

This presentation consists of three different parts. First, we focus on semi-Markov chains and we present different explicit formulas to describe reliability indicators such as failure rates. The Markov chains are defined in a discrete state space and the indicators are estimated by means of empirical plug-in type estimators. Our objective is to compare the different expressions, study the asymptotic properties of the estimators and finally compare them in terms of asymptotic variance. The strong consistency and the asymptotic normality of the estimators are proved. The asymptotic study is made in the large-sample context. Second, we move to continuous-time semi-Markov processes and present bootstrapped, kernel-type estimators and bootstrapped kernel-type estimators of reliability indicators. These last estimators are very advantageous in the case of real data studies, since the evaluation of their asymptotic confidence intervals is feasible due to the fact that they do not depend on theoretical quantities. The third part concerns reliability indicators for hidden Markov and hidden semi-Markov models. Explicit formulas are derived and estimated by means of plug-in type estimators.