Estimating reconstruction resolution: SSNR

Roberto Marabini

1 Theoretical Background

In applied mathematics, the two-dimensional Spectral signal-to-noise ratio (SSNR) measures the normalised cross-correlation coefficient between several two-dimensional images over corresponding rings in Fourier space as a function of spatial frequency (see [1] for details)

2 Calculation

$$SSNR(r) = \frac{\sum_{r_i \in R} \left| \sum_{k_i} F_{r_i,k} \right|^2}{\frac{K}{K-1} \sum_{r_i \in R} \sum_{k_i} \left| F_{r_i,k} - \bar{F}_{r_i} \right|^2} - 1$$

where $F_{r_i,k}$ are those pixels of the the Fourier transform of image k at all those pixels placed at radius r_i, F_{r_i} are the equivalent pixels computed from the average image. In this form, the SSNR takes many two-dimensional images and converts them into a one-dimensional array. Finally, K is the number of images.

3 Objetive

Using Matlab implemented the SSNR as described in [1].

4 Bibliography

[1] A new resolution criterion based on spectral signal-to-noise ratios by Michael Unser et al. doi:10.1016/0304-3991(87)90225-7