MICHIGAN STATE UNIVERSITY
Department of Statistics and Probability

CMSE TEACHING PRESENTATION

Yong Chen
University of Texas School of Public Health

Analysis of Longitudinal Data Under Biased Sampling

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Abstract

Over the past few decades, a dramatic increase in the incidence of obesity has become a worldwide health issue, contributing significantly as a risk factor of many diseases. Many individuals participate in web-based weight loss programs where their weights, physical activities and diets are self-reported. Such web-based program generated data poses new challenges to statistical modeling and inference, including subject-specific self-reporting times and outcome-dependent missingness. These challenges are known as biased sampling problem in statistical literature, and can lead to substantial bias in inference. In this talk, we propose a framework of novel statistical methods to efficiently detect and adjust for sampling bias, and to evaluate both the overall effectiveness of the weight loss program and the subject-specific effects of website usages on weight loss. The proposed methods provide elegant solutions for detecting and eliminating the impacts of biased sampling, and can achieve unbiased inference without fully specifying the complex data-generating mechanism. We apply the proposed methods to evaluate the effectiveness of a web-based program on weight loss, controlling the nonlinear trajectory of weights over time.