Estimation and Testing with Extended Sequential Order Statistics

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Theme 2
2023-08-18

Virtual - Researchers Catch-up host online from University of WA

Historically the lifetimes of individual units of multi-component systems are modelled as independent and identically distributed. Sequential Order Statistics relax this assumption by allowing component lifetime distributions to change upon failure of another unit.

This assumption is justified when the stress on the surviving units increases, and their respective lifetime expectation consequently reduces as components fail successively. Most load-sharing systems will exhibit such a relationship between components. Take a series of wash tanks that filter an inflow of contaminated products, for example. Each tank experiences a different workload based on its position in the series. Consequently, the tanks have different lifetime expectations, even if they are of the same type.

Tim will present a series of exciting inferential results for Extended Sequential Order Statistics. He will present a likelihood ratio test to help determine which model is better suited, the Sequential Order Statistics or the Extended Sequential Order Statistics model.
These estimation and testing techniques can achieve meaningful results in real-life applications. They empower system operators to predict failure times better and make educated decisions towards their maintenance schedule and stockpiling strategies.

About the presenter
Tim is a mathematician with experience in reliability probability estimation. Tim is passionate about the application of statistical models to real world problems and overcoming the challenges with such applications. Tim's PhD Research project aims to build a highly sophisticated model for coherent systems consisting of components with different lifetime behaviours which share a common workload.

He expects to deliver a model that industrial partners can deploy to predict failures of their equipment components.