Re: ? statistic and deterministic average

Source: http://sci.tech−archive.net/Archive/sci.math/2006−03/msg01939.html

- *From*: "Cheng Cosine" <acosine@xxxxxxxxxxxx>
- *Date*: Sat, 11 Mar 2006 17:23:24 GMT

"David" <david.davidr@xxxxxxxxx> wrote in message
news:1142069324.514907.237070@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

> Expectation is a linear operator, so
> Ey = A * Ex.
> (x and y can be vectors, A a matrix).
>
> > Then we know x belongs to range(adjoint(A))+null(A) and y belongs to
> > range(A)+null(adjoint(A)).
>
> Not sure why you're thinking in this direction.
>
> In any case, in your example x seems to be a scalar, so we're barely in
> the domain of linear algebra.

Hmm, let's be more specific. In statistics, definition of mean is clear,
and the key

for evaluating mean of a statistic variable is to have a proper def of
distribution function f(x).

Now turn to deterministic variables. Now we have no prior def of
distribution. It seems to

be able to apply some statistical results to deterministic model is first to
have a distribution

function properly defined. When a given linear function A maps an
independent var x to

a dependent variable y, we know somehow not any x has an image y under this
map A.

Also not any y can have an x. Therefore, both x and y have restrictions, but
still we have

no distribution function. In this case, how do we define a mean? An extended problem is

when we have a vectorized x and a vectorized y. Again, how do we define a mean?

In statistics, the principal components analysis gives an approximation that minimizes

sum of variances between an approximated soln to original soln. That is, accuracy of

approximation is based on measuring variance of each variable. To apply this kind of

approximation for deterministic case, we need first define a deterministic "mean". But how?

More explicitly, given a statistical vector x, do SVD for x*x' ([P S Q]=svd(x*x')), and

then project x to new variable y by y = P'*x, where P is left singular matrix of x*x' and

note that diag(S) is in non−increasing order. We found approximated yk = P(:,1:1:K)'*x picks

those ys with the first K largest variances of corresponding x. This approximation is, however,

based on minimizing sum of variances of x, which requires knowledge of distribution. Now, how

do we use approximation of this kind when variables x is deterministic?

Thanks,
by Cheng Cosine
Mar/11/2k6 NC

.