mask State at Iteration 21</p>  <p>A heatmap visualization of the mask state for the Llama image at iteration 21. The x-axis ranges from 0 to 500, and the y-axis ranges from 0 to 350. A color bar on the right indicates values from 0.0 (black) to 3.0 (white). The mask shows the Llama's head and neck in white against a black background.</p>	 <p>A binary mask of the Llama image, showing the head and neck in white against a black background.</p>
Memorial	<p>Mask State at Iteration 15</p>  <p>A heatmap visualization of the mask state for the Memorial image at iteration 15. The x-axis ranges from 0 to 400, and the y-axis ranges from 0 to 500. A color bar on the right indicates values from 0.0 (black) to 3.0 (white). The mask shows the Memorial's shape in white against a black background.</p>	 <p>A binary mask of the Memorial image, showing the Memorial's shape in white against a black background.</p>
Sheep	<p>Mask State at Iteration 5</p>  <p>A heatmap visualization of the mask state for the Sheep image at iteration 5. The x-axis ranges from 0 to 400, and the y-axis ranges from 0 to 400. A color bar on the right indicates values from 0.0 (black) to 3.0 (white). The mask shows the Sheep's head in white against a black background.</p>	 <p>A binary mask of the Sheep image, showing the Sheep's head in white against a black background.</p>
Stone2	<p>Mask State at Iteration 9</p>  <p>A heatmap visualization of the mask state for the Stone2 image at iteration 9. The x-axis ranges from 0 to 600, and the y-axis ranges from 0 to 400. A color bar on the right indicates values from 0.0 (black) to 3.0 (white). The mask shows the Stone2's shape in white against a black background.</p>	 <p>A binary mask of the Stone2 image, showing the Stone2's shape in white against a black background.</p>



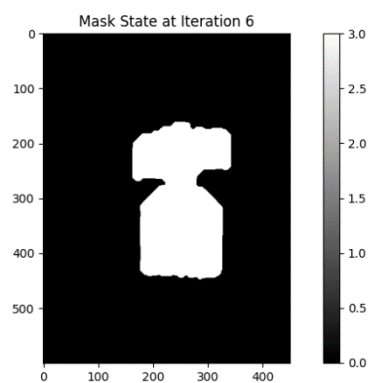
I'll examine bush, cross and grave images.

Results with original configurations:

Grave: acc: 0.96 jacc: 0.6 time to converge: 0.9 min

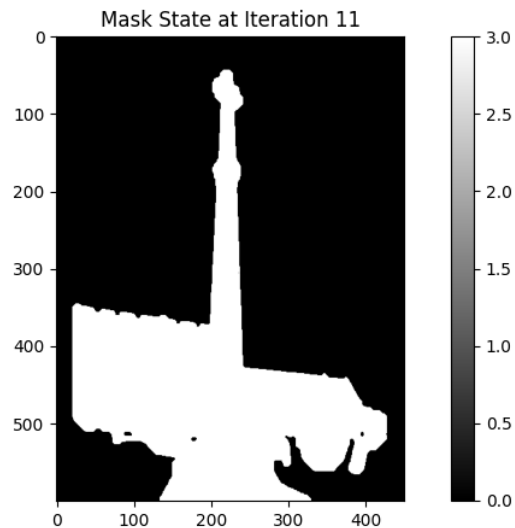
Cross: acc: 0.87 jacc: 0.65 time to converge: 1.2min

Grave hasn't succeeded to identify the top of the grave. We changed gamma to 2 to be more sensitive and number of components to 5 and got this:

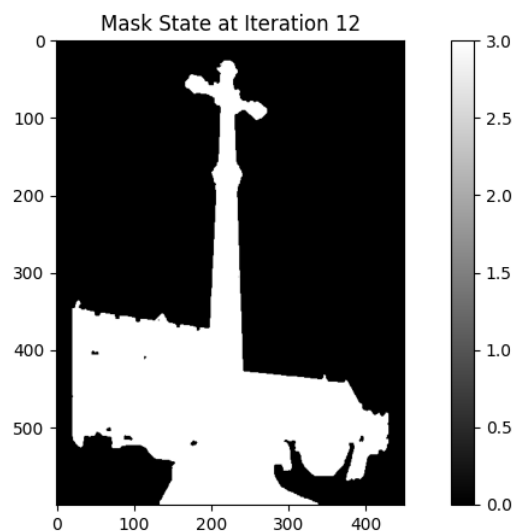


Accuracy of 0.97, Jaccard of 0.787 in 0.85 minutes. Great improvement.

We inspected the Cross, which has almost worst results. 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:



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:



Acc of 0.91!.

Poisson blending results

Banana1 with table:



The banana is blended well with the table background. The tight mask ensures that the edges of the banana are smooth and integrate seamlessly with the background, creating a realistic composite image.

Flower with Grass Mountains:



The flower integrates naturally with the grass mountains background, with intricate details captured by the tight mask, resulting in a smooth and realistic blend.

2 examples of Non Tight:



Both the bush and the grave exhibit blurred and poorly defined edges against the wall background. The non-tight masks cause inaccurate blends, making the objects appear less natural and less cohesive with the wall. The loose masks result in less defined edges, making the objects look unrealistic and poorly integrated