Robust Super-Resolution without Regularization

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Abstract

Super-resolution restoration is the problem of restoring a high-resolution scene from multiple degraded low-resolution images under motion. Due to imaging blur and noise, this problem is ill-posed. Additional constraints such as smoothness of the solution (i.e. regularization) is often required to obtain a stable solution. While regularization of the cost function is a standard practice in image restoration, we propose a restoration algorithm that does not require this extra regularization term. The robustness of the algorithm is achieved by a robust error norm that does not response to intensity outliers. With the outliers suppressed, our solution behaves similarly to a maximum-likelihood solution under the presence of Gaussian noise only. The effectiveness of our algorithm is demonstrated with super-resolution restoration of real infrared image sequences under severe aliasing and intensity outliers.

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