A method of image super-resolution (SR) is presented — reconstruction of a high resolution image from several low resolution images. A non-iterative method based on weighted median filtering is proposed.

The super-resolution is posed as a system of equations

\[ A_k z = u_k, \quad k = 1,2,\ldots,N, \]

where \( z \) is the high-resolution image, \( u_k \) are the given low-resolution images, \( A_k z = DF_k H z \) is a downsampling operator [1], where \( D \) is the decimation operator, \( H \) is the Gauss filter, \( F_k \) is the motion operator. We assume, that the motion is known.

In the proposed algorithm, the problem (1) is formulated in the following form:

\[ (H z)(x_n, y_n) = w_n \]

and consists in reconstruction of the blurred high-resolution image \( H z \) with known values \( w_n \) in the given points \( (x_n, y_n) \).

Even small errors in motion estimation results in serious degradation of the reconstructed image. To make the method stable to errors in the motion vectors, an averaging is used. For every target pixel \( (i, j) \), several values \( w_n \) from a certain neighborhood of \( (i, j) \) are taken.

The following averaging methods are considered: Gauss filter [2], median filter [3] and the proposed weighted median filter which is a combination of Gauss filter and median filter.

To estimate the results, edge adaptive metrics (BEP and BEN) from [4] were used. Illustrations of super-resolution methods for scale factor 2 and 16 low-resolution images are given. It is shown that the use of weighted median averaging enables us to reduce the influence of errors in motion vectors calculation. The work was supported by federal target program "Scientific and scientific-pedagogical personnel of innovative Russia in 2009-2013" and RFBR grant 09-01-92474-MHKC.

Literature