Simulations recurrent events model

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Summary

The basic capture-recapture model for estimating the size of a hidden population is the Poisson model. This document evaluates the potential of the recurrent events model for population size estimation. The difference between the two models is that the recurrent events model analyzes the 'history' of the captures, while the Poisson model only analyzes the total number of captures. As a consequence, the recurrent events model is more flexible than the Poisson model, and is able to model effects such as a temporary absence from the population or seasonal fluctuations in the population. A down-side of the model is that it requires more detailed data, which may seriously complicate the process of data collection. The aim of this report is to evaluate the costs and benefits of the recurrent events model.

The first three chapters describe the theory behind the recurrent events model, and its flexibility in modeling different effects. The simulation study in Chapter 4 shows that the recurrent events model, if specified correctly, results in better estimates than the Poisson model. Chapter 5 reports the results of a real data example; the estimation of the population of illegal immigrants in the Netherlands in 2009. In contrast to the Poisson model, the recurrent events model corrects the estimates for the time that the illegal immigrants spend in detention. As a consequence, the population estimate is substantially lower than that of the Poisson model.

The appendix describes the process of data collection for the illegal immigrant example. It shows that especially the collection of the detention times has been so complicated, that certain pragmatic choices had to be made. As a consequence, the quality of the required detention data is hard to assess.