Bayesian Nonparametric Policy Search with Application to Periodontal Recall Intervals

Abstract

Tooth loss from periodontal disease is a major public health burden in the United States. Standard clinical practice is to recommend a dental visit every six months; however, this practice is not evidence-based, and poor dental outcomes and increasing dental insurance premiums indicate room for improvement. We consider a tailored approach that recommends recall time based on patient characteristics and medical history to minimize disease progression without increasing resource expenditures. We formalize this method as a dynamic treatment regime which comprises a sequence of decisions, one per stage of intervention, that follow a decision rule mapping current patient information to a recommendation for their next visit time. The dynamics of periodontal health, visit frequency, and patient compliance are complex, yet the estimated optimal regime must be interpretable to domain experts if it is to be integrated into clinical practice. In this talk, we combine non-parametric Bayesian dynamic modeling with policy-search algorithms to estimate the optimal dynamic treatment regime within an interpretable class of regimes. Both simulation experiments and application to a rich database of electronic dental records from the HealthPartners HMO show that our proposed method may lead to better dental health without increasing the average recommended recall time, relative to competing methods.

This is joint work with Qian Guan, Eric Laber, and Brian Reich from the North Carolina State University.

DATE: Wednesday, April 24, 2019
TIME: 4:00 pm
PLACE: Philip E. Austin Bldg., Rm. 108

Coffee will be served at 3:30 in the Noether Lounge (AUST 326)