On the properties of measures of relative variability

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Talk Abstract

When comparing the variability of several datasets, whose values are expressed in different measurement units, is convenient to use a measure of relative variability. One common measure of relative variability is the coefficient of variation, which expresses the standard deviation as a proportion of the mean and does not depend on the unit scales. This measure can be applied for various purposes (as a measure of risk sensitivity, to represent the reliability of trials, and others), having important applications in research in agriculture, industry, medical and social sciences, education, and many other fields (e.g. Cox and Sadiraj[1], Reed et al.[2], Romano et al.[3], Weber et al.[4]). The assumptions for using the coefficient of variation are mostly related to the nature of the data, however some of the properties of this coefficient lead to limitations that affect its suitability in certain situations. In this work we address the properties of the coefficient of variation, analysing an alternative to the common coefficient of variation, introduced by Dodd[5], which allows us to overcome its disadvantage of dependence on sample size.

Keywords: bounds, corrected coefficient of variation, dispertion.

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References

 Cox, J.C. and Sadiraj, V., On the Coefficient of Variation as a Measure of Risk Sensitivity, *Behavioral and Experimental Economics (Editor's Choice)eJournal*, 2011.

- [2] Weber, E. U., Shafir, S.and Blais, A, Predicting risk sensitivity in humans and lower animals: Risk as variance or coefficient of variation, *Psychological Review*, 111, 2004, pp. 430–445.
- [3] Reed, G. F., Lynn, F. and Meade, B. D., Use of coefficient of variation in assessing variability of quantitative assays. *Clinical and Diagnostic Labo*ratory Immunology, 9, 2002, pp. 1235–1239.
- [4] Romano, F. L., Ambrosano, G., Magnani, M. B. and Nouer, D., Analysis of the coefficient of variation in shear and tensile bond strength tests, *Journal of Applied Oral Science*, 13(3), 2005, pp. 243–246.
- [5] Leadbetter, M.R., Lindgren, G. and Rootzën, H., *Extremes and related properties of random sequences and series*, Springer-Verlag, New York, 1983.

Dodd, S. C, On Percentage Moments, *The Scientific Monthly*, 74(4), 1952, pp. 220–222.