PIMS Distinguished Lecture Series

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Friday
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3:30 PM

Research & Innovation Centre
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Non-Penalty Shrinkage: A New Approach to Log-Logistic Proportional Hazards Modeling

In this talk, we consider the non-penalty shrinkage and pretest estimation methods for the regression parameters of the generalized log-logistic proportional hazards (PH) model. This model, a simple extension of the log-logistic model (which maintains the proportional hazards property), shares similarities with the Weibull model. We focus on right-censored data where some parameters are constrained to a restricted subspace. This constraint information is used to shrink unrestricted maximum likelihood estimates towards restricted model estimates, optimally combining them to create pretest and shrinkage estimators. While this approach may introduce bias, it demonstrably reduces overall mean squared error. The effectiveness of our proposed model and estimation techniques is validated through simulation studies and a real-world data application. We compare the performance of the generalized log-logistic, Weibull, and Cox PH models under unimodal and increasing hazard scenarios. Simulation and real data analyses reveal that the shrinkage estimator offers lower risk than the maximum likelihood estimator when the shrinkage dimension exceeds two.

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