EE 5731 Visual Computing

CA2

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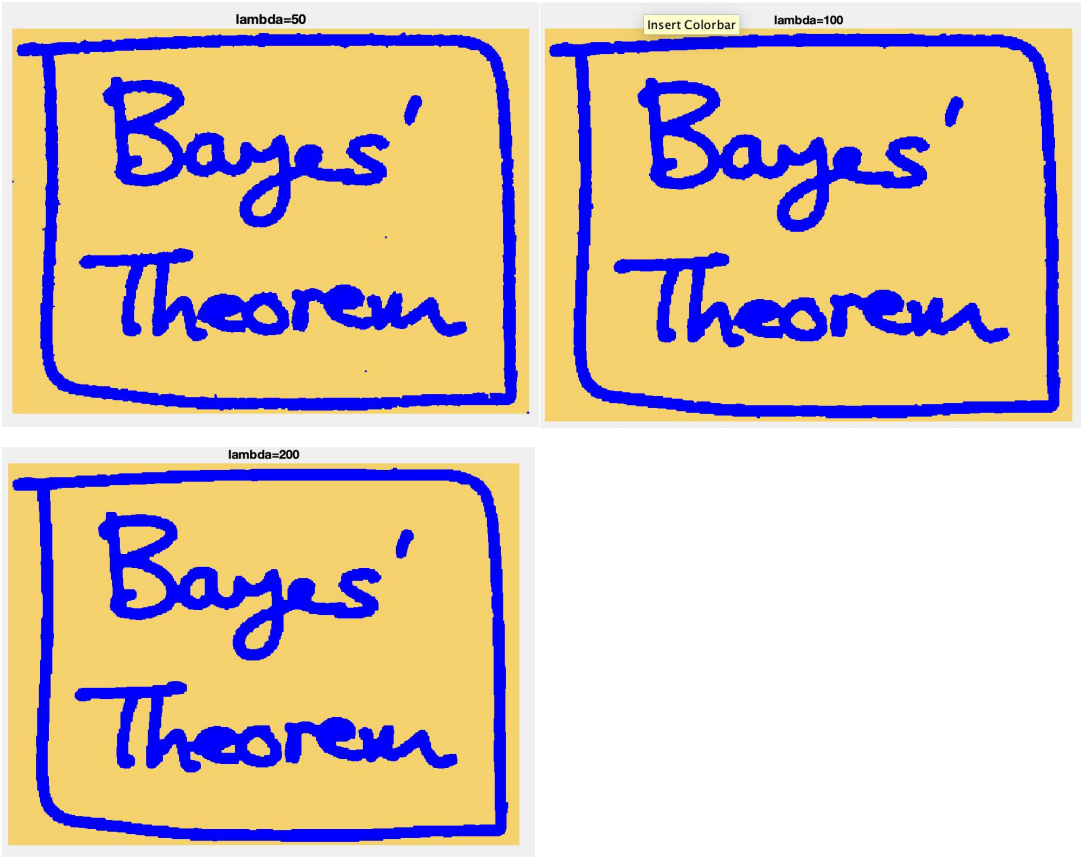
Part1: Noise Removal

Set lambda as 50, 100, 200, and the result are shown below.

The best result should be lambda = 100.

When lambda = 50, there are still some noise point on the image.

When lambda sets to too large, the detail will lose. The blue text will be blurry, and will be consider as background, becomes yellow color.

