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Some challenges in calculating process capability indices from automatic data

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In statistical evaluation of process effectiveness using statistics like capability or performance indices there are strong assumptions such as normality, homogeneity or independence. It can be problematic to check the assumptions for automated unsupervised data streams. Approaches are applied to standard data as well as data violating assumptions, like probability models. It has been shown that redefining or extending quality criteria can help to use standard quality tools meaningfully even in the case of serious departure from standard method assumptions. In structured data sources from different levels of production a need arises to aggregate quality metric statistics such as standard deviations and derived indices (cpk, ppk or probability measure dpmo). Normalization of heterogeneous data sources and aggregation techniques over time and process structure are investigated to achieve informative aggregated measures of quality and real world data examples are provided. A new scalable measure of the process improvement potential has been suggested: Quality Improvement Potential Factor (QIPF). Among the addressed problems are: interpreting high capability values, split-multistream, parallel and serial aggregation, univariate and multivariate process capability scaling.

References

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Primary author: KUPKA, Karel

Presenter: KUPKA, Karel

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