
Subject: bug in EIGENQL ?

Posted by [gpetty](#) on Fri, 18 Jun 1999 07:00:00 GMT

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Fellow IDLers:

I encountered the following strange behavior when using the IDL (v 5.2 under HP-UX 10.20) routine EIGENQL, which is supposed to compute the eigenvectors and eigenvalues of a real, symmetric matrix. The error is reproducible on my system and seems to occur the first time EIGENQL is called during an IDL session but not thereafter.

First I read in my data file (contents appears at bottom of this article)...

```
IDL> openr, lunr, "t", /get_lun
IDL> means = fltarr(7)
IDL> covar = fltarr(7,7)
IDL> readf, lunr, means
IDL> readf, lunr, covar
IDL> free_lun, lunr
```

I verify that I read what I wanted to...

```
IDL> print, means
  196.000   162.000   194.300   191.700   165.400   193.200   174.900
```

```
IDL> print, covar
  277.700   294.900   284.200   288.300   296.000   242.200   236.800
  294.900   373.000   304.300   314.000   359.400   267.700   281.600
  284.200   304.300   293.500   304.200   312.400   259.300   253.300
  288.300   314.000   304.200   340.600   348.000   307.700   297.700
  296.000   359.400   312.400   348.000   385.500   314.300   320.400
  242.200   267.700   259.300   307.700   314.300   321.900   306.100
  236.800   281.600   253.300   297.700   320.400   306.100   305.300
```

Now I attempt to compute the eigenvectors of the matrix....

```
IDL> evals = eigenql(covar,eigenvectors=evecs)
```

The following diagnostic message occurs only the first time EIGENQL is called. I don't know what it means.

% Restored file: EIGENQL.

 Now I print the results. The eigenvalues are correct, but notice the spurious zeros in the first row and last column of the eigenvector matrix. In fact, the whole matrix is erroneous.

IDL> print, evals

2106.65	118.913	51.9952	14.3094	3.72573	1.56117	0.345064
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IDL> print, evecs

0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000
-0.0203527	-0.142684	-0.475245	-4.46735e-05	0.748321	-0.439755	0.00000
0.0638729	0.732782	0.405909	0.256386	0.128762	-0.460299	0.00000
0.133166	-0.413454	0.573429	-0.546051	0.0375968	-0.427687	0.00000
-0.761143	0.134580	-0.242504	-0.282152	-0.362916	-0.363901	0.00000
-0.0365828	-0.482871	0.0594889	0.715859	-0.292982	-0.404557	0.00000
0.630155	0.143010	-0.467131	-0.209839	-0.452190	-0.340196	0.00000

 Now I run EIGENQL a second time with identical parameters. This time, the results for both evals and evecs are correct.....

IDL> evals = eigenql(covar,eigenvectors=evecs)

IDL> print, evals

2106.65	118.913	51.9952	14.3094	3.72573	1.56117	0.345064
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IDL> print, evecs

0.344896	0.395337	0.361339	0.395519	0.420594	0.362555	0.359734
0.366553	0.450309	0.285925	-0.0748501	0.0173607	-0.588532	-0.478365
-0.426247	0.580345	-0.400150	-0.314331	0.376371	-0.157386	0.236990
-0.293417	-0.320451	-0.0798885	0.555279	0.577378	-0.307122	-0.262319
0.256999	-0.395998	0.163642	-0.310046	0.235583	-0.498243	0.592017
0.227300	-0.211230	-0.00957581	-0.541312	0.540564	0.390869	-0.406961
0.600993	0.00285527	-0.770914	0.204148	-0.00832092	-0.0454444	0.0260860

Why the erroneous results on the first call?

- Grant

===== contents of input file "t" =====

196.0	162.0	194.3	191.7	165.4	193.2	174.9
277.7	294.9	284.2	288.3	296.0	242.2	236.8

294.9	373.0	304.3	314.0	359.4	267.7	281.6
284.2	304.3	293.5	304.2	312.4	259.3	253.3
288.3	314.0	304.2	340.6	348.0	307.7	297.7
296.0	359.4	312.4	348.0	385.5	314.3	320.4
242.2	267.7	259.3	307.7	314.3	321.9	306.1
236.8	281.6	253.3	297.7	320.4	306.1	305.3

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