

Likert and fuzzy scales: an empirical comparison through the MSE[†]

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SUMMARY

In dealing with random experiments related to questionnaires and surveys Likert scales are often employed to describe responses. These questionnaires and surveys are usually designed by considering a fixed-response format, so that possible responses reflect in some senses the imprecision associated with most of the opinions or judgments. However, the natural subjectiveness as well as the realistic high diversity underlying the responses are not well-captured with Likert scales.

In this paper, free-response format questionnaires or surveys based on the scale of fuzzy numbers are to be considered. To compare the use of both scales from a statistical perspective an empirical study is to be presented. In this way, by using a (generalized) mean squared error for fuzzy data, simulations are carried out to generate randomly fuzzy numbers as potential responses. Some plausible criteria are later applied to ‘Likertize’ these fuzzy numbers and the associated MSEs are compared.

This introductory empirical analysis allows us to conclude that although the fuzzy numbered free -response format questionnaire/survey enables a much higher diversity and subjectiveness than Likert’s one, the mean value is more representative for the first one than for the usual integer coding of the Likert in most of the situations. On one hand, the fuzzy numbers scale captures much better the diversity and subjectiveness of the responses and describes the imprecision in a much more accurate way and. On the other hand, the mean value leads in most of (in some cases even in all) the simulations to a lower (squared) error in representing/estimating the responses with the fuzzy than with the Likert scale.

Keywords: Likert scale, fuzzy numbers, generalized metric between fuzzy numbers

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