Corollary: N−P Silliness in Estimation Theory (was: Re: Unusual formulae for confidence intervals)

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- *From*: "Reef Fish" <large_nassua_grouper@xxxxxxxxx>
- *Date*: 24 Nov 2006 05:37:37 −0800

David Jones wrote:

> Reef Fish wrote:
>
>> Why was it that NO ONE challenged or commented about my
>> comment on the use of (n−1), n, and (n+1) as the THREE most
>> commonly used denominators for S^2, for reasons of ESTIMATION
>> criteria? Answer: probably none of the discussant know about
>> that one. :−)
>>
>> The use of "n+1" is certainly peculiar to those who don't use it,
>
> but
>
>> there is nothing "peculiar" about it for those who understand that
>> "unbiased estimate" and "maximum likelihood estimate" are just
>> TWO of the main THREE criteria in statistical POINT estimation!
>
> Well, I thought it was just a misinterpretation of what was in the
> original post ...
> where I think (subject to my own possible misinterpretation and
> without looking back) the "S" in question was meant itself to be a
> sample variance (of some form)

No. There is no ambiguity in S (by the OP) being the sample
STANDARD DEVIATION which is the square root of the sample
variance).

In retrospect, I believe the post by Koopman (initial follow−up, before
my posts of #3 and #4 in this thread) pointed out the major source of
the confusion:

RK> How did they define S^2? With n in the denominator?

That remains, and probably shall remain, forever, the AMBIGUOUS statistical usage of the term "sample variance".

There was a recent lengthy thread about it where Afonso argued incessantly that it's the population variance when divided by N and sample variance when divided by (N−1) which was unambiguously FALSE, of course. :=) But that was to be expected of Afonso who could never tell the difference between a population parameter and a sample estimate, resulting in whch nonsense as stating a hypohtesis as Ho: 3/13 < 8/13. :−)

But the REAL culprit is that in the "definition" of a "sample variance" both N and (N−1) are used, with the only emphsis that it's calculated from sample data!

S^2 is the SS deviations divided by (N−1) when it is the sample variance, which is an UNBIASED estimate of the population variance.

S^2 is the SS deviations divided by N when it is the sample variance which is the maximum likelihood estimate of the population variance.

To eliminate the "sample variance" ambiguity in common usage, one would have to say something not only clumsy but silly, like:

S^2 is the sample variance (unbiased) when the denominator is (N−1).
S^2 is the sample variance (MLE) when the denominator is N.

and both assume the population mean is unknown also.

To FURTHER complicant the ambiguous usage, we have the notion of a "standard error" (estimated standard deviation) of the sample mean, namely, sqrt(sigma^2/N) estimated by sqrt(S^2/N).

That is where Koopman's comment, and later re−iterated by me

RF> That was a VALID point made by Koopman about
RF> the ambiguous usage of S that probably led to some of the
RF> present confusion about (n−1) and n, because S/sqrt(n−1)
RF> and S/sqrt(n) could be IDENTICAL if different estimates were
RF> used for S.

> and not an unscaled sum of squares, and
> that the expression was meant to be used to decide a sample size to estimate a mean with a given precision, in which case a factor of 1/n would be usual (with a factor of 1/(n−1) contained in the calculation of the sample variance). I couldn't see why 1/(n−1) would appear in

> the formula given except perhaps as some form of allowance that would
> be better done using percentage points of a t−distribution.

The DISTRIBUTION of S^2 an entirely separate issue, from that of the meaning and definition of S^2, the sample variance, from which the square root is used as the estimated STANDARD DEVIAITON.

What form of S^2 to use is defined by the criterion of estimation!

But in a sense the MOST "peculiar" of all these concepts is the N−P theorists' pre−occupation of the notion of an UNBIASED estimate. E(statistic) = population parameter to be estimated.

Here, E (SSE/(n−1)) = sigma^2, hence an unbiased estimate.

but the SQUARE ROOT of S^2 is a BAISED estimate of sigma whether you use n, (n−1), or (n+1) as the denominator.

The only person in this newsgroup who claimed to have used the unbiased estimate for sigma was Jack Tomsky, who used it in an indirect way, when he estimated the quantile of a distribution.

I thought the insistence on UNBIASED estimates for sigma−squared, when the whole world is using S which is BIASED, for sigma, has got to be one of the most peculiar and the SILLIEST notion ever perpetrated and N−P theory of estimation in statistics.

> Of course the use of (n−1), n, and (n+1) as possible denominators for
> S^2 (where this is the sum of squared errors) should be well−known. I
> don't know whether there are any simple results available from the
> theory which would cover the type of two−stage sampling being
> contemplated here to say how one might use an initial sample to choose
> the size of a second sample in some "optimal" way.
>
> David Jones

When you used the term "optimal", you are automatically opening more cans of statistical worms. :−) The priests of unbiased
estimates
would undoubted say that they are the "optimal" estimate to use because it gives rise to all kinds of OTHER UMP optimality or other inherent "defects" of the Neyman−Pearson−Fisher school of Statistics.

The MLE does have the natural and commonsense advantage (as an estimation criterion) that it is INVARIANT to nonlinear transmations.

If S^2 is MLE for sigma^2; S raised to any power p different from 1
remains the MLE for sigma^p.

Since the N−P priests of unbiasedness can't have their cake and
eat it too, they will remain the brunt of the JOKE that the whole
world is using the BIASED estimate for sigma, and every time you
change the power of p for sigma^p, an entirely different
statistic has to be used to make that form of estimate unbiased.

So, there are INFINITELY MANY different unbiased estimates
for the infinitely many unknown parameters sigma^p, when there
is exactly ONE unknown sigma.

−− Reef Fish Bob.

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