

6.098 Digital and Computational Photography 6.882 Advanced Computational Photography

Spring 2006

Course schedule

Tuesday and Thursday 1-2:30pm in room 36-155

Course homepage

<http://groups.csail.mit.edu/graphics/classes/CompPhoto06/>

Instructors

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Course contents

Computational photography is a new field at the convergence of photography, computer vision, image processing, and computer graphics. It leverages the power of digital processing to overcome limitations of traditional photography and it offers unprecedented opportunities for the enhancement and enrichment of visual media. This advanced undergraduate course covers fundamentals and applications of hardware and software techniques, with an emphasis on software methods. The course will emphasize hands-on aspects and will culminate into a final project. The goal is to provide students with sufficient backgrounds to implement new solutions to photography challenges and opportunities.

Topics include cameras and image formation, image processing and image representations, high-dynamic-range-imaging, human visual perception and color, single view 3D model reconstruction, morphing, data-rich photography, super-resolution, image-based rendering.

6.882 meets with 6.098, but requires completion of additional homework and the presentation of a research paper.

Assignments

Programming assignment will be in Matlab. Students are not required to own a digital camera, although it might help. Cameras will be available for loan.

Grading

6.098: assignment 75%, final project 25%

6.882: assignment 70% (additional questions compared to 6.098), final project 22%, paper review 8% (read and write a review for a paper from the literature)

Course Syllabus

Lecture	Date	Description	Assignments
1	Tuesday, Feb 7	Introduction and course overview	
2	Thursday, Feb 9	Image formation	PS 1 out
3	Tuesday, Feb 14	Color and color perception	
4	Thursday, Feb 16	Demosaicing	
	Tuesday, Feb 21, Monday schedule of class to be held		
5	Thursday, Feb 23	Image processing and wavelets	PS 1 due, PS 2 out
6	Tuesday, Feb 28	Applics of wavelets, Heeger/Bergen texture synthesis	
7	Thursday, March 2	Matting	
8	Tuesday, March 7	High dynamic range image	
9	Thursday, March 9	Bilateral filtering and HDR display	PS 2 due, PS 3 out
10	Tuesday, March 14	Gradient image manipulation	
11	Thursday, March 16	Taking great pictures	
12	Tuesday, March 21	Markov random fields	
	March 27-31, Spring Vacation		
13	Thursday, March 23	Non-parametric image synthesis, inpainting, analogies	PS 3 due, PS 4 out
14	Tuesday, April 4	Tampering detection and higher-order statistics	
15	Thursday, April 6	Panoramic imaging	
16	Tuesday, April 11	Image and video registration	
17	Thursday, April 13	Spatial warping functions	PS 4 due, PS 5 out
	Tuesday, April 18, Patriots Day--Vacation		
18	Thursday, April 20	Motion analysis	
19	Tuesday, April 25	Temporal sequence re-rendering	
20	Thursday, April 27	Active flash methods	PS 5 due
21	Tuesday, May 2	Lens technology	
22	Thursday, May 4	Depth and defocus	
23	Tuesday, May 9	Non-photorealistic rendering	
24	Thursday, May 11	Future cameras	
25	Tuesday, May 16	Plenoptic function and light fields	
26	Thursday, May 18	Student project presentations	Project due