

A Non-intrusive Stratified Resampler for Regression Monte Carlo

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Stochastic dynamic programming equations are classic equations arising in the resolution of nonlinear evolution equations, like in stochastic control. In this talk we address a technique to solve certain dynamic programming equations associated to a given Markov chain X , using a regression-based Monte Carlo algorithm. More specifically, we assume that the model for X is not known in full detail and only a root sample X^1, \dots, X^M of such process is available. By a stratification of the space and a suitable choice of a probability measure, we design a new resampling scheme that allows computing local regressions (on basis functions) in each stratum. The combination of the stratification and the resampling allows to compute the solution to the dynamic programming equation (possibly in large dimension) using only a relatively small set of root paths. To assess the accuracy of the algorithm, we establish non-asymptotic error estimates in L2 of the chosen measure. Our numerical experiments illustrate the good performance, even with as low as 20 to 40 root paths.