Subject: IDL inverse matrix problem
Posted by amin farhang on Mon, 12 Jan 2015 17:56:33 GMT
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Dear All,

I have a 16x16 sparse matrix which its values are big. Unfortunately IDL return wrong value for matrix inverse. Therefore when I run command (print,invert(A)##A) the returned is not an identity matrix. I check the singularity of matrix and this inversion retuned correctly by other softwares like MATLAB or MATHEMATICA or even FORTRAN.
What is happening?

EXAMPLE:

A = [[7.3339770e12, 0.0, 0.0, 0.0, 0.0, 7.3339770e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0] , $
[0.0, 5.4254596e12, 0.0, 0.0, 0.0, 5.4254596e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
[0.0, 0.0, 4.9832916e13, 0.0, 0.0, 0.0, 4.9832916e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0, 9.7295220e13, 0.0, 0.0, 9.7295220e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 2.2853478e12, 2.2853478e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
[7.3339770e12, 5.4254596e12, 0.0, 0.0, 2.2853478e12, 1.5044784e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
[0.0, 0.0, 4.9832916e13, 9.7295220e13, 0.0, 0.0, 1.5037721e14, 3.2490665e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 3.2490665e12, 3.2490665e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 8.7204194e13, 8.7204194e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 8.7204194e13, 1.9651177e14, 0.0, 0.0, 1.3385090e13, 9.5922483e13, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 4.6135226e12, 1.1430911e12, 0.0, 0.0, 1.9939955e12, 1.4764362e12], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.1430911e12, 1.1430911e12, 0.0, 0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.3385090e13, 0.0, 0.0, 1.3385090e13, 0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 9.5922483e13, 0.0, 0.0, 0.0, 9.5922483e13, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.9939955e12, 0.0, 0.0, 0.0, 1.9939955e12, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.4764362e12, 0.0, 0.0, 0.0, 0.0, 1.4764362e12]]

BUT IDL return wrong inverse matrix

IDL> B = invert(A,/double)
IDL> print, B

1.0e-05 *

[-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
[-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $

[0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
[-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
[0.134, 0.134, 0.0, 0.0, 0.134,-0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
[0.0, 0.0,-0.0152,-0.0152, 0.0, 0.0, 0.0152,-0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0167, 0.0167, 0.0, 0.0,-0.0167,-0.0167, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-1.342, 1.342,-0.0,-0.0, 1.342, 1.342], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
[-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342], $
[-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342]]

best regards,

Subject: Re: IDL inverse matrix problem
Posted by Lajos Foldy on Mon, 12 Jan 2015 19:35:09 GMT
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On Monday, January 12, 2015 at 6:56:36 PM UTC+1, Amin Farhang wrote:
> Dear All,
>
> I have a 16x16 sparse matrix which its values are big. Unfortunately IDL return wrong value for matrix inverse. Therefore when I run command (print,invert(A)##A) the returned is not an identity matrix. I check the singularity of matrix and this inversion retuned correctly by other softwares like MATLAB or MATHEMATICA or even FORTRAN.
> What is happening?
>
>
> EXAMPLE:
>
> A = [[7.3339770e12, 0.0, 0.0, 0.0, 0.0, 7.3339770e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0] , $
> [0.0, 5.4254596e12, 0.0, 0.0, 0.0, 5.4254596e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 4.9832916e13, 0.0, 0.0, 0.0, 4.9832916e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 9.7295220e13, 0.0, 0.0, 9.7295220e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 2.2853478e12, 2.2853478e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [7.3339770e12, 5.4254596e12, 0.0, 0.0, 2.2853478e12, 1.5044784e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 4.9832916e13, 9.7295220e13, 0.0, 0.0, 1.5037721e14, 3.2490665e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 3.2490665e12, 3.2490665e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 8.7204194e13, 8.7204194e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 8.7204194e13, 1.9651177e14, 0.0, 0.0, 1.3385090e13, 9.5922483e13, 0.0, 0.0], $

> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 4.6135226e12, 1.1430911e12, 0.0, 0.0, 1.9939955e12, 1.4764362e12], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.1430911e12, 1.1430911e12, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.3385090e13, 0.0, 0.0, 1.3385090e13, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 9.5922483e13, 0.0, 0.0, 0.0, 9.5922483e13, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.9939955e12, 0.0, 0.0, 0.0, 1.9939955e12, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.4764362e12, 0.0, 0.0, 0.0, 0.0, 1.4764362e12]]
>
>
> BUT IDL return wrong inverse matrix
>
> IDL> B = invert(A,/double)
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> 1.0e-05 *
>
> [-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.134, 0.134, 0.0, 0.0, 0.134,-0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0,-0.0152,-0.0152, 0.0, 0.0, 0.0152,-0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0167, 0.0167, 0.0, 0.0,-0.0167,-0.0167, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-1.342, 1.342,-0.0,-0.0, 1.342, 1.342], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
> [-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342], $
> [-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342]]
>
>
> best regards,

Scale your matrix, use double precision and LAPACK, eg:

```
m=double(max(abs(a)))
inverse=la_invert(a/m)/m
```

regards,
Lajos

Subject: Re: IDL inverse matrix problem
Posted by wlandsman on Mon, 12 Jan 2015 19:37:14 GMT

You want to specify your matrix as double precision and then you will get the expected answer. It is *not* enough to use the /DOUBLE keyword to INVERT(). See, for example,

http://www.idlcoyote.com/math_tips/sky_is_falling.html

--Wayne

On Monday, January 12, 2015 at 12:56:36 PM UTC-5, Amin Farhang wrote:
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> [0.0, 5.4254596e12, 0.0, 0.0, 0.0, 5.4254596e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 4.9832916e13, 0.0, 0.0, 0.0, 4.9832916e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 9.7295220e13, 0.0, 0.0, 9.7295220e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 2.2853478e12, 2.2853478e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [7.3339770e12, 5.4254596e12, 0.0, 0.0, 2.2853478e12, 1.5044784e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 4.9832916e13, 9.7295220e13, 0.0, 0.0, 1.5037721e14, 3.2490665e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 3.2490665e12, 3.2490665e12, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 8.7204194e13, 8.7204194e13, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 8.7204194e13, 1.9651177e14, 0.0, 0.0, 1.3385090e13, 9.5922483e13, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 4.6135226e12, 1.1430911e12, 0.0, 0.0, 1.9939955e12, 1.4764362e12], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.1430911e12, 1.1430911e12, 0.0, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.3385090e13, 0.0, 0.0, 1.3385090e13, 0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 9.5922483e13, 0.0, 0.0, 0.0, 9.5922483e13, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.9939955e12, 0.0, 0.0, 0.0, 1.9939955e12, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.4764362e12, 0.0, 0.0, 0.0, 0.0, 1.4764362e12]]
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> IDL> print, B

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> 1.0e-05 *
>
> [-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [-0.134,-0.134, 0.0, 0.0,-0.134, 0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.134, 0.134, 0.0, 0.0, 0.134,-0.134, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0,-0.0152,-0.0152, 0.0, 0.0, 0.0152,-0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0152, 0.0152, 0.0, 0.0,-0.0152, 0.0152, 0.0, 0.0, 0.0, 0.0,-0.0,-0.0, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-0.0167, 0.0167, 0.0, 0.0,-0.0167,-0.0167, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,-1.342, 1.342,-0.0,-0.0, 1.342, 1.342], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0167,-0.0167, 0.0, 0.0, 0.0167, 0.0167, 0.0, 0.0], $
> [-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342], $
> [-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0,-0.0, 1.342,-1.342, 0.0, 0.0,-1.342,-1.342]]
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>
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