

Supplementary Materials: HDR Deghosting: How to deal with Saturation?

Jun Hu
Duke University

Orazio Gallo
NVIDIA Research

Kari Pulli
NVIDIA Research

Xiaobai Sun
Duke University

Instructions

Preview in FullScreen Mode, use (Page Up/Down) to toggle between images.

List of Figures

1	Window: image one	2
2	Window: image two	3
3	Window: image three	4
4	Window: aligned image one	5
5	Window: aligned image two	6
6	Window: aligned image three	7
7	Window: final result	8
8	Happy hour: image one	9
9	Happy hour: image two	10
10	Happy hour: image three	11
11	Happy hour: aligned image one	12
12	Happy hour: aligned image two	13
13	Happy hour: aligned image three	14
14	Happy hour: final result	15
15	Happy hour: usage map	16
16	Sculpture Garden: image one	17
17	Sculpture Garden: image two	18
18	Sculpture Garden: image three	19
19	Sculpture Garden: image four	20
20	Sculpture Garden: image five	21
21	Sculpture Garden: aligned image one	22
22	Sculpture Garden: aligned image two	23
23	Sculpture Garden: aligned image three	24
24	Sculpture Garden: aligned image four	25
25	Sculpture Garden: aligned image five	26
26	Sculpture Garden: a comparison with Gallo <i>et al.</i>	27
27	Garden one: image one	28
28	Garden one: image two	29
29	Garden one: image three	30
30	Garden one: image four	31
31	Garden one: image five	32
32	Garden one: image six	33
33	Garden one: aligned image one	34
34	Garden one: aligned image two	35
35	Garden one: aligned image three	36
36	Garden one: aligned image four	37
37	Garden one: aligned image five	38
38	Garden one: aligned image six	39
39	Garden one: a comparison with Zhang <i>et al.</i>	40
40	Garden two: image one	41
41	Garden two: image two	42
42	Garden two: image three	43
43	Garden two: image four	44
44	Garden two: aligned image one	45
45	Garden two: aligned image two	46
46	Garden two: aligned image three	47
47	Garden two: aligned image four	48
48	Garden two: a comparison with Hu <i>et al.</i>	49
49	Colosseum: image one	50
50	Colosseum: image two	51
51	Colosseum: image three	52
52	Colosseum: aligned image one	53
53	Colosseum: aligned image two	54
54	Colosseum: aligned image three	55
55	Colosseum: final result	56



Figure 1. Image one in the original stack.



Figure 2. Image two in the original stack.



Figure 3. Image three in the original stack.



Figure 4. Aligned image one



Figure 5. Aligned image two.



Figure 6. Aligned image three.



Figure 7. The fused result after the alignment using our algorithm. Note that the trees outside the window in the reference image (2nd one) is badly exposed, in particular, the regions around the lady's hair. Our result captures all the information from the three images but does not introduce artifacts.



Figure 8. Image one in the original stack.



Figure 9. Image two in the original stack.



Figure 10. Image three in the original stack.



Figure 11. Aligned image one.



Figure 12. Aligned image two.



Figure 13. Aligned image three.



Figure 14. The fused result after the alignment using our algorithm.

