Ph.D. program in Engineering and Applied Sciences

Ph.D. course on Real-Time Computer Vision

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1) Basics, point and neighborhood operators:

a) Sampling and Quantization, Images, Color spaces, RGB, YCbCr, HSV, HLS, Color Sensing in Camera
b) Linear point operator, Saturated arithmetic, Histogram, Contrast-stretching, Histogram Equalization, Thresholding, Automatic thresholding, Otsu thresholding, Adaptive thresholding
c) Linear filtering, Correlation and convolution, padding, Noise reduction, Gaussian Filter, High pass filter, sharpen, Median filter, Bilateral filters

2) Edge detectors, Template matching:

Contours, Boundary detection,
Image gradient, Discrete detectors, Sobel Operators, Canny Edge Operator, Template matching, Matching with filters, Gaussian pyramid, Laplacian pyramid, filter banks, Representing texture

3) Interest points and corners:

Keypoint Matching, Invariant Local
Features, Corners, Harris corner detector, Invariance and covariance, Automatic Scale Selection, Difference-of-Gaussian (DoG), Orientation Normalization, Scale Invariant Feature Transform (SIFT)

4) Image recognition:

Datasets, From global to local, Bag of keypoints,
Pyramid match kernels, Spatial Pyramid Matching, Kernel Codebook, Efficient Match Kernels, Vector of Locally Aggregated Descriptors (VLAD), The Fisher Kernel, Current direction