Re: The Acceptance − Rejection Method

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The Acceptance − Rejection Method

The all−purpose way to sample from a FD we know its expression, F (X).

Let be X a continuous random variable and x0 one its realization .We are seeking p (X=x0) = F (X<=x0), the probability y that X doesn t exceed x0.
Problem
Given y belonging to [0, 1] we intend to find exactly x0 = F^−1 (y). Generally speaking, its evident, this inversion is impossible to attain ANALITYCALLY.
The Hungarian J. Von Neumann (1903 1957) finds out how to do so point−by−point __THE ACCEPTANCE−REJECTION METHOD.
___Let be x0 a random number (the probability) and F (x0) the Distribution Function value at this point.
The criterion is:
_____Accept u=x0 while F (x0) >= u, reject otherwise.

Example

Let be the Exponential Distribution function
_____F(x) = 1− Exp (− x / m)_____(A)
_____x = [0 , infinity)
where the mean m=0.
An uniform random number, u = 0.765 , is the candidate.
We calculate F(0.765) = 1− Exp (− 0.765) = 0.534
Because 0.765 > 0.534 we ACCEPT 0.534.

IN FACT
This example is a * stupid * one because the inverse can be easily get
____x = −m * Log (1 − F) = Log (1− 0.765) = 1.2649
and belongs to the r. v. DOMAIN : therefore is ACCEPTED. (in this case there is NO rejected

values).

Luis Amaral Afonso

Afonso's formulas are stupid because by specifying m=0, it follows that $F(x) = 1-\exp(-x/0) = 1$ for $x>0$.

Jack (moderator)
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