Computing Densities for Markov Chains via Simulation

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We introduce a new class of density estimators, termed look-ahead density estimators, for performance measures associated with a Markov chain. Look-ahead density estimators are given for both transient and steady-state quantities. Look-ahead density estimators converge faster (especially in multidimensional problems) and empirically give visually superior results relative to more standard estimators, such as kernel density estimators. Several numerical examples that demonstrate the potential applicability of look-ahead density estimation are given.