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Outlier robust non-linear mixed model estimation on gene expression

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In standard analyses of data well-modeled by a Non-Linear Mixed Model (NLMM), an aberrant observation, either within a cluster, or an entire cluster itself, can greatly distort parameter estimates and subsequent standard errors. Consequently, inferences about the parameters are misleading. This paper proposes an outlier robust method based on linearization to estimate fixed effects parameters and variance components in the NLMM. An example is given using the 4-parameter logistic model, gene expression, environment datasets, and comparing the robust parameter estimates to the non-robust estimates.

Biography

Abdel-Salam Gomaa Abdel-Salam 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, he taught at Faculty of Economics and Political Science (Cairo University), Virginia Tech, and Oklahoma State University. Also, he worked at J P Morgan 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 was awarded a couple 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. Also, he was awarded the Start-Up Grant Award from Qatar University (2014/15) and The Cairo University Award for international publication in 2014. His research interests include all aspects of industrial statistics and economic capital models, including statistical process control, multivariate analysis, regression analysis, exploratory and robust data analysis, mixed models, non-parametric and semi-parametric profile monitoring, health-related monitoring and prospective public health surveillance.

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