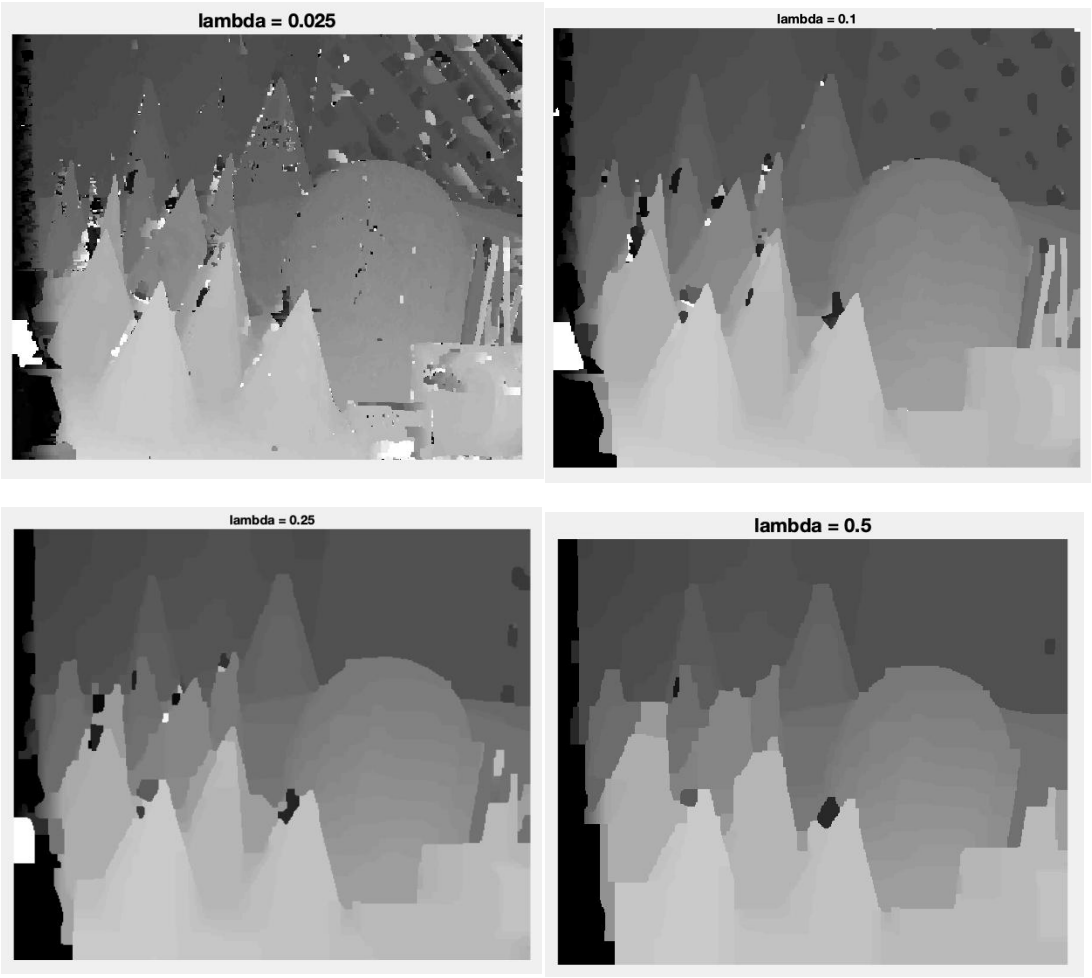


Part 2: Depth from Rectified Stereo Images

Set lambda as 0.025, 0.1,0.25,0.5, and the result are shown below.

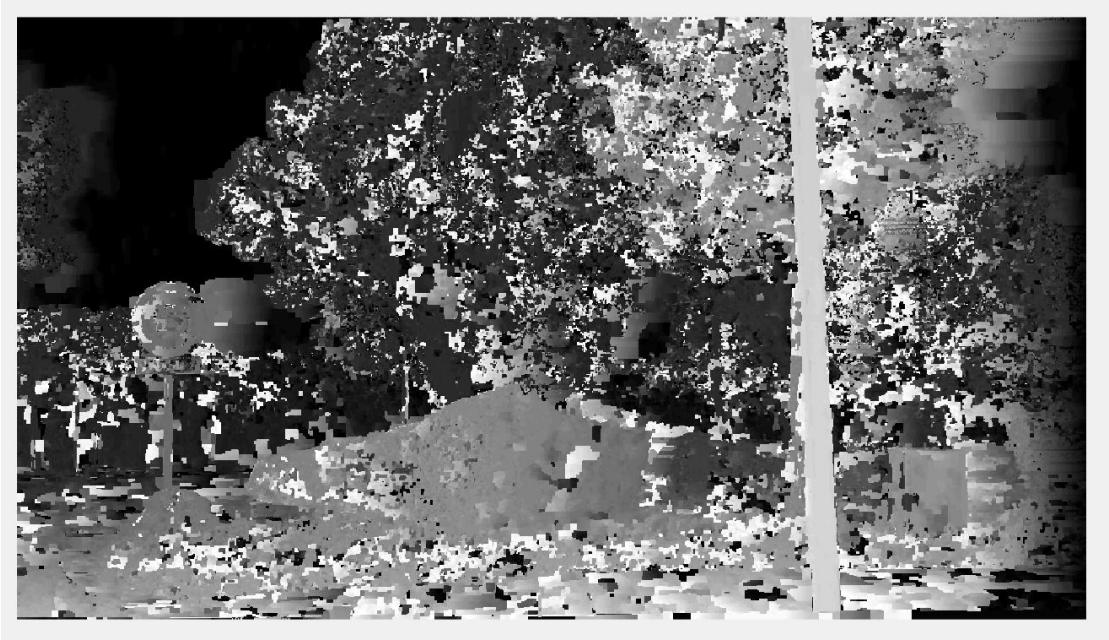
The best result should be lambda = 0.1.

When lambda is too small, there will be some noise need to be remove. As the lambda increasing, the result image becomes more smooth, but less detail.



