Re: Need help understanding Homogeneity of Variance please

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- *From*: Richard Ulrich <Rich.Ulrich@xxxxxxxxxxx>
- *Date*: Tue, 31 Oct 2006 21:57:31 −0500

On 30 Oct 2006 21:26:03 −0800, "Reef Fish"
<large_nassua_grouper@xxxxxxxxx> wrote:

> Richard Ulrich wrote:
>
>> On 30 Oct 2006 06:50:28 −0800, "Reef Fish"
>> <large_nassua_grouper@xxxxxxxxx> wrote:
>>
>>> stats newbie wrote:
>>>
>>>> Hi, I was hoping someone would be able to
>>>> explain the assumption of
>>>> homogeneity of variance. What is it and why
>>>> should it be addressed?
>>>> What are the consequences of not having
>>>> homogeneity of variance. I hope
>>>> I have posetd this in the correct group.
>>>> Thanks,
>>
>> RF >
>>
>>> That is a ASSUMPTION behind many different statistical
>>> methods.
>>>
>>> In order for the results of each method to apply, one must
>>> make sure
>>> that the ASSUMPTION(s) are valid, else the statistical
>>> results based
>>> the method will be all wrong.

RU> >

>> I would prefer to say, "the method *may* be all wrong," and I think
>> that RF expresses that more relaxed idea in his closing comments,

where some violations are more serious than others ....
[snip, some detail]

RF >

BUt those are TWO DIFFERENT sets of statements.

In the above, it means If the ASSUMPTION(s) are NOT valid, then the statistical results based on the method WILL be all wrong. There is no "may be" about it. If you have two binary variables X and Y and you test its correlation with the test statistic T for the Pearson correlation coefficient (which would be phi for the two binary variables), the result WILL be wrong because the assumption is violated 100%, without question.

It is true that some violations are unmistakable.

I think it is untrue that this makes them inevitably more serious. For larger N in all cells, the 2x2 phi has a test that becomes increasingly identical to the test on the Pearson. If the result is the test, what result is "wrong"?

On the other hand, for larger N and small associations, the assumption of independence −− which may be hard to determine −− becomes increasingly important.

RF>

In the situation below, it's about the VALIDATION of the assumption. If Normality is required of a variable, and it is not known 100% to be nonnormal, then there is leeway in deciding what is a serious violation and what is not,

− I'd judge, in the situation *above*, that definite non−normality can be definitely not−serious. So there is often leeway.

because in that case (unlike the case it
does not require any thinking to know that the (0,1) variable is NOT normal) the DATA can never prove with 100% certainty whether it came from a Normal population or not.

There is a BIG difference in the above two situations.

? What is the big difference? Formal reliance on the "right test"?

RF >

That is WHY before one runs any particular statistical procesure, one should VALIDATE that the underlying assumptions are not SERIOUSLY violated. One can tolerate small deviations and that's the property that is called "robustness" to certain types of violations.

RU> >

A apparent violation of assumptions gives you a *warning* that some other method might be more appropriate.

RF >

Or a different assumption may be appropriate, or both.

I'm not sure what the "both" should mean.

RU> >

The violation gives you the immediate problem that the p−values may be wrong, in the sense that a "more appropriate" analysis would give something rather different. If you have a choice of two analyses, the easy cross−check is to see if they differ.

RF >

And how do you conclude (if they differ) in your "cross−check" what is correct and what isn't? And what do you mean by cross−check?

If you think that Logistic Regression might fit better than Normal (Probit), you can test both ways. Same result? − no big problem.

Does an optional, debatable transformation give a different result? If there is no difference, you can report that while reporting the detailed result on either metric −− Showing that "It makes no difference" is a way of finessing an overly−conservative demand for "non−parametric" tests, in my experience.

When there *is* a different result for different analyses, then you know that the assumptions *do* matter in a way −− and to an extent −− that needs to be explained.

−− Reef Fish Bob.

RU > >

> The "neat" solution to "failed assumptions" occurs when one solution fixes all the apparent violations −− such as, when one transformation provides linearity, homogeneity of variance, normality (of the variable, or especially, of the residuals), and an "interval" scale of measurement. − Otherwise, you might have to invent a new analysis, or trying to weigh the importance of different violations.

http://www.pitt.edu/~wpilib/index.html
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