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Wireless Advertising: Location-Based Targeting

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Abstract

This research explores some of the issues involved in wireless advertising. The technology to deliver ads on mobile devices is here, and firms are already exploring ways for using this technology in a user friendly and non-intrusive way to generate ad revenues and increase sales. Issues such as who would pay for airtime, etc., are being sorted out. Our work looks at how to leverage the one new variable that is now available to the advertiser - the real time location of the consumer. We are exploring various models to improve effectiveness and targeting of advertising using information on a prospective customer's spatial location information in addition to other information such as their preferences.

Keywords: Wireless advertising, wireless communications, m-commerce

Introduction

Emerging Internet technologies promise to deliver a high level of personalization for commercial activities. In a bid to offer anytime, anywhere and personalized content delivery to consumers, companies are turning towards wireless communications. This transformation from e-commerce to mobile-commerce opens up variety of opportunities to offer a broad range of services to consumers, as mentioned by Ghosh and Swaminatha (2001).

The number of wireless data subscribers, currently estimated at 170 million, is projected to grow to 1.3 billion by 2004. Along with other applications, wireless messaging, expected to reach 244 billion messages per month in 2004, is projected to be an important application in this arena (Robinson 2000).

A recent mandate (E-911) by Federal Communications Commission requires that wireless carriers be able to locate a caller making a 911 emergency call, which is made possible with the help of Global Positioning System. The ability to locate the user anytime allows a new form of advertising: location based wireless advertising. Advertising companies such as SkyGo, Adbroadcast.com, Advertising.com, etc., have actually started delivering ads to consumers based on their location, time and choices. By 2003, Boston research firm Ovum expects wireless advertising to be a $1.2 billion market, skyrocketing to $16 billion by 2005 (Berman 2000).

Research Agenda

The focus of this research is to develop and analyze various business models for location based wireless advertising. We assume that advertisers (such as a local restaurant or store) contracts with a carrier (such as Cingular or AT&T Wireless) to deliver ads much like they do in other media, such as television and radio. These ads may be time specific (a limited time promotion) and/or location specific (a promotion valid only at a particular location, say to clear inventory). Other ads may be general brand ads, but those are not the focus of this research. This research considers the opt-in form of advertising, where consumers don’t receive unsolicited messages. Various research issues arise:

1. Ad Targeting: Which ads should be delivered to which customer at which location and at what time of the day.
2. **Consumer**: Capacity constraint limits the number of messages sent at any particular location and time. The high preference consumers might be targeted first. One issue is what if several consumers have similar preferences for advertisers.

3. **Location**: Suppose a consumer is visiting several locations and some advertisers may be available at many of those locations, what would be the right location to send ads for those advertisers.

4. **Time**: Ad response may also well depend on time of ad delivery. For example, a high response may be observed for restaurants if ads are delivered during lunch/dinner hours.

5. **Effect of distance and time from target**: Ad effectiveness may improve in the vicinity of the store, and may deteriorate with increasing distance in terms of time and location.

6. **Static and dynamic preference update**: Static and Real-time (dynamic) updates of consumer preference may offer different response rates and need to be chosen based on update costs and incremental response.

7. **Real time vs. predicted location**: In certain situations, real-time location information of consumers may not be actionable because of capacity constraints, and the carrier may need to use predicted future location of the subscriber instead.

8. **Market sustaining mechanism**: For a sustaining business model of location based wireless advertising, the cost-benefit structures for all the participating entities, i.e., consumers, carrier and advertisers need to be analyzed.

The primary challenge is to develop various algorithms to address some of the research issues identified above. An additional goal is to develop solution methodologies that can scale with increasing number of subscribers, advertisers, and geographical coverage.

Suppose the carrier manages ad delivery for a set of advertisers, S, and a geographical area comprising of a set of locations L. Let \( S_l \ (S_l \in S) \) denote the subset of advertisers at location \( l \ (l \in L) \). A consumer, \( i \), could be at any location \( l \) at any time of the day, \( t \). The carrier delivers (assigns) appropriate ads from the set of advertisers \( S_l \) to the consumers in the vicinity of the location \( l \). The market mechanism is such that the carrier wishes to maximize the response. For small size problems, this can be solved using a linear programming assignment model. We are working on heuristic algorithms to solve larger size problems.

If the carrier has the consumer location information and unlimited message sending capacity at any location and time, the problem becomes trivial. However, the carrier doesn’t have unlimited capacity and consumers generally loathe to receive too many messages. This limits the number of messages sent at a particular location and time. The carrier may intelligently predict the consumer location or path, in order to deliver ads at a location prior to the targeted one and get around the capacity constraint. We are working on models using Markov decision processes and Mathematical programming that incorporate predicted location and time factors.

Since ads are more effective if delivered close (in terms of time and distance) to the store visit, the models need to capture this dimension to maximize response. We are currently investigating these issues.

**References**

