An Approach to Co-Dependent Value Based Internet Advertisement Auction

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ABSTRACT

A structure of the Internet advertisement is that the service providers decide order of placement of many advertisements and advertising fees by auctions when advertisers offer their promotions. It is known that Generalized Second Price Auction (GSP) mechanism is the most efficient auction mechanism of the advertisement auction. Searching engine companies employ GSP mechanism basically. There are a lot of researches on GSP in order to analyze and clarify its feature and advantages. However, these researches assume that traded advertisements are mutually independent. That is means that each advertisement does not influence other advertisements. Also these researches do not consider a value of advertisement, which means some criterions of a name value of a company, effectiveness and an importance, that is dependently each other.

This paper proposes a new advertisement auction mechanism based on GSP with considering the value of advertisement. The authors analyze the auctioneer’s profit in comparison between normal GSP, normal VCG (Vickrey-Clarke-Groves Mechanism) and their proposed mechanism.

Keywords: Ad Auction, Dynamic Model, E-Marketplace, Generalized Second Price Auction (GSP), Multi-Unit Auction System

INTRODUCTION

Agent-based electronic commerce is one of promising techniques to enhance effectiveness and performance of trading. In this paper, we give an analysis of agent-based advertisement auction, which is displayed on a webpage.

Advertisements on the webpage provide good opportunity to get new customers. In recent years, a lot of webpages providing a search service have advertisements, which are related with searched word by user. Some searching company has a advertising space on his/her webpages and allocates it for some advertisers based on an advertising fee. As same as items trading in the Internet auctions, a displayed advertisement on web page is also based on the auction, called the Internet advertisement auction. Internet advertisement auction is one of important income source for some search

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engines such as Yahoo! and Google (Yahoo!, Google). When users search for some words on the search engine, an advertisement related with the searched keywords is displayed with result of search (Edelman, 2007). The order of advertisements to be displayed is determined based on bid value in an auction. Advertisers can set up the interval and period to display the advertisement as a time slot. The advertising fee is determined based on the Generalized Second Price Auction, which is known higher revenues than the Generalized Vickrey Auction (Vickrey, 1961). A winner in the auction gets a space to display their advertisement and the web page owner allocates time and position in the web page to show the advertisement. There are a lot of contributions about GSP(Generalized Second Price Auction) researches in electronic commerce research. In this auction, bidding and winner determination are conducted multiple time. Advertiser can change his/her bid value because the auction is continued with repetition. When advertisers try to bid in an auction, they bid on their strategy. However, GSP has an envy free equilibrium and webpage owner providing advertisement space can get larger benefit compared with VCG (Vickrey-Clark-Groves) Mechanism.

Figure 1 shows the interface of searched result of “travel” in Google. In right side of the interface, advertisements are shown. These advertisements are related with the searched words. When the advertisement is clicked by end-users, advertisement fee is paid from advertisement companies to the website owner (Google). Generally, possibility of click is high order of display. This means that the advertisement fee of top-displayed advertisement is more expensive than lower advertisements. Google earned about 5.2 million USD by this advertisement system in 2008.

In previous research, the value of advertisement is assumed as independent with each other. Otherwise, some of their researches do not refer the value of the advertisement. However, each advertisement has a certain value for users. It means some criterions of a name value of a company, effectiveness, an importance and an attribution, that is dependently each other. When same or similar item is sold in two e-commerce sites, the price on the advertisement is different from another one. If a buyer considers the price is important attribute

Figure 1. Capture of Google adwords
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