MS&E 235: Lecture 1
Prof. Ashish Goel
Mar 31, 2009
Notes by Rio Goodman

Lecture 1: Introduction and Advertising

Topics

1. Advertising and Marketing
2. Reputation, Prediction and Recommendation Systems
3. Social Networks
4. Peer to Peer Systems

Internet Commerce Vs. Regular Commerce

1. Efficiency: Internet commerce enables monetization of the long tail. For example, a company like blinds.com which would have had to operate stores across the country (requires huge investment) to sell blinds (one of the cheaper items in a house ie. the long tail) can through internet commerce maintain centralized inventory in one place and sell products across the country through a website.

2. Pull driven marketing and advertising: Advertising on search engines like Google and Yahoo enables businesses to target customers as and when they search for related information. For example, a person searching for 'Xbox' is likely to be interested in buying the Xbox or more generally, video gaming systems and therefore advertisements about the Xbox are more likely to result in a sale when shown to this person. Notice that the user's action, ie. his searching for information, resulted in a targeted advertisement being displayed. Traditionally, this has not been possible with regular commerce. Advertising which was a cost center in regular commerce became a profit center in internet commerce because now businesses spend money only when potential buyers visit their website and if they are spending more money on advertising, it means more potential buyers are visting their website hopefully resulting in greater sales.

3. Issue of Trust and Reputation: Through complex algorithms, search engines display the most relevant and trustworthy information at the top of millions of search results retrieved. This gives users a certain amount of confidence that the businesses listed at the top of the search results are trustworthy and superior to the others. Furthermore, one can easily obtain reviews of businesses and compare competitors at online portals line www.epinions.com. Establishing trust across a broad audience has traditionally been much harder for businesses to achieve.

4. Personalization/Community Effect: Internet commerce offers great opportunities for businesses to deliver a personalized and targeted experience that is tailored to each customer. These may range from product recommendations to allowing customers to decide what they want to see and how they want the website to look. For example, amazon.com recommends products to people based on their purchase history. Furthermore, they also use the past buying behavior of the community as a whole to determine what products a person may be interested in once they buy a certain product.

5. New opportunities: Certain products became possible only after the internet revolution. Some examples would be information based products such as live stock market quotes and entertainment based ones such as music and video streaming. Another revolution around the corner is that of the open access / open standards mobile network which will unleash a whole new wave of innovation by allowing devices to communicate with one another.

Types of advertising models

The three main types of advertising models are:

1. CPC (Cost Per Click): Here the advertiser has to pay every time someone clicks on their advertisement. Example: Ads shown next to search results at google.com, CPC is typically used for search results ads.

2. CPM (Cost Per Thousand Impressions): Here the advertiser has to pay the publisher a certain amount for every 1000 times their ad is displayed. Example: Ads at the top of the New York Times homepage, CPM is typically used for banner ads.

3. CPA (Cost Per Acquisition/Action): In this model, the publisher displays an advertisement requesting users to fill out some information and then this information is sold to other parties as a lead. In such models, the advertiser pays every time a user completes an action or for every new user they acquire. Example: Amazon affiliate program, CPA is typically used for rare sale items.

Difference between the three advertising models

The Click Through Rate (CTR) is the percentage of ad impressions that lead to users clicking on the ad. For example, if the ad is viewed 100 times and is click on 3 times, the CTR = .03.

Let us say that out of every 10^7 impressions (CPM), there are 10^5 clicks (CPC) which result in 10^3 actions (CPA). Paying \$100 per action is the same as paying \$1 per click and \$10 per thousand impressions. Therefore, it is possible to tune each model to produce the same expected return. The difference lies in who assumes the risk in each model.

In the CPM model, the risk is taken by the advertiser for none of the 1000 impressions result in a sale. In the CPA model the risk is absorbed by the publisher as he gets paid only when he is able to sell a lead. The CPC model involves risk sharing wherein the advertiser has the risk that lots of people click but no one buys and the publisher has the risk that lots of people see the ad but none click the ad.

Note:- The prices for CPM, CPC and CPA advertising models might make arbitrage possible allowing buying of say impressions in bulk and selling the actions that result from these impressions.

Differences between selling ads and selling other goods and services

Types of Advertisements

1. Contextual Advertisements: These advertisements are displayed based on a context. They are of three main types:

   (a) Search Ads: These are ads that are displayed as and when the user searches for information and are based on the search query entered by the user. The Google Adwords program is an example of search advertising.

   (b) Content Based Ads: These ads are displayed based on the content of a web page. The Google Adsense program is an example of a content based advertising system.

   (c) Community/Social Ads: These ads are displayed based on either profile information or based on information such as past websites viewed. There is a question of privacy violation that arises in certain types of social ads.

2. Non-Contextual Advertisements: These are advertisements that are out-of-context. For example, banner advertisements on some sites are delivered in a non-contextual fashion. However, the gap between Contextual and Non-contextual ads is blurring with growth in advertising networks and intermediaries which are able to generate targeted ads based on a person's surfing history, cookies, information that can be easily ascertained such as the time of the day etc. These networks use algorithms to determine which advertisement to show to each customer.

Keyword Pricing

How should the keywords be priced?

1. Posted Price: The publisher charges a fixed price for a keyword. It is difficult to use traditional "posted price" auctions for selling ads. An example of a posted price auction is: selling toothpaste. The seller asks for \$2, and the buyer either buys it at \$2, or does not. But it is not easy to implement this type of pricing for advertisements. For instance, how much would Google charge for displaying an ad on the search keywords "green tipped shoe?" The reasons that posted pricing does not work for advertisements are:

   (a) Lack of information: The number of keywords is huge and you can also sell keyword combinations. For example, advertisers will be ready to pay more for 'dentist degree' than just 'dentist' for they stand to earn much more if someone enrolls in a dental program as opposed to visiting their dentist.

   (b) Duplicates: In general, no two products are the same. However, a keyword is after all just a keyword and the posted price is well its price. However, when I search for 'metal', it might be that I am searching for the music genre or say steel or iron. There is difficulty in determining what price to charge. Also, different words might mean the same thing but a few among those synonyms might also mean other things. This adds further complexity to determining one fixed price.

   (c) The problem of long tail: Posted prices do not work with the long tail. It is easy for Google/Yahoo to price 'mortgage' but it is very hard to price 'blinds and draperies'. There are also seasonal variations and consumer trends. In general, as the long tail is monetized, more and more prices will be set in a distributed fashion.

2. Bidding: The keywords are priced based on a keyword auction where advertisers place bids per click and when their ad is clicked they are charged a certain amount. The amount they are charged is different in different auction types and this is discussed in the next lecture.

A real world example of why it is hard to price advertisements is the case of Vioxx, a painkiller which was quite popular before it was found to have serious side effects from long-term, high-dosage use. The effect this news had on the price of advertising on keyword "Vioxx" was extreme and surprising. It caused the ad price to jump by a factor of 10. Why did this happen?

It turns out that previous to this event, the advertisers who wanted to buy the keyword "Vioxx" were mainly drug companies trying to sell painkillers. After the event, there were people willing to pay much more for advertising: lawyers. Many lawyers were attempting to build class action suits, which represent much more revenue than selling a bottle of painkillers, and thus were willing to pay much more for the advertising spots.

Next lecture: Game Theory, Auctions, Truthtelling