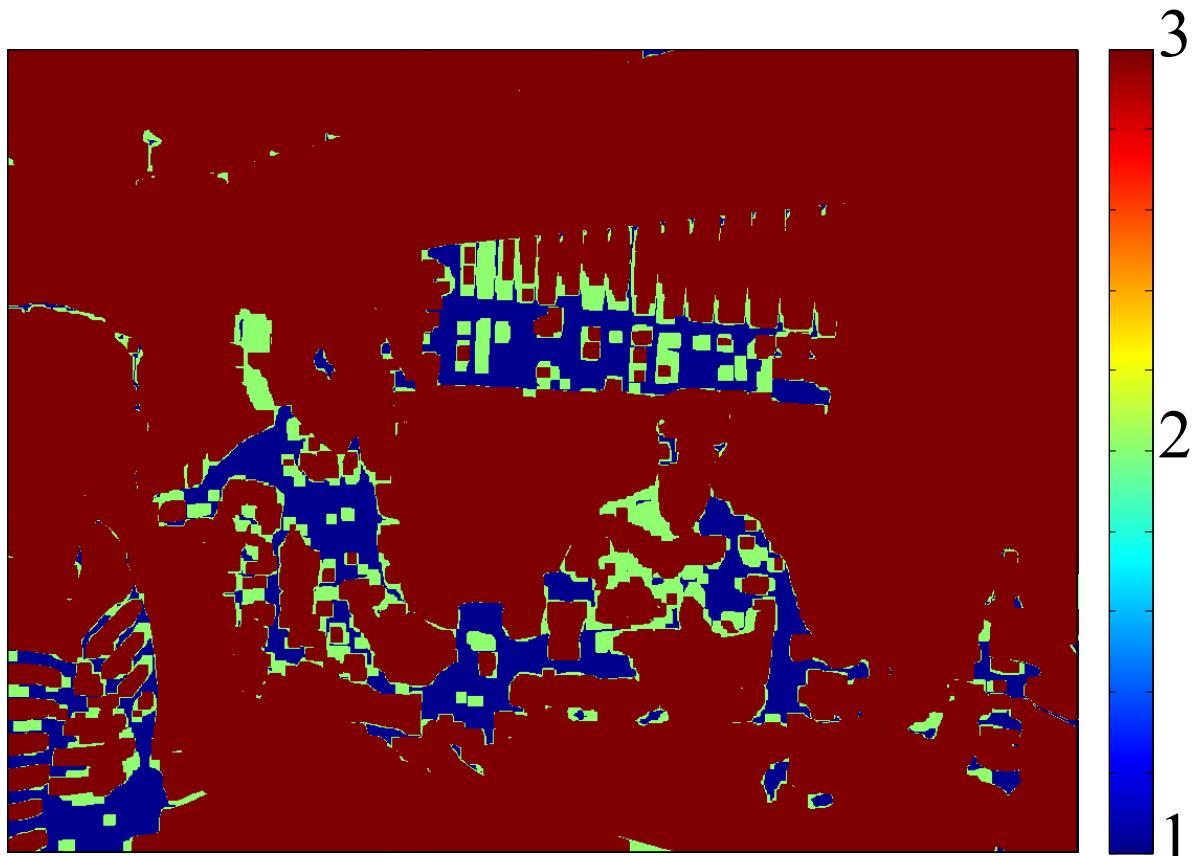


Figure 15. Taking inspiration from Gallo *et al.*, we show how many of the original images contribute to each pixel in the fused image. In our case, what this means is that the red regions were warped and synthesized in all the aligned images. For the blue region, no matches were found between the original images of the stack and the reference: those pixels are therefore reconstructed using only the reference image. A similar explanation applies to the green areas, where only two images are used.



Figure 16. Image one in the original stack.



Figure 17. Image two in the original stack.



Figure 18. Image three in the original stack.



Figure 19. Image four in the original stack.



Figure 20. Image five in the original stack.



Figure 21. Aligned image one.



Figure 22. Aligned image two.



Figure 23. Aligned image three.



Figure 24. Aligned image four.



Figure 25. Aligned image five.

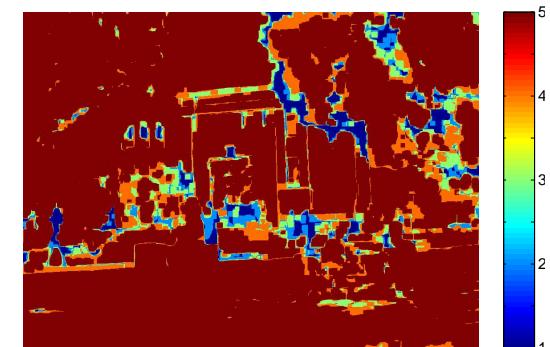


Figure 26. A comparison with Gallo *et al.* The top left image is the result by Gallo *et al.*, the bottom left image is our fused result. The right column show blown-out of the region of the image that are not good for Gallo *et al.*, our algorithm does not generate such artifacts. We also show how many of the original images contributed to the final image. For Gallo *et al.*'s result (cropped from author's presentation slide), most pixels (stationary background) are reconstructed using four images in the original stack, while our algorithm uses all five source images to reconstruct those pixels. Note that our algorithm uses only the reference image to reconstruct people (blue regions), this is because people in those regions disappear across the exposure stack. Images courtesy of Orazio Gallo.

