European Network for Business and
Industrial Statistics

Contribution ID: **68**   Type: **not specified**

Non-parametric multivariate control charts based on data depth notion

Tuesday, 14 September 2021 15:30 (30 minutes)

A control chart is used to monitor a process variable over time by providing information about the process behavior. Monitoring the process of related variables is usually called a multivariate quality control problem. Multivariate control charts, needed when dealing with more than one quality variable, relies on very specific models for the data generating process. When large historical data set are available, previous knowledge of the process may not be available or a unique model for all the features cannot be adopted, and no specific parametric model turns out to be appropriate and some alternative solutions should be adopted. Hence, exploiting non-parametric methods to build a control chart appears a reasonable choice. Non-parametric control charts require no distributional assumptions on the process data and generally enjoy more robustness, i.e. are less sensitive to outlier, over parametric control schemes. Among the possible non-parametric statistical techniques, data depth functions are gaining a growing interest in multivariate quality control. These are nonparametric functions which are able to provide a dimension reduction to high-dimensional problems. Several depth measures are effective for purposes, even in the case of deviation from the normality assumption. However, the use of the L^p data depth for constructing nonparametric multivariate control charts has been neglected so far. Hence, the contribution of this work is to discuss how a non-parametric approach based on the notion of the L^p data depth function can be exploited in the Statistical Process Control framework.

Keywords

L^p data depth, Statistical Process Control, ARL.

Special/invited session

"ISBIS session" (Session Title: Advances in Statistical Modeling and Applications)

Primary authors: IORIO, Carmela (University of Naples Federico II); Dr PANDOLFO, Giuseppe (University of Naples Federico II)

Presenter: IORIO, Carmela (University of Naples Federico II)

Session Classification: Advances in Statistical Modeling and Applications (ISBIS)