Part3: Depth from Stereo

The result seems got too many noise. Those parameters needs to be tuning a bit to achieve the best result, like increase the lambda value.

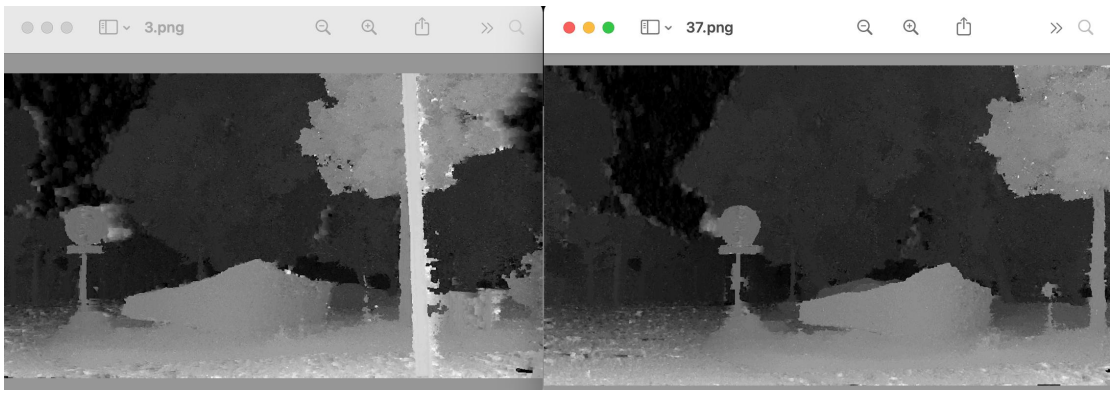


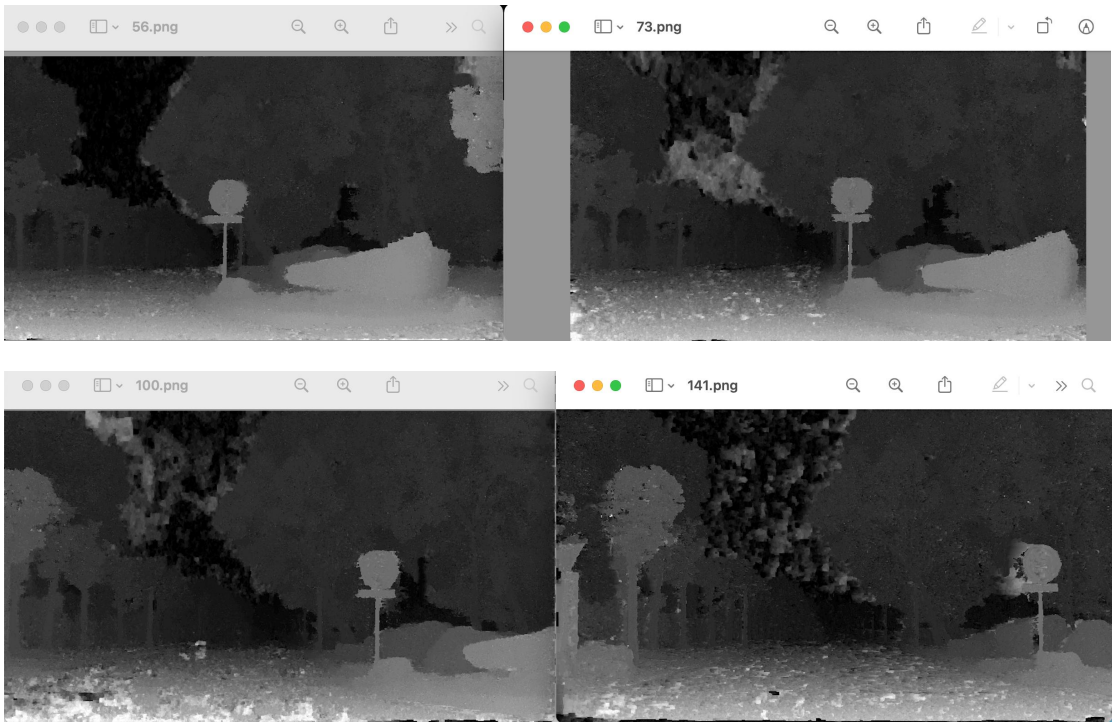
Part4: Depth from Video -- Basic

I selected 6 images form 1 to 141 randomly and shown below.

The number of frame was set to 10.

From the result we can the same subjects eg. Trees are not that clear at that clear. The best result should be the No. 141, the subjects are more recognizable.





