

# *AdX Game*: The Ad Exchange Game

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January 13, 2017

## 1 AdX Game

The **AdX Game** (advertisement exchange game) is an electronic game where autonomous agents play the role of advertisement agencies competing for advertisement contracts and impression opportunities needed to fulfill said contracts and earn a profit. At a high level, the agents in the game are faced with a fundamental task: compete for enough campaigns and impression opportunities to make a substantial profit while maintaining a good reputation. An agent's reputation is a function of its ability to keep its promises, i.e., of fulfilling campaigns it contracted. The agent with the most profit at the end of the game is declared the winner.

### 1.1 Game Elements

A **user** refers to a simulated internet user visiting a website. A user is either a Male or a Female, of age Young or Old, and of income Low or High. A **market segment** is a set of users with same characteristics and thus, there are 26 possible market segments (Male, Female,..., Male Young, Male Old,..., Female Old High Income). Upon a visit, the user generates an **impression opportunity** that is auctioned to all agents. An impression opportunity is characterized by the **market segment** to which the user belongs.

A **campaign** is a contract that defines a minimum number of impressions to be reached from a market segment, and a budget. If the advertiser wins enough impressions of matching market segments on behalf of a campaign, then we say that it fulfilled the campaign, and in this case the agent makes a profit equal to the budget of the campaign minus the cost of impressions. Each agent is assigned a numerical **quality score** that indicates the ability of the agent to fulfill campaigns. The quality score of the campaign's owner is updated daily according to the following formula:

The quality score impacts the ability of agents to participate in campaigns' auctions.

### 1.2 Overview

The AdX Game is played in 60 simulated days hereupon refer to as days. Each day a fix number of **campaign opportunities** are announced to all agents who bid for ... To reduce the taxing communication between agents and the server, each agent submits a daily **Bid Bundle** mapping all bids to be placed on behalf of the agent for the current simulated day. The server then runs all auctions and report results in the form of summary statistics. Agents get a detailed report on the performance of their campaigns only.

### 1.3 Campaign Auction

### 1.4 Ad Auction