

Toward Improved Sepsis Treatment through Predictive Modeling

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Abstract

Sepsis afflicts 750,000 people in the US each year, with its more severe forms, severe sepsis and septic shock, killing one in every four patients. Early medical intervention can substantially improve patient outcome and reduce mortality. Hence, prediction systems that take advantage of electronic medical record (EMR) data to provide early warning to medical staff can be of great benefit, saving lives and reducing healthcare costs. This is a challenging task for a number of reasons, with a major one being the fact that EMR data is very messy: it is large, often has missing observations, is very noisy, and is heterogeneous. Furthermore, solving the problem in a practical way requires an understanding of both the disease and how hospitals actually function. This means building an interdisciplinary team and working together to find an applied solution. We use statistical modeling and machine learning approaches to address the challenges inherent to the data, aiming to improve prediction of sepsis mortality. We work with our medical collaborators to codify these approaches into software that can actually be deployed in a hospital and will be useful and trusted by physicians in practice.

Biographies

Vincent Liu is a board-certified physician in Internal Medicine, Pulmonary Diseases and Critical Care Medicine. After completing his medical training at New York University, Memorial Sloan-Kettering Cancer Center, and Stanford University, he has also completed two Master's degrees at Stanford University in Health Services Research and Biomedical Informatics. Dr. Liu currently works at Kaiser Permanente and focuses on utilizing large scale and complex data from hospitalization to understand how to improve the treatment of individual patients as well as large populations.

Ana Paula Sales is a formally trained biologist with a Master's degree in statistical science and Ph.D. in computational biology and bioinformatics, both from Duke University. After obtaining her Ph.D., she completed a two year postdoctoral fellowship in applied statistics at Lawrence Livermore National Laboratory, and has since become a member of LLNL's research staff. Ana Paula is interested in development and application of statistical models and machine learning approaches to biomedical-related problems.