Subject: Cubic root finding on a grid
Posted by Luds on Fri, 20 Nov 2009 16:03:40 GMT
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Hi IDL'ers,

I'm trying to find an efficient method for estimating the eigenvalues of a tensor which is defined on a cubic (NxNxN) grid. The tensor is a simple 3x3 (symmetric) matrix defined at each of the N^3 grid points, so the eigenvalues at a given grid point can be calculated by (for example) the IDL routine IMSL_ZEROPOLY simply by finding the roots of the cubic polynomial defined by the matrix at that point - but this routine doesn't handle array's of coefficients, so it has to be evaluated on the grid point by point.

My grids are up to 512^3, so using a for-loop to compute the eigenvalues at each node is rather slow. Does anyone know of any adaptations of the IMSL_ZEROPOLY routine that can work on a grid of 3X3 matricies (or on an array of polynomial coefficients)?

Any suggestions would help.

Best,
Ludlow

Subject: Re: cubic root
Posted by Lajos Foldy on Tue, 16 Apr 2013 15:19:00 GMT
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On Tuesday, April 16, 2013 5:08:12 PM UTC+2, fd_...@mail.com wrote:
> Hi all
>
>
>
> I have a question about cubic roots. The cubic roots of a negative number there exists. The cubir root of -1 is -1, 0f -2 is -1.25 and so on why when I typed in IDL to calculate the cubic root of a negative value it print out NaN which means Not a Number?
>
>
>
> E.g. I typed: (-1)^1.0/3 and it prints out NaN
>
>
>
> Is there any way to fixed it and don't get NaNs but get the actual value?
>
>

>
> Best Wishes
>
> Maria

(-1)^1.0/3 gives -0.333333 for me.

You have to specify that you want complex roots:

IDL> help, complex(-1.0)^(1.0/3)
<Expression> COMPLEX = (0.500000, 0.866025)

(and note that ^ has higher precedence than /).

regards,
Lajos

Subject: Re: cubic root
Posted by wlandsman on Tue, 16 Apr 2013 15:27:10 GMT
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You can also use FZ_ROOTS to get all 3 roots to the equation x^3 + 1 = 0

IDL> print,fz_roots([1,0d,0,1.0d])
(-1.0000000, 0.0000000)(0.50000000, -0.86602540)(0.50000000,
0.86602540)

or use http://idlastro.gsfc.nasa.gov/ftp/contrib/freudenreich/cuber oot.pro

On Tuesday, April 16, 2013 11:08:12 AM UTC-4, fd_...@mail.com wrote:
> Hi all
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> Maria

Subject: Re: cubic root
Posted by Lajos Foldy on Tue, 16 Apr 2013 16:44:19 GMT
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On Tuesday, April 16, 2013 5:19:00 PM UTC+2, fawltyl...@gmail.com wrote:

> (-1)^1.0/3 gives -0.333333 for me.
>
> You have to specify that you want complex roots:
>
> IDL> help, complex(-1.0)^(1.0/3)
> <Expression> COMPLEX = (0.500000, 0.866025)
>

Also, here is a function for the real cubic root:

```
function cubic_root, x
return, x ge 0 ? x^(1/3.0) : -(-x)^(1/3.0)
end
```

(Change 3.0 to 3.0d for double precision x.)

regards,
Lajos
