How to Control Survey Quality when Estimation and Testing are Combined

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SUMMARY

Methods of surveying quality control consist generally of both parameter estimation and statistical hypothesis testing. Estimation, often via a least-squares adjustment, is then carried out to obtain optimal estimates of the parameters of interest, while statistical testing is conducted to detect and identify possible misspecifications in the assumed working hypothesis. Although estimation and testing is conducted on the same data, current quality control methods fail to take the interdependence between them into account. As one of the serious consequences, in particular for risk-critical applications, the resulting quality description will become too optimistic. The DIA (Detection, Identification, Adaptation)-method presented in this contribution avoids this serious pitfall through a rigorous integration of the probabilistic uncertainties of both estimation and testing. Various numerical examples will be given to illustrate the DIA-methodology and underlying concepts involved.