

Markov-Chain-Based Optimal Filtering and Smoothing

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Abstract : This paper describes an optimum filter and smoother for recovering a Markov process message from noisy measurements. The developments follow from an equivalence between a state space model and a hidden Markov chain. The ensuing filter and smoother employ transition probability matrices and approximate probability distribution vectors. The properties of the optimum solutions are retained, namely, the estimates are unbiased and minimize the variance of the output estimation error, provided that the assumed parameter set are correct. Methods for estimating unknown parameters from noisy measurements are discussed. Signal recovery examples are described in which performance benefits are demonstrated at an increased calculation cost.

Keywords : optimal filtering, smoothing, Markov chains

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