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Mixtures of Length-Biased Weibull Distributions for Loss Severity Modelling

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Abstract : In this paper, a class of length-biased Weibull mixtures is presented to model loss severity data. The proposed model generalizes the Erlang mixtures with the common scale parameter, and it shares many important modelling features, such as flexibility to fit various data distribution shapes and weak-denseness in the class of positive continuous distributions, with the Erlang mixtures. We show that the asymptotic tail estimate of the length-biased Weibull mixture is Weibull-type, which makes the model effective to fit loss severity data with heavy-tailed observations. A method of statistical estimation is discussed with applications on real catastrophic loss data sets.

Keywords : Erlang mixture, length-biased distribution, transformed gamma distribution, asymptotic tail estimate, EM algorithm, expectation-maximization algorithm
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