
Subject: Algorithm for PCA transform in ENVI

Posted by [eva.ivits-wasser](#) on Tue, 08 May 2012 16:57:53 GMT

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Does anybody know what the algorithm for PCA transform in ENVI is? I've compared the eigenvectors and the spatial patterns of ENVI's PCA transform with IDL's `eigenql`, `svdc` and `la_svd` procedures. The first PC components are the same but from the second component on I have negative values where ENVI give positive values and vice versa. Accordingly, the first element in the diagonal of the eigenvector matrices has the same sign but the rest of the signs are just the opposite comparing results from ENVI and IDL.

Any clues?

Thanks in advance,

Eva

Subject: Re: Algorithm for PCA transform in ENVI

Posted by [ivitseva](#) on Fri, 11 May 2012 14:02:39 GMT

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On May 10, 4:39 pm, [ivitseva](#) <[eva.ivits-was...@jrc.ec.europa.eu](#)> wrote:

> On May 10, 2:12 pm, [alx](#) <[lecacheux.al...@wanadoo.fr](#)> wrote:

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>> On 10 mai, 11:17, [ivitseva](#) <[eva.ivits-was...@jrc.ec.europa.eu](#)> wrote:

>

>>> On May 9, 5:01 pm, "Kenneth P. Bowman" <[k-bow...@null.edu](#)> wrote:

>

>>>> In article <[0de35e20-3a9c-4593-8f06-ed3e6461f...@p21g2000vby.googlegroup s.com](#)> ,

>

>>>> [eva.ivits-was...@ext.jrc.ec.europa.eu](#) wrote:

>>>> > Does anybody know what the algorithm for PCA transform in ENVI is?

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>>>> > transform with IDL's `eigenql`, `svdc` and `la_svd` procedures. The first PC

>>>> > components are the same but from the second component on I have

>>>> > negative values where ENVI give positive values and vice versa.

>>>> > Accordingly, the first element in the diagonal of the eigenvector

>>>> > matrices has the same sign but the rest of the signs are just the

>>>> > opposite comparing results from ENVI and IDL.

>>>> > Any clues?

>>>> > Thanks in advance,

>>>> > Eva

>

>>>> If you have a properly-constructed covariance matrix, the eigenvalues should all
>>>> be greater than or equal to zero. If you are getting negative eigenvalues you
>>>> are doing something wrong.

>

>>>> <http://brunnur.vedur.is/pub/halldor/PICKUP/eof.pdf>

>

>>>> Ken Bowman

>

>>> Hi Ken,

>>> Thanks.

>>> It is the eigenvectors and not the eigenvalues I was talking about

>>> (btw. the eigenvalues are all positive). And using the svdc function

>>> you do not use the covariance matrix but the centered time series.

>>> Anyway, the problem is that the signs in the spatial patterns (EOFs or

>>> the modes) are the opposite of that what ENVI reports, which is

>>> probably a question of rotation. However, I do not know what ENVI does

>>> and thus I cannot decide what the problem is. That is why I've posted

>>> the question.

>

>>> Eva

>

>> Eva,

>> SVD algorithm produces unique singular vectors, up to multiplication

>> by an unit phase factor (for the real case up to sign). That is the

>> same as saying that singular vector matrices must be unitary.

>> ENVI and IDL are not in contradiction. They are just doing different

>> arbitrary choices.

>> alain.

>

> Hi Alain,

>

> I understand when you are saying that ENVI and IDL are just doing

> different arbitrary choices. However, if I look at the second EOF mode

> I will have negative values in ENVI reporting, using precipitation

> anomalies as input, drought whereas I'll have positive values in IDL's

> output reporting wetter than average conditions. Over the same pixels!

> I still do not understand how the outcomes can be so different, I mean

> COMPLETELY different up to the level of reporting a contradictory

> meteorological phenomena! Sorry for being difficult....

> Cheers,

> Eva

>

>

Dear Alain,

I have it, I understood! What helped was when you wrote that they are
just doing the oppostie things. I've just got stuck and did not notice

that not only the spatial pattern but that also the PC time series has a different sign. That means everything is just the oppsite so eventually shows the same thing. Thanks for your help again!

Cheers,
Eva
