CAP 4401 - IMAGE PROCESSING

Review for Quiz 1.

Quiz Format: in class, closed book, closed notes, 4 or 5 questions, length 1h 15min

Topics:

- Basic image manipulation introduction (gray scale, color, basic smoothing, etc.)
- Image representation and image operations (point, local and global operations; arithmetic and logic operations)
- Image smoothing (noise reduction via averaging, uniform smoothing and general (weighted) smoothing, ways to speed up the computations: 2D vs 1D and incremental)
- Gaussian smoothing – details and computations; approaches to reduce blurring effects of smoothing ("edge-preserving" smoothing including threshold-based and directional) (v1-5)
- Binary images and thresholding (fixed, multiple, variable, etc.) (v1-4), iterative thresholding algorithm
- Brightness transformation: position dependent (brightness correction) and position independent (various grey scale transformations) (v1-4)
- Grey level histogram (thresholding using histogram, histogram modification, histogram stretching, equalization, specification). Histograms of color channels, pseudo-coloring. (v1-3, v1-4)
- Color representation and color spaces: RGB, CMY, CMYK, and HSI (v1-8, v2-6))
- Median filtering (properties, implementations, weighted median filtering) (v1-5)
- General filters and properties (v1-5)
- ~~Geometric transformations, forward and reverse mapping, bilinear interpolation, translation, rotation and affine transformations (v2-8)~~
- ~~Gradient-based edge detection (edge strength, edge direction). Compass operator. Laplacian of Gaussian edge operator (v1-6)~~

Reading:

- Class lectures (primary study material is your lecture notes and handouts)
- Text, appropriate sections as covered in class (topics mentioned above):
  Volume 1 (Fundamental Techniques): Chapter 1, 3 (3.1-3.6), 4 (4.1-4.6), 5 (5.1-5.5), ~~6 (6.1-6.4),~~ 8 (8.1-8.3)
  Volume 2 (Core Algorithms): Chapter 6 (6.1), ~~10 (10.1-10.3)~~