Advance Image Processing Lab

Lab. 12 - Image Perfecting and Enhancement

Exercises in calibration of the imaging system dynamic range and point-spread function and in image enhancement.

12.1 Calibration of the imaging system dynamic range

12.1.1   Write a program for image calibration by reducing image mean and standard deviation to certain standard values (program **mean.m**, **std2d.m**). Write a program for image calibration by reducing image mean and standard deviation to those of a certain reference image. Observe the results.

12.1.2   Observe image histogram standardization (program **histosta.m**). Compare the results with standardization by mean and standard deviation.

12.2 Calibration of the imaging system point spread function

12.2.1 Test aperture correction of image scanning and display devices for different images (program **invapert.m**). Observe amplification of noise when correcting noisy.images. Determine admissible signal-to-noise ratio (SNR).

12.2.2 Test "frequency response of the image point spread function blind" calibration (program **apcortst.m**) for different amplification factor *g* of high spatial frequencies and different threshold *thr* for the additive correcting term. Observe image aperture correction effects using program **apertcor.m**.

12.3 Image enhancement

12.3.1 Unsharp masking Test image high frequency component enhancement by "unsharp masking":***OUTIMG=g1IMPIMG+ g2(INPIMG-conv2(INPIMG, ones(L)/L2)*** with ***g1***, ***g2***, and ***L*** as enhancement parameters. Generate several versions of unsharp masking and synthesize and observe artificial color image preparations (program **coldispl.m**).

12.3.2 Nonlinear modification of image spectraTest image high frequency component enhancement by a nonlinear *P*-th low transformation of image spectra (program **dctspenh.m**).

12.3.3 Histogram modification. Test image enhancement by *P*-histogram equalization (program **phistequ.m**). Compare histogram equalization with *P*-histogram equalization.

12.3.4 Image "homogenization" Test image local calibration by local mean and variance (program **lcstanda.m**) and local maximum and minimum (program **lcmxmnst.m**).

12.3.5 **Local histogram modification.** Test image enhancement by local histogram and *P*-histogram equalization in a running window (programs **lchstequ.m** and **lcphsteq.m**) for different window size and different nonlinearity index *P*.

Submit: Experimental results, with comments, and programs