

Recent research in generative models came up with a promising approach to modelling the prior probability of natural images. The architecture of these prior models is based on deep neural networks. Although these priors were primarily designed for generating new natural-like images, its potential use is much broader. One of the possible applications is to use these models for solving the inverse problems in low-level vision (i.e., image reconstruction). This usage is mainly possible because the architecture of these models allows computing the derivative of the prior probability with respect to the input image. The main objective of this thesis is to evaluate the usage of these prior models in image reconstruction. This thesis proposes a novel model-based optimization method to two image reconstruction problems – image denoising and single-image super-resolution (SISR). The proposed method uses optimization algorithms for finding the maximum-a-posteriori probability, which is defined using the above mentioned prior models. The experimental results demonstrate that the proposed approach achieves reconstruction performance competitive with the current state-of-the-art methods, especially regarding SISR.