ABSTRACT

In restoration technique of *blurred* and *noisy* degraded image, estimation exactness of degradation parameters is a problem for image restoration method. With that problem a restoration technique with adaptive scheme is needed. With using neural network system with *self organizing* ability and iterative algorithm applied is a thing that can use for image restoration with adaptive scheme.

With Hopfield neural network model with *recurrent network* configuration, image restoration is doing with estimated network parameters according to the degradation parameters and constant of λ value that controlled between sharpness and smoothness the image, then the degraded image reconstruction in iterative method is applied for acquire more good quality of the image. Then robustness of degradation rate and robustness of inexactness the degradation parameters estimation is experimented for examine the Hopfield network model reliability for degraded image restoration.

For implementation result on Baboon.bmp image, if the degraded image is not *noised* the result of restoration is gained with improvement of PSNR 10.41dB from degraded image with PSNR 52.26dB. If the degraded image is *noised*, restoration is doing with smoothing the *noise* and with λ=0.05 the result of restoration is gained with improvement of PSNR 7.92dB from degraded image with PSNR 43.7dB. For experiment result of robustness of degradation rate, in increasing the *blur* degradation rate from 56.95dB of PSNR to 48.18dB of PSNR, the RSME value is 8.26 increased. Then for experiment result of robustness of inexactness the degradation parameters (degradation: *Gaussian blur* 5x5 *Standard deviation* 2), for few fault estimated (restoration: *Gaussian blur* 5x5 *Standard deviation* 2.2) the improvement of PSNR is 10.13dB, if the estimated fault is large (restoration: *Gaussian blur* 7x7 *Standard deviation* 2.2) with λ=0.001 the improvement of PSNR is 0.14dB.

***Keywords**: Image restoration, Hopfield neural network, Image processing*.