Generation of Multivariate Random Vectors Using Retrospective- Approximation Methods

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ABSTRACT

In the process of simulations,the input model often need a set of relative random variables to respond the true condition. And the random variables can have different probable distributions. But most of the literatures of the generation of multivariate simulations emphasized one of the special multivariate family or time series. So the past literatures weren''t content with the need of general multivariables. The thesis aimed above questions . In the conditions of having every marginal distribution and a reasonable relative matrix, we develope the algorithms of the multivariate generation. We propose a new algorithm -- "generation of multivariate random vectors using retrospective approximation methods" to generate multivariate random vectors with specified marginal distributions and a specified correlation matrix. Users need only provide the inverse function of different marginal distributions. The algorithms generate multivariate random vectors with marginal-oriented approach. But before using the marginal-oriented approach, $n(n-1)/2$ equations must be solved. We use retrospective approximation algorithms to solve these stochastic root-finding problems. We also improve the algorithms to aries the efficiency by solving concurrently $n(n-1)/2$ equations. We progress the simulated experiments with the algorithms -- "generation of multivariate random vectors using retrospective approximation methods". In the most specified distributions, the algorithms can get good accuracy and efficiency.We analysize the property of stochastic root-finding equations and discuss the correlations between variables that be generated with the algorithms that be proposed by us.In addition to the restriction , we also ask that users can conclude and provide a reasonable correlation matrix to make the algorithms executing the correct "cholesky decomposition".

Keywords : cholesky 分解 ; multivariate random variables ; generation of multivariate random vectors using retrospective-approximation methods ; marginal-oriented approach ; retrospective-approximation methods ; stochastic root-finding ; cholesky decomposition

Table of Contents