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Modeling Frequency and Severity of Claims with the Zero-Inflated Generalized Cluster-Weighted Models

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Abstract
In this paper, we propose two important extensions to cluster-weighted models (CWMs). First, we extend CWMs to have generalized cluster-weighted models (GCWMs) by allowing modeling of non-Gaussian distribution of the continuous covariates, as they frequently occur in insurance practice. Secondly, we introduce a zero-inflated extension of GCWM (ZI-GCWM) for modeling insurance claims data with excess zeros coming from heterogenous sources. Additionally, we give two expectation-optimization (EM) algorithms for parameter estimation given the proposed models. An appropriate simulation study shows that, for various settings and in contrast to the existing mixture-based approaches, both extended models perform well. Finally, a real data set based on French auto-mobile policies is used to illustrate the application of the proposed extensions.

KEYWORDS: GCWM, CWM, clustering, automobile claims.

JEL CLASSIFICATION: C02, C40, C60.

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