Re: Questions concerning T−tests

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Hello. I have read with interest the comments posted by
Rich Ulrich (Thu, 16 Dec 2004 14:37:40 −0500) in reply to a double
query posted by Noli Brazil (Wed, 15 Dec 2004 13:02:15 +0000).

We are in agreement that no version of the t−test is robust
wrt deviations (however tiny) from normality, when the samples are
very large. The same goes for the K−S test of normality for each
sample.

I also agree that the Mann−Whitney test (aka "U test" or
"Wilcoxon two−sample test") does not even apply to the first
problem, because the two distributions are not assumed to be
identical.

Perhaps the reader has forgotten the simple answer with the difference
of the sample−means, which seems to me *the* correct solution. Or do
you disagree? I repeat it here, a bit more verbosely. Each sample is
so large that the StDev of each distribution may be assumed as
practically identical to its estimate: s1 and s2. The corresponding
StDevs for the two means are s1/sqrt(n1) and s2/sqrt(n2), and they
are distributed normally, with a good approximation, regardless of
the two underlying distributions. The StDev for the difference of
the two sample−means is sqrt((s1^2)/n1 + (s2^2)/n2) and, according
to the null hypothesis the mean of this difference is zero. Ergo we
have to perform a test using the normal distribution.

The above solution is robust wrt using very large samples, because
of the asymptotic normality of each sample−mean. (I admit that I
have not considered other issues, like computational rounding off or
the increase in probability that some of the data may be corrupt.)

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It seems to me that the following reply was in jest; please correct
me if I am wrong.

>> should i use the parametric t−test with the Welch correction in
>> addition to a non parametric test?
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> (yep, for a simplistic answer.)

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When I have time I plan to debate the following maxim:
> The defining characteristic of a rank−test is that it
*> tests *ranks* and not *means*.*

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Wrt the second question...

>> I am comparing one member's score to the mean of 40 to 150
>>member scores. [...] to test whether or not there is statistically
>>significant difference between the one score and the mean of the
group
>>scores.

... for one, this is not a comparison between two numbers but a comparison between a number and a sample.

If normality can be assumed, then the solution given by Ray Koopman applies. That is, the two−sample t−test, where the first sample consists of a single datum.

If normality cannot be assumed, then the Mann−Whitney test (mentioned above) applies. This is a two−sample test; the first sample now consists of a single datum.

Without having gone through the details, I presume that the plain nonparametric test in my first reply (Wed, 15 Dec 2004 22:42:19 +0200, <news:41C0A0E8.FB22ABE9@hol.gr> is equivalent to the Mann−Whitney test as reduced in this situation.

~ George Kahrimanis