Re: Help with eigenvalue decomposition

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- *From*: israel@xxxxxxxxxxx (Robert Israel)

- *Date*: 6 Oct 2005 21:58:40 GMT

In article <15257961.1128546708381.JavaMail.jakarta@xxxxxxxxxxxxxxxxxxxxxx>,
Amit Singh <cool78amit@xxxxxxxxx> wrote:

>I would be really grateful if someone could help me with the following
>problem (I apologize if the problem seems trivial).
>
>Suppose we have a full−ranked symmetric matrix A , that can be represented as
>
>A = B D B^T
>
>where ^T denotes matrix transpose, B is a unitary matrix (inv(B)=B^T)
>and D is the diagonal matrix that contains the eigen values of A in
>increasing order. The elements of B are orthonormal eigenvectors of A.

The columns of B, that is...

>Suppose we have another representation of A as
>
>A= E F E^T
>
>where E is again a unitary matrix, and F is a diagonal matrix with
>elements arranged in increasing order.
>
>Is it correct to say that F=D and E=Perm(B) i.e. the columns of E are
>permutation of columns of B? It would be very nice if you could point me
>out to references that discuss this problem?

No. F=D, but the relation of E to B is more complicated: E = B U where
U is a unitary matrix consisting of diagonal blocks corresponding to
the distinct eigenvalues. Thus if diagonal entries number i_1 to i_2
of D are all those with some particular value, you can have any unitary
(i_2−i_1+1) x (i_2−i_1+1) matrix in the block of U for rows and columns
i_1 to i_2; all other entries in rows i_1 to i_2 are 0.

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- ***References***:
  - ***Help with eigenvalue decomposition***
    - *From:* Amit Singh

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