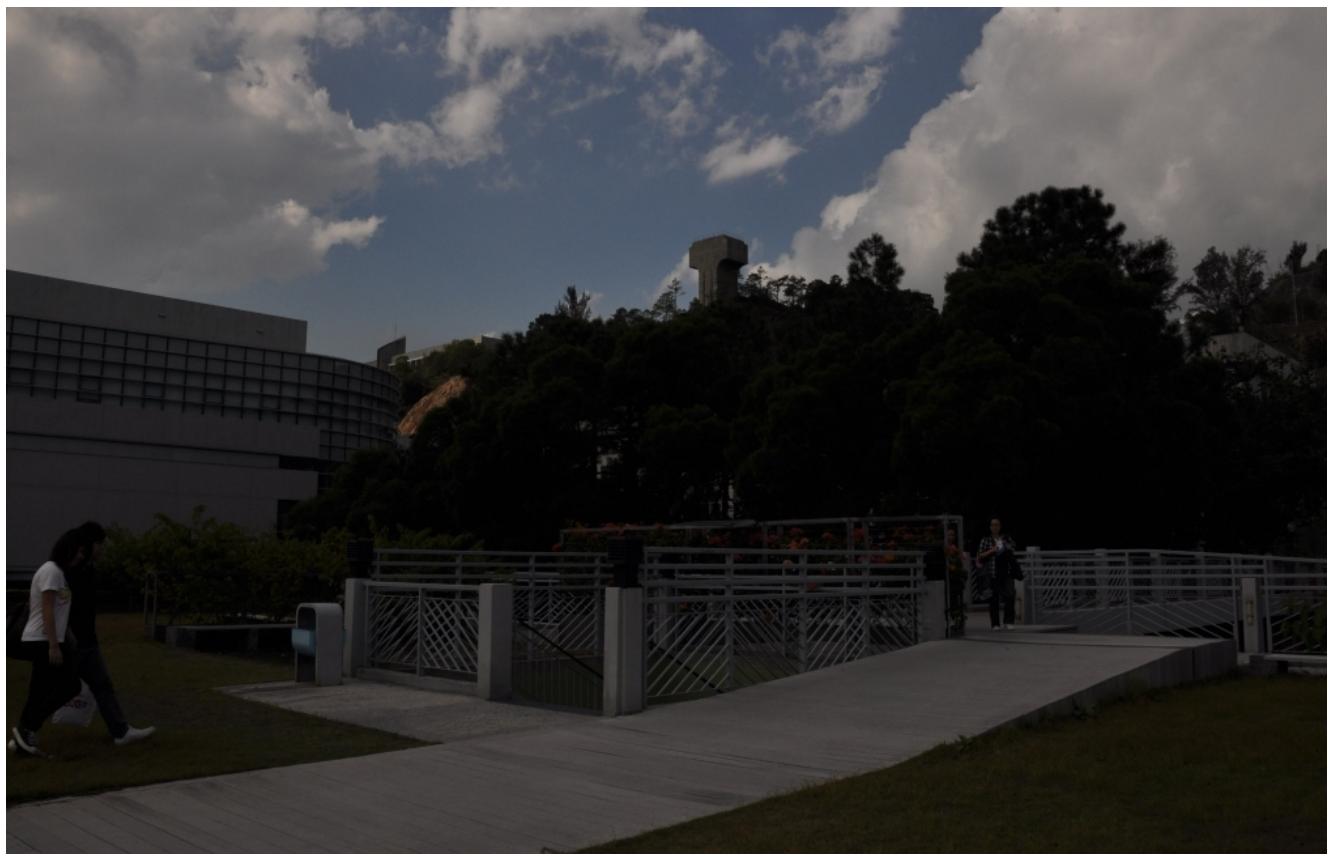


Figure 27. Image one in the original stack.



Figure 28. Image two in the original stack.



Figure 29. Image three in the original stack.



Figure 30. Image four in the original stack.



Figure 31. Image five in the original stack.



Figure 32. Image six in the original stack.



Figure 33. Aligned image one



Figure 34. Aligned image two.



Figure 35. Aligned image three.



Figure 36. Aligned image four.



Figure 37. Aligned image five.



Figure 38. Aligned image six.

