IMAGE PROCESSING (RRY025)

Studio Exercises

Image Restoration III: image reconstruction from projections

EX. 1

- Create two images: a rectangle (`I1`), and a Shepp-Logan head phantom (`I2`).
- Display `I1` and `I2`.
- Compute the projections of `I1` (`R1`) and `I2` (`R2`) for $0° \leq \theta < 180°$ at intervals $\Delta\theta = 1°$.
- Display `R1` and `R2` as sinograms, i.e. as greyscale images with ρ along the horizontal axis (from left to right) and θ along the vertical axis (from bottom to top).
- Compute the non-filtered backprojections of `I1` (`IR1`) and `I2` (`IR2`).
- Display `IR1` and `IR2`: ... *haloes are not only around galaxies* :-)
- Now compute the ramp-filtered backprojections of `I1` (`IR1_a`) and `I2` (`IR2_a`).
- Display `IR1_a` and `IR2_a`: ... *the lord of the rings* :-)
- Then compute the Hamming-filtered backprojections of `I1` (`IR1_b`) and `I2` (`IR2_b`).
- Display `IR1_b` and `IR2_b`: ... anything to notice?
- Compare `IR1_a` and `IR1_b`: *ringing* vs. *blurring*!