

MTH 540 Project

Generating Normal Random Variable by Different Methods

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Most modern programming language provide uniform random number generator, but not all of them provide random number generator from other distribution models. In class, we introduced a transformation based method to generate standard normal random variable from uniform random variable. In the second section of the paper <http://people.missouristate.edu/songfengzheng/Teaching/MTH540/NormalPaper.pdf>, the authors provide 9 methods to generate standard normal random variable. To tell if a dataset is from a normal distribution, people often use quantile-quantile plot (Q-Q plot). If the Q-Q plot shows a linear pattern, that means the data is from normal distribution; if the plot is far from linear pattern, the data is not from normal distribution. Please see the interpretation of Q-Q plot at http://emp.byui.edu/BrownD/Stats-intro/dscrptv/graphs/qq-plot_egs.htm, or you can search other pages. There is an R command to draw the Q-Q plot, search qqnorm function in R.

Please do the following:

1. Using statistical programming language R, implement the 9 methods
2. Generate 1000 standard normal random variables using each of the 9 methods, plot out the histogram of the generated data, and plot the QQ plot using R, does your data close to normal?
3. Using the built-in normal random number generator of R to generate 1000 standard normal random numbers and plot out the histogram
4. Superimpose the pdf curve of standard normal to each of the histograms, are they close?