

A new decision rule for parameter δ in MAP EM (OSL) reconstruction with the Gibbs prior

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In MAP EM (OSL) reconstruction with the Gibbs prior, the parameter δ which appears in the prior is commonly treated as a fixed value. Because the quality of reconstructed images depends on this parameter, we have to select δ very carefully, and because the statistics of an image vary locally, we should not choose a single δ value for each image. We propose a new decision rule to select an appropriate local δ . In our proposed method, δ is determined as the median of the differences between a value of the pixel of interest and those of neighboring pixels. This selection yields an appropriate prior depending on the regional statistics. The prior therefore preserves the edge property without amplifying statistical noise and it is not necessary to know the appropriate δ value to obtain high quality images. We performed computer simulations to determine the effectiveness of the proposed method. The results showed that the quality of reconstructed images obtained with the proposed method was superior to those obtained with the prior with a fixed δ .

Key words: single photon emission CT, MAP estimation, median filter, Gibbs prior, image processing