samsi
NSF·Duke·NCSU·UNC

GDRR Program Opening Workshop
August 5-9, 2019

SPEAKER TITLES/ABSTRACT

Evans Gouno
Universit´e de Bretagne Sud

"Bayesian Inference for Common Cause Failure Rate Based on Causal Inference with Missing Data"

A common-cause failure (CCF) is defined as the simultaneous failure of two or more components of a system due to a shared cause. The number of components involved in the system failure is called the order of the CCF. The cause of a CCF can be of different natures. For example, extreme environment or human error or manufacturing error can provoke synchronized failure.

In this talk we will describe a methodology to handle the causality to make inference on common-cause failure in a situation of missing data. The data are collected in the form of contingency table but the available information are only the numbers of CCF of different orders and the numbers of failure due to a given cause. Therefore only the margins of the contingency table are observed; the frequencies in each cell are unknown. Assuming a Poisson model for the count, we suggest a Bayesian approach and we use the inverse Bayes formula (IBF) combined with a Metropolis-Hastings algorithm to make inference on the rate of occurrence for the different combination cause, order. The performance of the resulting algorithm is evaluated through simulations. A comparison is made with results obtained from the _-composition approach to deal with causality suggested by Zheng et al. (2013).
keyword: Common-cause failure, Inverse Bayesian formula, Contingency table, Missing data, Causal inference.