Very simple and relatively precise mapping of the normal quantile function intended to generate normal pseudo-random numbers fastly

Piotr Sulewski[1] **and Antoni Drapella**[2]

[1]*Pomeranian University in Słupsk, Poland*
[2]*Professor emeritus, Poland*

Abstract

This paper puts forward both simple and precise method of mapping of the normal quantile function. Our method aims to fastly generate normal pseudo-random numbers (NPRNs). We use the method of Cholesky (LU decomposition). In order to get in touch with accuracy of interpolation, we define two discrepancy measures namely local and total ones. We compare our very simple and relatively precise mapping of the normal quantile function with other methods of mapping the Gaussian quantile function. Cubic splines are applied to shorten time of generating NPRNs. We compare our fast generator with the generator implemented in R software and realized using the "rnorm" function. Products of generators in question are compared to each other in terms of goodness-of-fit tests statistics. In addition, trend tests and seasonality test were performed. The authors also propose to use order statistics to test the generator quality. All the calculations are performed in the R software. Proposed methods are also implemented in the VBA (Excel) and Mathcad. Proposed NPRN generator is a very interesting alternative to the commonly used NPRN generator from the R software.

Keywords

Normal distribution, Quantile function, Pseudo-random number generator, Monte Carlo simulation.

References

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