FLEXIBLE BIVARIATE MODELS FOR SEROLOGICAL DATA

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The serologies of infectious diseases as e.g. measles and rubella are unlikely to be independent. As such, there is a great interest in studying the association among those diseases. We use the bivariate Dale model (Dale, 1986) and the baseline-category logit model (see e.g. Agresti, 2002) to relate the prevalences (the presence of infection-specific antibodies) of both diseases. Apart from using the odds ratio to describe the association in a Dale model, we opt to use a conditional synchrony measure which stems from neuronal fitting (Faes et al. 2004) and measures the synchrony in acquiring both infections. We restricted ourselves to model the dependency of the joint, marginal and conditional prevalence as a function of age and use both parametric and nonparametric methods. The results show that nonparametric methods are more adequate to describe the prevalence and related diseases parameters as the force of infection, i.e. the rate at which a susceptible individual acquires infection. Since antibodies are required lifelong, an additional complexity which is dealt with is this prevalence to be monotone as a function of age or equivalently the force of infection to be positive for all ages.