

COMPUTER SCIENCE SEMINAR SERIES

Department of Computer Science
City University of Hong Kong
(Departmental Seminar Seminar 2006/2007 - No 53)

Dynamics of Strategic Manipulation in Ad-Words Auction

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Date :

2 May 2007 (Wednesday)

Time :

11:30am - 12:00pm

Venue :

CS Seminar Room, Rm Y6405, 6th Floor Yellow Zone, Academic Building, City University of Hong Kong, Tat Chee Avenue, Kowloon Tong.

Abstract

The rise of Internet advertisement has created a demand for new auction models. The ad-words auction, used by Google for this purpose, called the position auction by Varian [15], assigns advertisement slots to top price bidders in a decreasing order of the attractiveness to the viewers, and charge each winning agent, for every click generated from its weblink at the allocated slot, the price of the next lower bid. It has been known that this protocol is not incentive compatible but a pure Nash equilibrium exists for the game among the bidders. Moreover, refined solution concepts based on Nash equilibrium have been proposed for better understanding this game [9, 15]. As the participating agents may not bid their private values in the game, it is not clear whether those existential equilibria can be reached.

In this paper, we are interested in the dynamic process how bidders interact to reach an equilibrium. We first propose a new solution concept, the forwardlooking Nash Equilibrium, for the position auction by considering the strategic manipulations of an agent that take into consideration the effect of the existing strategies of other agents, as well as their future responses to its own benefit.

Interestingly, we prove that the forward-looking Nash equilibrium in its pricing and allocation scheme is equivalent to the VCG auction outcome, which was regarded not suitable as too complicated to transfer into it from the current Google's position auction pricing system. In fact, our results justify the use of Google's position auction pricing scheme. In presence of the most sophisticated users, it is indeed equivalent to the Vickrey auction pricing scheme. Most importantly, we justify the new solution concept by deriving its convergence property. We study several dynamic adjustment schemes by the bidders, including one that converges in a finite number of steps. Moreover, we show that a randomized adjustment scheme will converge to the forward-looking Nash equilibrium with probability one.

Supervisor: Prof. Xiaotie Deng (CS)
Research Interests: Internet Economics, game theory.

All are welcome!

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In case of questions, please contact Prof Xiaotie Deng at Tel: 2788 8632, E-mail: csdeng@cityu.edu.hk, or visit the CS Departmental Seminar Web at <http://www.cs.cityu.edu.hk/>.