Topics covered (and book reading)

Note that primary material source is class lectures. Topics 9-15 covered by Quiz 1.

1. Image representation and image operations (point, local and global operations)
2. Image smoothing(reduction via averaging, uniform smoothing and weighted smoothing, ways to speed up the computations)
3. Gaussian smoothing, approaches to reduce blurring effects.
4. Median filtering (properties, implementations, weighted median filtering).
5. Binary images and thresholding (fixed, multiple, variable and iterative thresholds, Optimal thresholding and Otsu algorithm).
6. Brightness transformation (position dependent and position independent)
7. Grey level histogram (thresholding using histogram, histogram modification, histogram stretching, equalization, specification).
8. Color representation and color spaces
9. Gradient-based edge detection (edge strength, edge direction). Compass operator. Laplacian of Gaussian edge operator.
10. Hough transform for lines and circles
11. HT for other shapes including Generalized HT
12. Linear Systems and Fourier Transform (linear systems 1D and 2D, impulse response, shift invariance, Fourier transform 1D and 2D, inverse F.T.,
13. Properties of FT: spatial frequencies, linearity, shift property, convolution theorem, etc.
14. Image Filtering (2D low-pass filter, high-pass, band-pass, band-stop filtering).
15. D.F.T and F.F.T, use of space domain vs. frequency domain, computational complexity
16. Stereo and triangulation

Reading:

- Class lectures
- Handouts
- Readings below
- Introductory reading: Chapter 1 and Chapter 2
- (topics 1-9) Text, appropriate sub-sections as covered in class from Chapter 2 (2.3-2.5), Chapter 5 (5.1, 5.2, 5.3) and Chapter 6 (6.1, 6.2)
- (topics 10-19) Text, appropriate sub-sections as covered in class from Chapter 6 (6.2, 6.3), Chapter 3 (3.1, 3.2), Chapter 8 (8.1, 8.2, 8.3), Chapter 15 (15.1), Chapter 11.