

In this paper, we propose residual interpolation (RI) as an alternative to color difference interpolation, which is a widely accepted technique for color image demosaicking. Our proposed RI performs the interpolation in a residual domain, where the residuals are differences between observed and tentatively estimated pixel values. Our hypothesis for the RI is that if image interpolation is performed in a domain with a smaller Laplacian energy, its accuracy is improved. Based on the hypothesis, we estimate the tentative pixel values to minimize the Laplacian energy of the residuals. We incorporate the RI into the gradient-based threshold free algorithm, which is one of the state-of-the-art Bayer demosaicking algorithms. Experimental results demonstrate that our proposed demosaicking algorithm using the RI surpasses the state-of-the-art algorithms for the Kodak, the IMAX, and the beyond Kodak data sets.