UWI ST. AUGUSTINE CAMPUS

FACULTY OF SCIENCE & TECHNOLOGY

Title: **Properties of a Stochastic Dynamic Programming Formulation to Influence Maximization**

Abstract:

This research considers a novel stochastic dynamic programming approach to influence maximization (IM) named influence maximization-revenue optimization (IM-RO). The novel part of the approach derives from adopting a resource allocation perspective to the influence maximization (IM) problem by implementing stochastic dynamic programming. The practical application is to strategically assign advertisement impressions to users in an online social network (OSN) to maximize clicks and revenue. The results of this research provide numerical evidence on some useful properties of the IM-RO problem that are specific to real-life applications of computational results. Moreover this research expands on preliminary findings which demonstrated that the objective function for the IM-RO problem was concave with respect to the number of impressions placed. Using a Lagrangian relaxation with subgradient optimization, we establish bounds on the objective function and evaluate the performance of various stepsizes used in the experiments. Further, the multiplier sequence generated by the subgradient method allows for deriving theoretical results for a lower bound. We also present an approximate iterative method that provides a computationally tractable solution for solving the IM-RO problem and its related properties for convergence. Consequently, we compare the performance of the Lagrangean Relaxation method and approximate iterative algorithm on different graphical models and real-world networks.

Key words: influence-maximization-revenue optimization, stochastic dynamic programming, Lagrangean relaxation with subgradient method, concavity, bounds.

Speaker: Ms. Trisha Lawrence

Date: Thursday 4th April, 2024

Venue: Department of Mathematics and Statistics Seminar Room

2nd Floor, Natural Sciences Building, FST.

Zoom: https://sta-uwi-edu.zoom.us/j/91427814302?pwd=VzN0MzVuY1daOWc3L0ZnVGVac29Tdz09

Meeting ID: 914 2781 4302   **Passcode: 821508**

Time: 12:00 pm – 1:00 pm