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173

Correlated random effects in survival analysis

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Survival analysis is a popular methodology when analyzing the occurrence of an event as a function of time. It allows to use both time independent and time dependent explanatory variables, as well as to include unobserved random heterogeneity into survival data models. The Survival Kit software package is frequently used for survival analysis in animal breeding, as it allows handling very large databases with a possibility to account for the relationship between animals. From version 6 on, it is possible to jointly estimate variances for two normally distributed random effects, assuming that they are independent from each other. In certain situations however one might suspect some connection between the two random effects. This is the case for genetic effects which vary with time (e.g. the sire effect on culling of his daughters in early vs later lactations) or for survival traits influenced by direct and maternal genetic effects (e.g. survival from birth to weaning). We present an extension of the Survival Kit where it is possible to include correlated random effects, accounting for their relatedness. The correlation coefficient can be estimated or fixed, in case it is already known. The methodology is demonstrated using a practical example.