Fast Rauch-Tung-Striebel Smoother based Image Restoration for Noncausal Images

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Abstract: We describe a technique for restoration of blurred images corrupted with additive noise. Our algorithm uses a practical implementation of the Rauch-Tung-Striebel (RTS) smoother based on noncausal prediction that models the blurred image as a finite lattice Gauss Markov random process (GMrp). The one-sided regressors of the GMrp converge at a geometric rate to shift-invariant values along the rows of the image. This leads to a steady state solution for the RTS filter. Experimental results illustrate the superiority of our RTS based algorithm over deterministic filters and filters that use the one-sided causal state model.

Keywords: Image Restoration, Estimation, Symmetric Blur, Degraded Image, Rauch-Tung-Striebel (RTS) smoother, Kalman-Bucy filter (KBf).