Re: Simple Statistics Question

Source: http://sci.tech−archive.net/Archive/sci.stat.math/2005−04/msg00173.html

* *From*: Richard Ulrich <Rich.Ulrich@xxxxxxxxxxx>
* *Date*: Thu, 07 Apr 2005 23:19:57 −0400

On Thu, 7 Apr 2005 10:28:11 −0500, "Ashok. R"
<ashokr@xxxxxxxxxxxxxxxxxx> wrote:

> Hello all,
>
> My message is a little verbose. But it is very simple. I urge you not to
> discard it purely because of its length. It is actually a very nice read :)
>
> An experiment to measure CUMULATIVE strains proceeds in four stages. Let us
> call them stage1, stage2, stage3, and stage 4. The INCREMENTAL strain
> (denoted by lambda) is measured experimentally at each stage. Different
> number of data points are used at each stage:
>
> lambda1 = incremental strain at stage 1 (N1 data points)
> lambda2 = incremental strain at stage 2 (N2 data points)
> lambda3 = incremental strain at stage 3 (N3 data points)
> lambda4 = incremental strain at stage 4 (N4 data points)
>
> Within each stage, we can calculate the mean and standard deviation for the
> lambdas. All this is simple and straightforward.
> mlambda1 = mean(lambda1) −−−>Computed from N1 data points
> mlambda2 = mean(lambda2) −−−>Computed from N2 data points
> mlambda3 = mean(lambda3) −−−>Computed from N3 data points
> mlambda4 = mean(lambda4) −−−>Computed from N4 data points
>
> std_lambda1 = ste(lambda1) −−−>Computed from N1 data points
> std_lambda2 = ste(lambda2) −−−>Computed from N2 data points
> std_lambda3 = ste(lambda3) −−−>Computed from N3 data points
> std_lambda4 = ste(lambda4) −−−>Computed from N4 data points
>
>
> Now comes the hard part: We need to compute the CUMULATIVE strain at each
> stage. This computed from the mean incremental strains at each stage:
>
> clambda1 = mlambda1
> clambda2 = mlambda2*mlambda1
> clambda3 = mlambda3*mlambda2*mlambda1
> clambda4 = mlambda4*mlambda3*mlambda2*mlambda1

I clearly don't understand what "strain" is, or how it is
measured. Does it exist (say) in a narrow range around 100%?
Is it centered (potentially) on zero?

Your formula seems to indicate a cumulative leveraging.
For numbers around zero, this multiplicative error
increases rapidly. Do you have data like that?

For numbers with *very* small SD relative
to the mean, the *variances* can be additive; see
my example below.

>
> Now I want to find out the standard error (not standard deviation) for each
> of these cumulative strains. Note: standard error = standard
> deviation/sqrt(N), where N is the number of data points. To do this, I need
> to find out the "net" standard deviations and the "net" number of data
> points used.

I don't comprehend a sampling framework that lets you
refer to any "standard error" across the experiment.
This *seems* to describe just one experiment.

If there are multiple experiments, the SE falls out naturally.

>
> Let us tackle the "net" standard deviation first:

[snip, confused stuff, which I have covered as much
as I can at this point.]
>
> The reason I am using standard errors is that if I am just adding the
> standard deviations from the individual stages, then the error bars will be
> really large in the cumulative strain plot and that does not look good in a
> published paper.
>

Sometimes a problem gives us huge error bars.
We have to live with it.

Variances are what we typically add; so the total SD
increases a *little* slower than from adding SDs.

But you can't add them unless you have a situation
where you are effectively adding the 'strains', too:
101% taken 4 times, multiplied, is approximately 104%,
just like 4 times 1% is 4%.

There are more complicated approximations for the
variances, if you are multiplying numbers around zero.

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- ***References***:
  - ***Simple Statistics Question***
    - ◊ *From:* Ashok. R

- Prev by Date: ***Re: OT: My Keyboard Devil (was Re: z−value)***
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