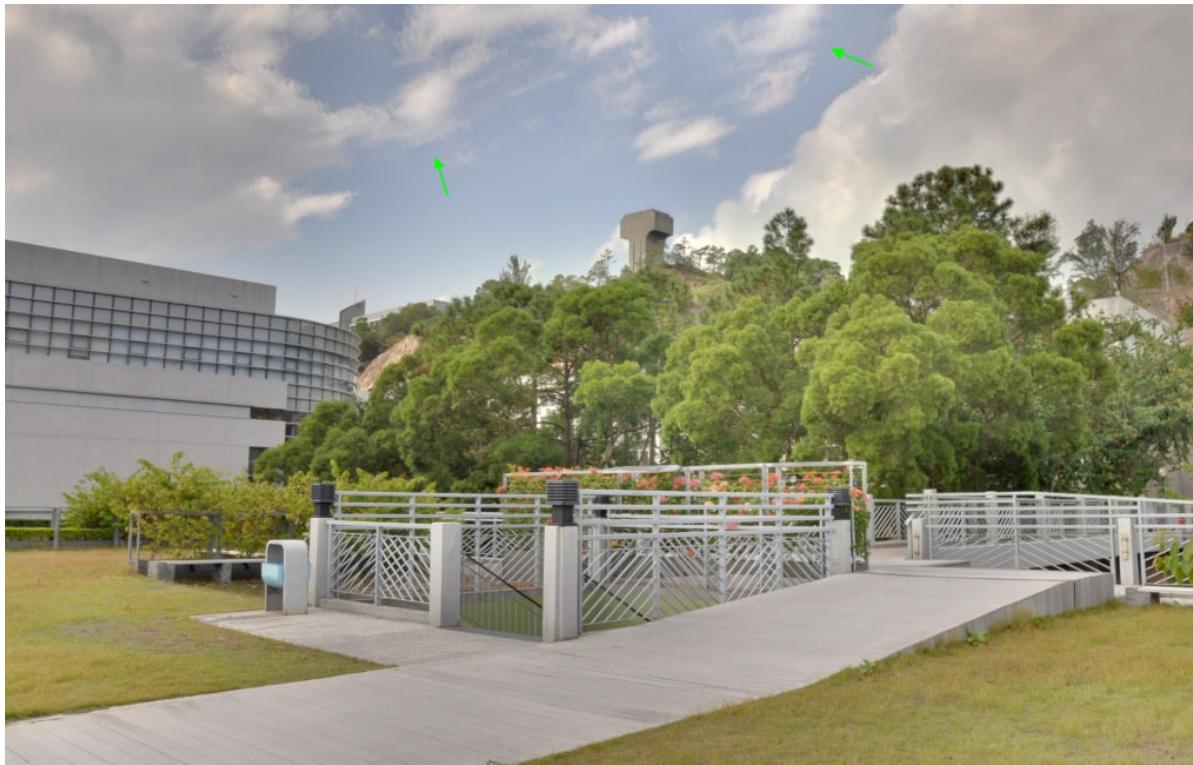


Figure 39. A comparison with Zhang *et al.*. The top image is the result by Zhang *et al.*, the bottom image is our result. The final results are competitive, but our algorithm has few artifacts on the sky (Green arrows). Images courtesy of Wei Zhang (Original stack) and Jun Hu (Top image with green arrows cropped from author's paper).



Figure 40. Image one in the original stack.



Figure 41. Image two in the original stack.



Figure 42. Image three in the original stack.



Figure 43. Image four in the original stack.



Figure 44. Aligned image one



Figure 45. Aligned image two.



Figure 46. Aligned image three.



Figure 47. Aligned image four.



Figure 48. A comparison with Hu *et al.*. The top image is the result by Hu *et al.*, the bottom image is our result. The final results are competitive, but our algorithm is 3x-4x faster. Images courtesy of Jun Hu.



Figure 49. Image one in the original stack.



Figure 50. Image two in the original stack.



Figure 51. Image three in the original stack.



Figure 52. Aligned image one



Figure 53. Aligned image two.



Figure 54. Aligned image three.



Figure 55. The fused result after the alignment using our algorithm. Note that the sky in the reference image (3rd one) is totally saturated, but our algorithm synthesizes it well.