VERIFICATION OF STATISTICAL CALCULATIONS IN INTERLABORATORY COMPARISONS BY SIMULATING INPUT DATASETS

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Abstract
In order to introduce a traceability chain into metrology computation, European project EMRP NEW 06 TraCIM was agreed between EC and European metrology association Euramet. One of the tasks of the project is also to establish random datasets and validation algorithms for verifying software applications for evaluating interlaboratory comparison results. Statistical analysis of different types of interlaboratory comparisons is based on numerous statistical quantities, which depend on the form of results reported by the participants, way of determining assigned value and its uncertainty, outliers etc. Complex statistical analysis is normally performed by using different software applications. In order to check the performance of those applications, we have developed validation software, which consists of a user interface, data generator and a module for calculating all standardised statistical quantities used for evaluating interlaboratory comparison results. This article is presenting our approach for verifying the validation software before offering it to the metrology community. The verification is based on simulating different cases of interlaboratory comparisons and on comparing results of statistical calculations between different SW packages like Wolfram Mathematica and Microsoft Excel.

1. INTRODUCTION

Quality of a measurement result is most commonly expressed with an interval of possible scattering around the true value of a measured quantity. In calibration and in advanced measurements, this interval is expressed in terms of measurement uncertainty and is determined according to [1]. However, in most industrial measurements and in some conformity assessment activities like testing and inspection, the measurement result is not accompanied with the information about measurement uncertainty. The interval of allowed scattering is defined with a tolerance zone or expected level of accuracy.

Regardless to the way of expressing measurement result quality, laboratories in metrology business like calibration and testing laboratories are obligated to prove their performance by taking part in interlaboratory comparisons [2-4]. National metrology institutes having their calibration and measurement capabilities (CMCs) published in the international Key Comparison Database (KCDB) must take part in key and supplementary BIPM comparisons on regular basis in order to prove their performance capability on highest metrological level [5-7]. Interlaboratory comparisons are also very important for proving quality of measurements, where measurement uncertainty is hard to determine [8]. In testing, laboratory bias may be assessed by tests on reference materials, when these are available. Otherwise, interlaboratory comparisons provide a generally available means of obtaining information about laboratory bias. However, stability and repeatability will affect data obtained in comparison, so that it is possible for a laboratory to obtain data in a round of a proficiency test which indicate bias that is actually caused by poor stability or poor repeatability [3].
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REFERENCES


