Subject: Re: realizing the formula in idl
Posted by Craig Markwardt on Fri, 09 Sep 2005 07:57:25 GMT
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pravesh.subramanian@gmail.com writes:
> Hello,
> How do I realize this formula in IDL?
>
> matrix(x, y) = 1/(s^2 * 2 * pi) * Exp (-(x^2 + y^2)/2 * s^2)
>
> let's say x = y = 300

Greetings, your question is not quite complete. Are X and Y indices,
or are they the independent variables of the function?

Assuming you have a 2D function, and you have the grid positions that
you want to sample as 1D arrays in X and Y, then first I typically
make a 2D array of grid positions,

```
XX = X # (Y*0+1)
YY = (X*0+1) # Y
```

Then it's a simple matter to compute the function almost exactly as
you wrote it,

```
MATRIX = 1/(s^2 * 2 * !dpi) * Exp (-(xx^2 + yy^2)/2 * s^2)
```

If you want to avoid underflow errors, then there are two extra steps
to mask them out,

```
U = -(xx^2 + yy^2)/2 * s^2
MASK = ABS(U) LT 60  ;; May need to tweak this number
MATRIX = MASK/(s^2 * 2 * !dpi) * Exp (-(xx^2 + yy^2)/2 * s^2 * MASK)
```

Good luck,
Craig

--
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Craig B. Markwardt, Ph.D. EMAIL: craigmnet@REMOVEcow.physics.wisc.edu
Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response
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Subject: Re: realizing the formula in idl
Posted by Timm Weitkamp on Fri, 09 Sep 2005 08:40:24 GMT

pravesh.subramanian@gmail.com wrote:

> How do I realize this formula in IDL?
>
> matrix(x, y) = 1/(s^2 * 2 * pi) * Exp (-(x^2 + y^2)/2 * s^2)
>
> let's say x = y = 300

I assume that by "x = y = 300" you actually mean that x and y are 1D arrays with approximately 300 elements each, right? The formula then describes a 2D Gaussian with width "s". Here is a way of doing it:

```
s = 100.0       ;  or whatever other value you want for the width
nx = 300        ;  number of elements of x
ny = 300        ;  number of elements of y
x = FINDGEN(nx)  ;  your x values
y = FINDGEN(ny)  ;  your y values

;  Blow x and y up to two dimensions

xx = x # (1.0 + FLTARR(ny))
yy = y ## (1.0 + FLTARR(nx))

;  ... and then the calculation of the Gaussian is as easy as this:

matrix = 1.0 / (s^2 * 2 * !PI) * EXP(-(xx^2 + yy^2) / (2.0 * s^2))
```

Hope this helps,
Timm

Timm Weitkamp
ESRF, Grenoble, France

Subject: Re: realizing the formula in idl
Posted by James Kuyper on Fri, 09 Sep 2005 14:14:17 GMT

pravesh.subramanian@gmail.com wrote:
> Hello,
> How do I realize this formula in IDL?
>
> matrix(x, y) = 1/(s^2 * 2 * pi) * Exp (-(x^2 + y^2)/2 * s^2)
>
> let's say x = y = 300

The other people who've responded have assumed that what you mean is that matrix is a 300x300 array, and that you want to fill in the entire array. That seems likely, but there's an alternative interpretation of your message, for which the answer is different. If you merely want to set one element of the array to this value, then what you've already written is almost exactly the correct IDL translation:

matrix[x, y] = 1/(s^2 * 2 * !dpi) * Exp (-(x^2 + y^2)/2 * s^2)

Even the use of the square brackets "[]" isn't strictly necessary, I just think it's clearer.

Subject: Re: realizing the formula in idl
Posted by pravesh.subramanian on Fri, 09 Sep 2005 14:44:12 GMT
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Hello,
Thanks for all the replies. they were really helpful

i did mean that it is a gaussian kernel , actually of size 192 * 192
where x and y will be the indices of this kernel
hence, i need to realize a 2D gaussian of size 192 filled at all positions.

I need to use to in k-space for a smoothing operation. From the responses, I gather that suggestions 1 and 2 could be appropriate.

Does that sound ok?

My sincere thanks,
pravs
