

Canadian Queueing Theorists and Practitioners Conference (CanQueue 2020, Online) (20w2253)

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1 Overview of the Field

Queueing theory is the mathematical study of various aspects arisen from the congestion and delays of waiting in line, including modelling, performance, control, simulation, computations, approximations, inference, optimization among possible others. Moreover, Queueing Systems involve "customers" waiting for "services." Where, the terms "customers" and "servers" are generic. Customers could, for example, be humans waiting in a physical line or waiting on hold on telephones, jobs waiting to be processed in a factory, or tasks waiting for processing in a computer or communication system and more of this type of services.

The CanQueue annual conference started from a workshop, organized by Dr. Alfa, at the University of Manitoba in 1999. Since then, twenty (20) CanQueue conferences have been held in Canada, including CanQueue 2002 at U of Saskatchewan; 2004 at UBC Okanagan, 2006 and 2011 at Banff, both sponsored by BIRS. It was a decision at the CanQueue2019, at Fields Institute in Toronto in August 2019 that CanQueue 2020 will be organized by us and held at Banff (based on the feedback from Canadian queueing community people). It turned out a very special and very successful event of this Canqueue, despite the pandemic of COVID-19.

Queueing theory started with the work of Danish mathematician A. K. Erlang in 1909, which was motivated by the problem of designing telephone exchanges. The field has grown to include the application of a variety of mathematical methods to the study of waiting lines in many different contexts. The mathematical methods include Markov processes, linear algebra, transform theory, and asymptotic methods, to name a few. The areas of application include computer and communication systems, manufacturing systems, and health care systems. Many recent developments in queueing theory have been driven in large part by a greater interest in applications that involve human customers, for example in the rapidly growing call centre sector. Humans behave in less predictable ways than, say, jobs in a factory or tasks in a computer system. For example, they may renege (abandon the queue), and retry later. The needs of human customers are likely to be heterogeneous (motivating the use of skills-based routing to connect different customers to different servers) and to vary with time (sometimes requiring transient rather than steady state solutions).

In CanQueue2020, which sponsored by BIRS, more than 40 participants attended, most of whom are from Canada and some of whom are from USA, Australia and Europe. Two prominent professors: Prof. Peter Taylor of the University of Melbourne and Winfried K. Grassmann of the University of Saskatchewan provided plenary (one-hour) speeches at the event.

The plenary talk by Prof. Taylor addressed admission policies for complex resource allocation problems, and the talk by Prof. Grassmann emphasised that queueing theory is in a world where most queueing problems are solved by simulation.

There were 16 other research talks given at the conference within the two days (August 21-22). Seven of these talks were delivered by graduate students or post-docs, covering a broad spectrum of topics such as: block-structured queues, double-sided queues, $GI/G/1$ queues, queues with time-varying periodic transition rates, statistical queues, admission policies, allocation problems, copulas, error estimation, matrix-analytic methods (MAM), mean-field approximations, random walks, simulation, optimal joining strategies, Markov chain decomposition method, health care applications.

Overall, on the feedbacks of participants, this conference was very successful and useful mostly for graduate students. Moreover, it was a great idea that the whole talks have been recorded by BIRS facilities and availability of talks for public. In fact, this technology first used in this conference, by the fact that the conference was virtual, which was successful.