Regression Modeling of Time to Event Data using the Ornstein-Uhlenbeck Process

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Abstract

Often in biostatistical research, the goal is to identify factors related to survival or disease development. The traditional approach in this setting is to apply a Cox regression model which requires the assumption of proportional hazards. An alternative model, which doesn't require proportional hazards, is the First Hitting Time (FHT) model where a subject's health is modeled using a latent stochastic process which fails once it hits a boundary value. In this talk, we present an FHT model based on the Ornstein-Uhlenbeck (OU) process; a modified Wiener process which drifts toward a state of equilibrium or homeostasis present in many biological applications. Methods for incorporating covariate information and a cure rate are presented and applied to data from two cancer clinical trials.

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