The computation of the group inverse and related properties of Markov chains via perturbations

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The derivation of the group inverse and the mean first passage times in a finite ergodic Markov chain is explored. The basic technique involves row by row perturbations of the transition matrix with a systematic update at the each stage. By starting from a simple base where no formal computations are required, six different algorithms are compared for accuracy. The techniques are based on those outlined in Hunter, J. J., The computation of stationary distributions of Markov chains through perturbations, Journal of Applied Mathematics and Stochastic Analysis, 4, 29-46, (1991).