THE GENERAL OF UNIFORM VARIATES; pdf

1: Inverse transform sampling - Wikipedia

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2: Uniform distribution (continuous) - Wikipedia

Although it may not be readily intuitive that the general form of the pdf of the sum of Uniform variates would tend to follow approximately Normal for large n, the pdf is a piecewise polynomial function of degree n

In this work we present a method to achieve this task that generates samples from the marginal distributions of the components of the random vector. The results shown here can be specially usefull to extend existing algorithms, like the Box-Muller method and the methods based on on the properties of spacings. An isotropic density ip x is defined as one invariant to rotations. This family is the base to define the densities with ellipsoidal symmetry, which comprise a number of common distributions like the multivariate normal, the multivariate Student-t, the uniform distribution on the hipersphere, etc. Different algorithms to generate uniform random variates on the spheric shell have been proposed in the literature, most of them relying on the generation of a particular isotropic random variate which is then normalized see Devroye for a detailed discussion. In this paper other direct approaches are proposed, in which samples from the marginal distributions of the components are 1 obtained. We work out first an algorithm based on transformation of Gamma densities, and later on we present acceptance-rejection methods. Straightforward from a change of variables. Proposition 2 shows that conditioning on any component of the random vector E keeps the remaining components on a sphere one in a lower dimension and with a different radius, but still a sphere. This result, together with the one on proposition 3 , suggests that an iterative procedure that generates random variates following 1 can be used to generate the whole vector E. Such a procedure is formalized in the following proposition 4. Proposition 4 The algorithm defined by the steps 1. Straightforward from propositions l , 2 and 3. The following proposition shows the probability distribution corresponding to the density in 1. Proposition 5 Let X be a random variable with density 1. Thus, any beta generator can be used to produce variates from density 1. For example, the well-known relationship between the Beta and the Gamma densities ca be employed: Of particular interest for improving the performance of these algorithm are gamma generators or more generally, beta generators that take advantage of the particular features of the distribution in 1 , i. Note that this choice is similar to the one of Cheng They show that the scale parameter s seems to decrease asymptotically to 0 as d goes to infinity, which is very reasonable: On the other hand, the shape parameter c shows an erratic behavior with a decreasing trend, which seems to converge to some value between 3. Intuitively, this indicates that the blanketing constant A is more robust to the choice of c than to the choice of s the function is "flatter" in the direction of c. Figure 2 shows plots of the rejection constant A and for the rejection probability p when using the optimal parameters. Thus, piecewise linear or quadratic quickacceptance and quickrejection steps are sujested. Plots of the optimum parameters s a and c b up to dimension In this case, a pair U,V must be generated uniformly in the region: The pair U, V is obtained by rejection sampling from the square which completely encloses fi. Despite this rejection constants are greater than those of the algorithm in the previous section, the evaluation of the rejection requires less operations. Also, due to the shape of the region, the squeeze function 2 4 6 d 8 Figure 2: Plots of the rejection constant A a and the rejection probability p b for the optimum parameters up to dimension All of the alternatives presented are based on recursive generation of random variates from the marginal distribution, being of particular interest the ratio-of-uniform method presented in the last section. The ideas presented here can be the base to build a multidimensional extention of the Box-Muller method for isotropic densities not only for the multivariate normal but also for the multivariate Student-i distribution. Also, our algorithm can be used to extend the algorithms based on the properties of spacings to odd dimensions. Plot of the rejection constant A for the ratio-of-uniforms method up to dimension Annals of Mathematical Statistics, 13, Comunications in Statistics, 2, Journal of the American Statistical Association, 63, Communica- tions of the ACM, 21, Communications of the ACM, 2,

3: statistics - Generating uniform different random variables in R code - Stack Overflow

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LINEAR COMBINATIONS OF UNIFORM VARIATES, THE VOLUME OF A SIMPLEX, EULERIAN NUMBERS, AND e. Ã•Ã'I Let S denote the simplex given by8 S x,x,,x ax, where x 0, a 0, and 08"#8 44 4 4.

4: Non-Uniform Random Variate Generation

General Approaches to Generating Random Variates Five general approaches to generating a univariate RV from a distribution: Inverse transform.

5: Generating Correlated Uniform Variates - COMISEF Wiki

General Principles in Random Variates Generation Uniform Random number generators Pesudo-Random sequences Pseudo-random sequences (1/3) The key ingredient for Monte Carlo methods is a generator of random.

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