Image processing

ASSIGNMENT 3: FREQUENCY FILTERING (2024)

For this assignment you must write a short report in any word processor of your choice (MSWord, Latex, ....) where you explain your methods and show your results. All input and output images must be shown (preferably so that they can be compared on the same page). Add the code in an Appendix.

1． Take the image text.jpg and blur it by convolving with the following 13 *×* 13 mask:



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. . .

Call the result *B*. Take the same matrix *M* and pack it into a 512 *×* 512 matrix, call it *M*0. Make sure that you pack it correctly so that the center of the mask matrix *M* lies at the position (257,257) in the larger matrix *M*0.

Let *H*0 be the Fourier transform of *M*0. Then deconvolve *B* with *H*0 and try to recover the original image in this way. You must choose a suitable threshold for suppressing the higher frequencies.

2． The image Mariner4noise.jpg was taken by the Mariner 4 spacecraft, launched on 28 Novem- ber 1964 and it flew by Mars on 15 July 1965. It was one of the first images of the planet that clearly showed craters. It is a patch just south of the Amazonis Planitia, centered at

32.7 S, 162.7 W. However, the technology of those days was such that the transmission mode superimposed high-frequency periodic noise on the image.

Use suitable notch-filters (for removing the periodic signal) as well as suitable low-pass-filters for removing any high-frequency noise, if necessary, and improve the image.