

Time-varying regression coefficients for semi-Markovian Model : Application to malaria serological and Covid 19.

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Abstract:

Time homogeneous Markov model has been successfully used to extend the classical survival analysis to the multi-states analysis. This model assumes that the evolution of the process is independent to the waiting time in the state. In our clinical problem, this constraint is restrictive. The semi-Markov can be used to extend the time-homogeneous Markov model with discrete states and continuous time, because waiting time distributions are considered. We propose a parametric semi-Markovian model applied to the malaria serological data. We develop a semi-Markov model with time-varying regression coefficients adapted to medical context. The purposes are threefold. The first is to introduce a modified Weibull distribution on the semi-Markovian process class offering some flexibilities than those often used as Weibull and exponential Weibull. The second is to discuss a simple approach based on using appropriate time-dependent covariates effect in a homogeneous semi-Markov model and to propose a non-parametric estimation for the time-varying regression coefficients using spline functions. The third purpose is to discuss the application of these results on semi-Markov models to malaria serology.

Keyword : Multi-state model, Semi-Markov process, Flexible Weibull distribution, Hazard function, Malaria serology, longitudinal analysis.

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