Phase II Monitoring of Correlated Simple Linear and Logistic Regression Profiles

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Abstract

Sometimes, quality of a process or a product is described by a relationship between a response variable and one or more explanatory variables which is referred to as profile. There are different types of profiles including simple linear, multiple linear, polynomial, nonlinear and generalized linear models and so on. In some cases, the quality is described by more than one profile in which the corresponding responses are correlated. This is known as multivariate profile in the literature of profile monitoring. In all studies in this area, it is assumed the responses follow multivariate normal distribution. However, sometimes the normality assumption of some responses may be violated. As a result, those responses may follow other distributions such as binomial distribution rather than normal distribution. Responses with binomial distribution are usually modeled by a logistic regression model. In this paper, we consider a correlated simple linear profile and logistic regression profile. Then, we develop a Phase II monitoring procedure based on the residuals to monitor the correlated profiles. The performance of the proposed method is evaluated through simulation studies in terms of average run length (ARL) criterion. The results indicate desirable performance of the proposed method rather than monitoring the profiles individually.

Keywords
Profile monitoring, simple linear profile, logistic regression profile, average run length (ARL), Phase II

Biography

Mona Ayoubi is a PhD candidate in Industrial Engineering at Tarbiat Modares University. She holds a MS degree in Industrial Engineering from Iran University of Science and Technology. Her research interests are including statistical process control and profile monitoring.

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