

Yale SCHOOL OF PUBLIC HEALTH

Biostatistics

Presentation

" Individualized- and Community-level Disease Risk Prediction through the Integration of Information across Disparate Data Sources "

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ABSTRACT

Large-scale epidemiologic studies are rapidly leading to novel findings of risk factors associated with various human diseases. The increasing availability of multi-modal health data provides us with major opportunities to develop data integration methods for developing advanced risk prediction tools incorporating a rich set of risk factors, which could generate more effective strategies for disease prevention on healthy individuals and treatment strategies for patients. Such data fusion has been an understudied area with many open questions. In this talk, I will present data integration methods for risk model development via two specific applications. The first application focuses on the effective integration of individual- and summary-level information from studies on different types of risk factors and community-level pandemic dynamics to develop individualized prediction models for COVID-19 mortality risk. Such a methodological framework can be applied to predict and validate the risk of other diseases on both individual- and community-level and be continuously updated once new datasets or information are available. In the second application, we develop enhanced genome-wide polygenic risk scores for the underrepresented non-European populations by appropriately borrowing information from the much larger European datasets through the integration of ethnicity-specific genetic datasets. Both applications demonstrate future promise of data integration methods for developing comprehensive risk models and informing targeted disease prevention strategies.

Biography

Dr. Jin Jin is a postdoctoral fellow in Dr. Nilanjan Chatterjee's group at the Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health. She received Ph.D. in Biostatistics from the University of Minnesota, Twin Cities in 2019 under the supervision of Drs. Joseph S. Koopmeiners and Lin Zhang. Before that she received her bachelor's degree in statistics from the School for the Gifted Young, University of Science and Technology of China (USTC). Her research interests focus on developing statistical and computational methods to address cutting-edge problems in public health and medicine by integrating large-scale, multi-source datasets. Within this scope, her research involves Bayesian hierarchical modeling, disease risk prediction with a focus on reducing health disparities, statistical genetics, Mendelian randomization, and clinical trial design.

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