Multivariate Statistical Process Control

Kulahci, Murat

Published in:
Workshop on Farm Animal and Food Quality Imaging 2013

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

Multivariate Statistical Process Control

Murat Kulahci

Technical University of Denmark, Applied Mathematics and Computer Science

Abstract. As sensor and computer technology continues to improve, it becomes a normal occurrence that we confront with high dimensional data sets. As in many areas of industrial statistics, this brings forth various challenges in statistical process control (SPC) and monitoring for which the aim is to identify "out-of-control" state of a process using control charts in order to reduce the excessive variation caused by so-called assignable causes. In practice, the most common method of monitoring multivariate data is through a statistic akin to the Hotelling's T^2. For high dimensional data with excessive amount of cross correlation, practitioners are often recommended to use latent structures methods such as Principal Component Analysis to summarize the data in only a few linear combinations of the original variables that capture most of the variation in the data. Applications of these control charts in conjunction with image data are plagued with various challenges beyond the usual ones encountered in current applications. In this presentation we will introduce the basic ideas of SPC and the multivariate control charts commonly used in industry. We will further discuss the challenges the practitioners are facing with in the implementation of these charts.