The Negative Binomial Distribution Efficiency in Finite Mixture of Semi-parametric Generalized Linear Models

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Extended Abstract

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Introduction

Selection the appropriate statistical model for the response variable is one of the most important problem in the finite mixture of generalized linear models. One of the distributions which it has a problem in a finite mixture of semi-parametric generalized statistical models, is the Poisson distribution. In this paper, to overcome over dispersion and computational burden, finite mixture of semi-parametric generalized linear models using the negative binomial (GFMMNB) distributions instead of finite mixture of semi-parametric generalized linear models using the Poisson distributions (GFMMP) has been proposed. Efficiency of GFMMNB to GFMMP using weighted generalized mean of square error (WGMSE) for both the simulation data and real data are shown.

Material and methods

In this scheme, first we have introduced finite mixture of semi-parametric generalized linear models using the Poisson distributions (GFMMP). Then, we have introduced finite mixture of semi-parametric generalized linear models using the negative binomial (GFMMNB) instead of GFMMP. For estimating the parameters in the proposed model, the EM algorithm in two steps computed. We have used the efficiency method using weighted generalized mean of square error (WGMSE) for comparing between GFMMNB and GFMMP model in both the simulation and real data.

Results and discussion

Results of real example and simulation study between GFMMNB and GFMMP model are shown that the proposed method is very competitive in terms of estimation accuracy and speed of computational estimation methods. The reported results demonstrate that there is a good agreement between simulation study and real data in the GFMMNB model.

Also, the numerical results reported in the tables indicate that the accuracy improve by increasing the n for GFMMNB model. Therefore, to get more accurate results, the larger n is recommended.

Conclusion

The following conclusions were drawn from this research.

- Computation of estimators for proposed model using the EM algorithm are found very easily and therefore many calculations are reduced.
- Confidence intervals for parameters in GFMMNB model is more accurate than GFMMP model.
- The main characteristic of proposed method is that it improves the finite mixture model and can be easily solved by using iterative method.

Keywords: Equating, EM Algorithm, Penalized Function, Mixture Models.

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