

## **Methods of Reconstruction and Restoration of Images**

Balovsyak S.V., Lutsyk I.V., Fodchuk I.M.

*Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine*

In the real conditions for a photo and video shooting, as well as obtaining the results of X-ray and electron diffraction techniques, images are often distorted due to defects of sensors and other instrumental factors. This leads to a decrease in visual quality imaging in particular, due to noise and blur.

In this paper analyzes the possibility of using modern methods of reconstruction and restoration of damaged digital images. We describe the advantages and disadvantages of these methods and identified possible areas of use. For the reconstruction and restoration of images used three basic approaches: spatial, frequency and wavelet filtering [1, 2].

The basis of spatial filtering is image processing within local spatial regions, for example, by convolution of the damaged image with the kernel of filter. As the result of this filtration, depending on the type of the used kernel of filter, there is the smoothed image out or, opposite, image with the selected contours. The advantage of spatial filtering is the simplicity and drawback is to decrease performance with increasing the size of the filter kernel.

Frequency filtering is based on the direct and inverse Fourier transform. It is characterized by high performance. For frequency filtering frequencies of noise weakened more than the frequency signal. The frequency filtering is most effective when frequencies the desired signal and noise is not overlap. The main disadvantage is the difficulty of spatially inhomogeneous image processing.

Wavelet processing is one the most perspective methods, which allows to execute multiscale spatial heterogeneous filtration of images. The main disadvantage of wavelet filtering – difficulty of settings adjustment.

Implementation of the program processing a series of images of X-ray topography and magnetic resonance imaging performed by the described above methods in Matlab environment using packages Wavelet Toolbox and Image Processing Toolbox. As a result of the analysis of methods of reconstruction and restoration of images advantages and prospects of their use are defined at the image processing of certain type depending on spatial homogeneity and frequency spectrum of images.

1. Bates R. Restoration and Reconstruction of images / R. Bates, M. McDonnell. – M. : Mir, 1989. – 336 p.
2. Gonzalez R. Digital Image Processing using MATLAB / R. Gonzalez, R. Woods, S. Eddins. – Prentice Hall, 2004. – 609 p.