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An Interactive Software Application for Gauge R&R Analysis

Measurement System Analysis is a fundamental element in quality improvement initiatives in manufacturing and is commonly conducted by Gauge Repeatability and Reproducibility (Gauge R&R) studies. However, most of the widely used software tools for Gauge R&R analysis confine the analyst to a restricted design in which the analysis is performed by ANOVA. In such analyses, generally part and operator factors are considered as sources of variability. However, industrial applications sometimes have a different structure and extend beyond this standard template. For instance, measurement variance can be decomposed into other sources of variability, have a nested structure, or include higher order interactions. Forcing such designs into a standard two-factor crossed model can be unsuitable.

This study presents an interactive software application developed to allow practitioners specify different measurement system designs without requiring programming and provide variance component estimates together with Gauge R&R metrics. The user identifies the factors affecting the measurements and classifies each factor by its source. The interface then enables the configuration of nested relationships and interactions. Based on the user's selections, the application builds the corresponding effects model and estimates the variance components using the chosen method, either the classical ANOVA approach or REML. Unlike ANOVA, REML also enables the analysis of unbalanced and incomplete measurement data. A range of diagnostic graphics including main-effect plots, interaction plots, and variance-contribution plots are provided as the visual assessment of each variance component.

Special/ Invited session

Classification

Mainly application

Keywords

Measurement System Analysis, Gauge R&R, Statistical Quality Control, Measurement Uncertainty

Primary author: KARAMAN, Mahmut Onur (Hacettepe University)

Co-author: Prof. TESTIK, Murat Caner (Hacettepe University)

Presenter: KARAMAN, Mahmut Onur (Hacettepe University)

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