

Indiana University-Purdue University Indianapolis

Department of Mathematical Sciences

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, November 03, 2020

Zoom Meeting: Meeting ID: 751 025 519

Speaker: Ross Grinvalds

Department of Mathematical Sciences, IUPUI

Title: Extending free one-knot-to-multiple spline model for changepoint detection in the US COVID-19: a review of definitions, implementation methods, and preliminary results

Abstract:

In a prior discussion about change point detection given this semester on September 15th, the consistency and asymptotic normality of the least squares estimates of free-knot spline model parameters was established. The original analysis used data published by the New York Times through June 18th, 2020. In this analysis, daily cases of COVID-19 in the United States were modeled as a function of the total number of cases. The trends captured in this timeframe include both the rapid onset and spread of COVID-19 as well as the first major decline in daily cases. This data could therefore be characterized using only a single change point. Data collected past June 18th reveals additional change points in daily cases which are obvious by inspection. This suggests a need for models with more than one change point. Because the number of total possible models grows exponentially with the number of knots permitted in the model, a method for rapid model generation, measure, and retrieval is desirable. We summarize our results over the past two months and conclude with the future direction of our work. We also discuss a major predicament and known problem of free-knot spline models in general, the identification of an optimal number of knots.