Re: Standard Deviation and "False Alarm" Rate

Source: http://sci.tech−archive.net/Archive/sci.stat.edu/2006−09/msg00047.html

- *From*: bodybuilder@xxxxxxxxxxxxx

- *Date*: 12 Sep 2006 09:54:57 −0700

Richard,

Thank you very much for the assistance. What he is trying to comment on is a methodology that is currently being utilized to identify high and low performers. The current methodology simply utilizes standard deviation differences of 0.5 and 1.0. He was arguing that these differences may not constitute statistically significant differences from the overall mean. The percentage he was trying to calculate was the percentage that would display a difference of 0.5 and 1 standard deviations but not necessarily be statistically significant. Would the proper way to calculate this be as follows:

For 0.5 Standard Deviations:
[(31% above 0.5 standard deviations) + (31% below 0.5 Standard deviations)] −
[(5% above 1.96 standard deviations) + (5% below 1.96 standard deviations)] = ~52%
Therefore, 52% of the time when the student's score is 0.5 or more standard deviations above the mean the difference will not be statistically significant.

For 1.0 Standard Deviations:
[(16% above 1 standard deviations) + (16% below 1 Standard deviations)] −
[(5% above 1.96 standard deviations) + (5% below 1.96 standard deviations)] = ~22%
Therefore, 22% of the time when the student's score is 1.0 or more standard deviations above the mean the difference will not be statistically significant.

Please let me know if what I have proposed above seems reasonable to you.

Thank you very much for your time!

L.T.

Richard Ulrich wrote:

On 8 Sep 2006 15:12:57 −0700, bodybuilder@xxxxxxxxxxxxx wrote:

> Hello. I am a stats novice and have a question regarding how the percentages quoated in the following statement were derived:
>
> "It is important to note that even when there is no significant difference between a student's score and the class average, tehse two values will still differ by 0.5 or more standard deviations 35 percent of the time, and by 1 or more standard deviations 24 percent of the time. This represents a high percentage of "false alarms," which can lead to inaccurate conclusions."
>
> No additional information is provided. I am trying to determine how to derive the 35% and 24% quoted above. Any assistance you can provide would be greatly appreciated! Thank you!

Usually, such claims make use of the normal distribution.

This one misuses the normal distribution in a unique way −
I think I found where the writer got his number

The proper numbers would be that 31% score more than
0.5 SD above the mean, and another 31% score that much
below it, 62% in all. And 16%+16%, or 32% score, more
than 1 SD from the mean.

A handy table of the normal distribution shows me that the
numbers from the writer, 0.35 and 0.24, happen to be the
y−ordinates for the normal curve, at 0.50 and 1.0 respectively.
It seems that he looked them up, and used the wrong column.

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

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