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Model robust profile monitoring for the generalized linear mixed model for phase I analysis

There are so many applications for detecting the changes in the relationship between the response variable and explanatory variable (s) may be the most important consideration rather than detecting the changes in univariate or multivariate quality characteristics. This relationship between the response variable and one or more explanatory variables is called a profile. The act of using various techniques to statistically monitor the process or product profiles is known as profile monitoring. The study introduces two mixed model methods to monitor profiles from the exponential family: a nonparametric (NP) regression method based on the penalized spline regression technique and a semi-parametric (SP) method (Model robust profile monitoring for the generalized linear mixed model (MRGLMM)) which combines the advantages of both the parametric and nonparametric methods. A correctly specified parametric (P) model will have the most power in detecting the profile shift, while a NP method can give improved performance for any type of profile. The MRGLMM method gives results similar to the P method when P model is correctly specified and it gives results similar to the NP method if the proposed P model is badly misspecified. The MRGLMM method gives results that are superior to either the P method or the NP method if the P model provides some useful information regarding profile behavior. Thus, the MRGLMM method is robust to model misspecification. The performances of P, NP and MRGLMM methods are compared through a simulation study using binary data.

Biography

Abdel-Salam Gomaa holds BS and MS (2004) degrees in Statistics from Cairo University and MS (2006) and PhD (2009) degrees in Statistics from Virginia Polytechnic Institute and State University (Virginia Tech, USA). Prior to joining Qatar University as an Assistant Professor and a Coordinator of the Statistical Consulting Unit and Coordinator for the Statistics Programs, he taught at Faculty of Economics and Political Science (Cairo University), Virginia Tech, and Oklahoma State University. Also, he worked at JPMorgan Chase Co. as Assistant Vice President in Mortgage Banking and Business Banking Risk Management Sectors. He has published several research papers and delivered numerous talks and workshops. He has awarded couples of the highest prestige awards such as Teaching Excellence from Virginia Tech, Academic Excellence Award, Freud International Award, and Mary G Natrella Scholarship from American Statistical Association (ASA) and American Society for Quality (ASQ), for outstanding graduate study of the theory and application of Quality Control, Quality Assurance, Quality Improvement, and Total Quality Management. He is a Member of the ASQ and ASA.

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