

On the identifiability of start-up demonstration mixture models

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Abstract In start-up demonstration testing, the performance of the unit on successive start-ups is taken into account and several different types of decision criteria (most of them are inspired by the theory of runs and scans) for accepting or rejecting the unit have been introduced. Although the use of a start-up demonstration test assumes the existence of units of lower quality, when the estimation of the respective probability comes up, there is still much work to be done. Therefore, in this paper, we study binary start-up demonstration tests, assuming that we have at hand two different types of units with potentially different probabilities of successful start-up. In this case, the waiting time distributions are expressed as two-component mixture models and their identifiability is discussed. Finally, an estimation method based on the EM algorithm for the model parameters is described and some numerical examples are presented to illustrate the methods developed here.

Keywords Start-up demonstration tests · i.i.d. binary trials · Waiting time distributions · Mixture models · Identifiability · Maximum likelihood method · EM algorithm

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