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On Claims Reserving with Machine Learning Techniques

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Abstract

In this thesis we will explore the possibility of improving traditional non-life claims reserving models with machine learning techniques. We present three models; gradient boosting machines (GBM) and two neural network models. The first neural network reserving model is specified such that the claim counts and claim amounts are modelled separately in their own networks. The second one models the claim counts and amounts jointly in one network. The starting point for both neural network reserving models is the over-dispersed Poisson (ODP) reserving model estimates. Hence, the neural network models can be thought of as neural network boosting of the traditional ODP reserving model. We discuss the fitting procedure of the machine learning models and predict the outstanding reserves for simulated and real-world data. In addition, we calculate the mean squared error of prediction (MSEP) to examine the variation of the models. The presented models perform very well on the simulated data, especially GBM shows excellent performance. Moreover, the predictions are also improved for real-world data with GBM compared to the traditional Chain-Ladder reserving model.

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