Data Analytics for Complex Service Systems: Advancing the Science of Health Care Delivery.
Devashish Das, Ph.D.

Biography

Dr. Devashish Das is a Research Associate in the Health Care Systems Engineering Program at the Mayo Clinic Robert D. and Patricia E. Kern Center for the Science of Health Care Delivery. He received his Ph.D. in Industrial Engineering from the University of Wisconsin – Madison in 2015 and B.Tech. in Manufacturing Science and Engineering from the Indian Institute of Technology – Kharagpur in 2010. His research interests lie at the intersection of statistics, operation research and systems engineering to improve complex service systems, with a focus on advancing the science of health care delivery.

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Abstract

One of the major applications of big data analytics in complex service systems is to quickly identify deterioration in quality of service. To realize this goal, many industries are collecting vast amounts of data related to important performance metrics. For example, hospital emergency departments collect time-stamped data, which can be used to calculate metrics such as patient's length of stay and time patients wait till seen by a doctor. These data are often complex and inferring changes in such complex data is a challenge. Therefore, there is need to develop better statistical modeling and inference tools that effectively detect changes in performance metric data. This presentation mostly focuses on building a statistical monitoring scheme for service systems that experience time varying arrivals of customers and have time varying service rates. Motivated by the emergency department of the Mayo Clinic, the goal of the proposed method is to build a statistical monitoring framework that generates an alarm when the quality of service has changed. The proposed method is able to identify patterns of inefficiency or delay in service that are hard to detect using traditional statistical monitoring algorithms. The presentation will also showcase other applications of statistical monitoring techniques in analyzing high-dimensional and complex data.