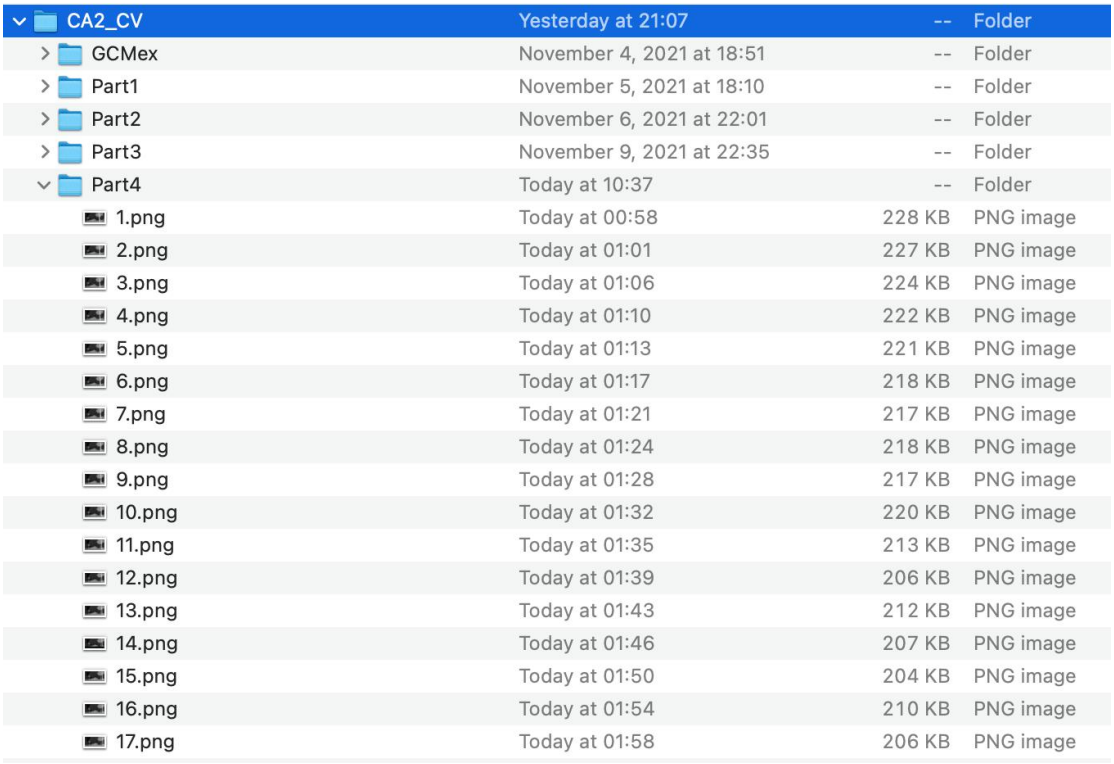
Part5: Depth from Video -- Advanced

the drawbacks of graph cut algorithm:

1. The execution time of algorithm is still far from real time.

Evidence:

Based on my experience, the total process time of the 141 frames is around 10 hours.



CA2_CV	Yesterday at 21:07	--	Folder
GCMex	November 4, 2021 at 18:51	--	Folder
Part1	November 5, 2021 at 18:10	--	Folder
Part2	November 6, 2021 at 22:01	--	Folder
Part3	November 9, 2021 at 22:35	--	Folder
Part4	Today at 10:37	--	Folder
1.png	Today at 00:58	228 KB	PNG image
2.png	Today at 01:01	227 KB	PNG image
3.png	Today at 01:06	224 KB	PNG image
4.png	Today at 01:10	222 KB	PNG image
5.png	Today at 01:13	221 KB	PNG image
6.png	Today at 01:17	218 KB	PNG image
7.png	Today at 01:21	217 KB	PNG image
8.png	Today at 01:24	218 KB	PNG image
9.png	Today at 01:28	217 KB	PNG image
10.png	Today at 01:32	220 KB	PNG image
11.png	Today at 01:35	213 KB	PNG image
12.png	Today at 01:39	206 KB	PNG image
13.png	Today at 01:43	212 KB	PNG image
14.png	Today at 01:46	207 KB	PNG image
15.png	Today at 01:50	204 KB	PNG image
16.png	Today at 01:54	210 KB	PNG image
17.png	Today at 01:58	206 KB	PNG image

Solution:

A possible real time solution come from a GPU acceleration to improve the efficiency of algorithms. It allows parallel implementations on pixel level.

The graphcut algorithm can be run in parallel over graph nodes which correspond to pixels. Thus, pixel based GPU architecture is a perfect match for accelerating for computing graph cuts in vision and graphics.

Reference：

https://scholar.google.com/citations?view_op=view_citation&hl=zh-CN&user=h6_PdYsAAAAJ&citation_for_view=h6_PdYsAAAAJ:ufrVoPGSRksC

Graph cuts in vision and graphics: Theories and applications