

Re: Eigenvalues and transformations

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- *From:* Sensei <senseiwa@xxxxxxx>
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On 2006-04-20 19:47:42 +0200, Sensei <senseiwa@xxxxxxx> said:

$$A = P^T X P$$

The matrix X as you pointed out can be obtained by the left inverse of P : $QP=I$, and $X = Q^T A Q$. X is a matrix over K , $M \times M$. Let's have $M > N$.

Is there any connection between the eigenvalues/eigenvectors of X and A ?

I read about the singular value decomposition, and since P is real (I'm not interested in something too advanced, it's too early!) and A is real too, it can be decomposed into three matrices, the same can be done on Q ($QP=I$) and I can say this, if I'm not mistaken:

$$Q = U S V^T$$

V is such that $V^T V = V V^T = I$, the same is for U (if I understand, since they are real matrices). So, I can write:

$$X = Q^T A Q = (U S V^T)^T A (U S V^T) = V S (U^T A U) S V^T$$

Another thing... If A is positive definite, can we say that X is positive definite? Probably not... In the last line, the matrix S "preserves" positive definiteness since singular values are non-negative, but U is just unitary (same for V)... but I'm new to algebra...

Well, I just don't know! Any hint, or link, or better, a book, is appreciated! :)

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Sensei <senseiwa@xxxxxxx>

The optimist thinks this is the best of all possible worlds.
The pessimist fears it is true. [J. Robert Oppenheimer]