



THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Seminar

The Supermarket Game

by

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Time : 11:00am – 12:00noon
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The Chinese University of Hong Kong

Abstract

A supermarket game (joint work with Jiaming Xu) is considered with N FCFS exponential server queues. Upon arrival each customer chooses a number of queues to be sampled uniformly at random and joins the least loaded sampled queue. Customers are assumed to have cost for both waiting and sampling, and they want to minimize their own expected total cost. The game is motivated by the study of distributed load-balancing systems, such as in cloud computing of wireless access. We study the supermarket game in a mean field model that corresponds to the limit as N converges to infinity. It is shown that there always exists a Nash equilibrium for arrival rate per queue less than one, and the Nash equilibrium is unique for homogeneous waiting cost for arrival rate less than $1/\sqrt{2}$. Furthermore, we find that the action of sampling more queues by some customers has a positive externality on the other customers in the mean field limit, but not always for finite N . (Full paper at <http://arxiv.org/abs/1202.2089>.)

Biography

Bruce Hajek is a Professor in the Department of Electrical and Computer Engineering and in the Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign, where he has been on the faculty since 1979. His research interests include communication and computer networks, stochastic systems, combinatorial and nonlinear optimization, and information theory. He served as Associate Editor for Communication Networks and Computer Networks for the IEEE Transactions on Information Theory, as Editor-in-Chief of the same Transactions, and as President of the IEEE Information Theory Society. He is a member of the US National Academy of Engineering and he was a winner of the 1973 USA Mathematical Olympiad. He received the Eckman Award of the American Automatic Control Council, an NSF Presidential Young Investigator Award, an Outstanding Paper Award from the IEEE Control Systems Society, and the IEEE Kobayashi Computer Communications Award.

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