

CSc 470 / I0807: IMAGE PROCESSING

Prof. George Wolberg

MW 2:00pm - 3:15pm (CSc 470)

W 4:30pm - 7:00pm (CSc I0807)

Fall 2006

This course is an intensive introduction to image processing intended for advanced undergrads and graduate students. Topics include digital filtering theory, image enhancement, image reconstruction, antialiasing, warping, and the state-of-the-art in special effects. These are topics that form the basis of high-quality rendering in computer graphics, as well as low-level processing for computer vision, remote sensing, and medical imaging. The course will emphasize computational techniques for implementing useful image processing functions. There will be a handful of programming assignments aimed at reinforcing the material covered in class.

Prerequisite: CSc 322 (good working knowledge of C and UNIX).

Required text: *Digital Image Warping* by G. Wolberg, IEEE Computer Society Press, 1990.

Text and course notes will be made available in class.

SYLLABUS

Week	Topic
1	Introduction, overview
2,3	Point Operations (thresholding, quantization, histogram manipulation, homomorphic filtering, halftoning, dithering, error diffusion)
4	Neighborhood Operations (blurring, sharpening, edge detection)
5	Fourier transform
6	Fast Fourier transform
7,8	Sampling Theory
9	Image reconstruction (windowed sinc, NN, linear, cubic convolution)
10	Fast filtering for resampling (mip-maps, summed-area tables, EWA)
11	Spatial transformations
12	Incremental texture mapping
13,14	Separable warping algorithms (Catmull-Smith alg, 3-pass rotation, 2-pass frozen edge, Fant algorithm, Wolberg-Boult algorithm)
15	Special effects