Subject: Re: Normal Distributed Random Numbers Posted by Craig Markwardt on Tue, 04 Sep 2001 21:04:13 GMT View Forum Message <> Reply to Message

"Kay Bente" <KBente@lycos.de> writes:

- > Hi
- > I have to create arrays with normal distributed random numbers, but with
- > variable FWHM (Full width half max/standard deviation sigma?).
- > I want to add normal distributed noise to an image, so that the values
- > differ around a mean value.
- > has.

From the IDL Reference Guide:

- > The RANDOMN function returns one or more normally-distributed,
- > floating-point, pseudo-random numbers with a mean of zero and a
- > standard deviation of one.

So there you go, the deviates produced by RANDOMN have a gaussian sigma of 1, like this:

S = RANDOMN(SEED, 1000)

And then it's well established for a gaussian distribution that if you want a new mean, MU, and new gaussian sigma, SIG, then you would apply the following formula:

SPRIME = S*SIG + MU

And, knowing that gaussian sigma is approximately SIG = FWHM / 2.35, you are set. The key here is that SIG can be an array, not just a scalar, so you can have a different value of SIG (and hence FWHM) for each pixel.

Good luck. Craig EMAIL: craigmnet@cow.physics.wisc.edu Craig B. Markwardt, Ph.D. Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response

Subject: Re: Normal Distributed Random Numbers Posted by James Kuyper on Tue, 04 Sep 2001 21:24:07 GMT

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Kay Bente wrote:

>

- > Hi
- > I have to create arrays with normal distributed random numbers, but with
- > variable FWHM (Full width half max/standard deviation sigma?).
- > I want to add normal distributed noise to an image, so that the values
- > differ around a mean value.
- > In IDL there is a procedure to create such arrays RandomN, but you cani; ½t
- > change the FWHM and I can�t find what FWHM the normal distribution there
- > has.

For a normal distribution, FWHM = 2*sqrt(alog(2))*(standard deviation)

RandomN produces a distribution with a mean of 0 and a standard deviation of 1.0. Therefore, to create an array with a desired mean value and a desired value for FWHM, use:

array = mean + fwhm*RandomN(Seed, N)/(2*sqrt(alog(2)))

Subject: Re: Normal Distributed Random Numbers Posted by thompson on Tue, 04 Sep 2001 21:34:40 GMT View Forum Message <> Reply to Message

"Kay Bente" <KBente@lycos.de> writes:

- > Hi
- > I have to create arrays with normal distributed random numbers, but with
- > variable FWHM (Full width half max/standard deviation sigma?).
- > I want to add normal distributed noise to an image, so that the values
- > differ around a mean value.
- > In IDL there is a procedure to create such arrays RandomN, but you can't
- > change the FWHM and I can't find what FWHM the normal distribution there
- > has.
- > So I would be glad If somone can tell me how to create such arrays (maybe
- > outof uniform distributed arrays created with RandomU, I have no idea.
- > I'm using IDL 5.4

The RANDOMN() function creates a Gaussian distribution with an average of 0, and a standard deviation of 1. Mathematically, this is written as

EXP(-0.5*X^2)

If you want a different distribution, e.g. a different average or a different standard deviation, all you need to do is something

RanVals = AvgVal + Sigma*RANDOMN(Seed, Num)

For example,

RanVals = 500 + 3*RANDOMN(Seed, 10000)

would produce a bunch of random numbers with an average value of 500, and a standard deviation of 3. In other words, most of the numbers would be between 497 and 503.

(The FWHM of this distribution is 2*Sigma*SQRT(2*ALOG(2)), or about 2.35*Sigma, but I suspect you're really thinking about the standard deviation Sigma rather than the FWHM.)

William Thompson