Statistical Inference for Component Distribution from System Lifetime Data

In this talk, statistical inference of the reliability characteristics of the components in the system based on the lifetimes of systems will be discussed. Various point and interval estimation methods for the parameters in different models are proposed. Next, we discuss the problem of testing the homogeneity of distributions of component lifetime based on system lifetime data with known system signatures. Both parametric and nonparametric procedures are developed for this problem. The performance and limitations of the proposed nonparametric method are discussed. Then, we assume the component lifetimes follow exponential distributions and develop exact and asymptotic parametric tests. Monte Carlo simulation study is used to compare the performance of different parametric procedures as well as the nonparametric procedure. Based on the simulation results, discussions and practical recommendations as well as some concluding remarks are finally provided.

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