

Selling the Aether – A New Billing Schema for Mobile Advertising

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Abstract: The ubiquity and personalization of mobile phones makes them a promising platform for advertising. Currently, practices known from online advertisement can be adapted, e.g. content-aware ads. However, location as a special feature requires further refinements for mobile advertising. In this paper, we present a conceptual proposal of a billing schema for location-aware advertising. The introduced model describes the pricing of mobile ads related to the spatial distribution of their advertising strength.

1 Introduction

Mobile computing has become an omnipresent issue in nowadays information technology. The processing power of handheld devices is still steadily increasing and mobile connectivity is becoming faster, cheaper and more reliable. In addition, the penetration of devices with embedded sensing capabilities is rising, especially for geographic positioning. Our everyday environment is already pervaded with a high density of these devices. Such mobile and personalized always-on devices provide a new platform for advertising.

Today, a conventional ad is an audio-visual representation of an advertising message placed at a certain location on a specific medium (e.g. billboard, TV spot, radio spot). In this paper – in contrast – we propose a pervasive ad to be a digital audio-visual representation of an advertising message bound to a certain context. This defines the situation the ad should appear in, i.e. the location of the ad, the time span for advertising and the current activity of a customer.

In conventional advertising there is a trade off between the costs for an ad and the number of people who can be reached. Therefore the aim is to minimize the costs and maximize the revenue by focusing on people who will possibly buy the good. An advantage of pervasive advertising – in contrast to conventional advertising – is the possibility of a more precise targeting. In a pervasive computing environment a large knowledge base about people is available, either explicitly by user input or implicitly by sensing and reasoning. Therefore a deeper targeting can be done by profile-based and context-aware filtering. For instance, an ad for fishing equipment would certainly reach people not interested in fishing, although the advertisement was localized near to the coast by choosing a local newspaper or radio channel. However, whereas in conventional advertising the problem of flooding is naturally regulated by a billing schema that evolved over time, in digital advertising the number of appearances of an ad does not relate to costs on the advertiser's side a priori.

In this paper we focus on the spatial distribution of mobile advertising and design an appropriate billing schema. We introduce an advertising space inside a digital layer that covers the earth's surface - conceivable as the aether. The contribution of this paper is a model for pricing pieces of this space for mobile advertising. An advertiser pays for placing his ad on the mobile displays within a certain piece of the aether.

2 Designing a Space for Mobile Advertising

2.1 Idea and Model of a Distribution Volume

In conventional advertising media, e.g. billboards or TV, the space for advertising has a physical and therefore very clear nature: it is available in the form of surface or time units of a resource. As a rule of the thumb, the more units of the resource an advertiser buys, the higher is the probability that people recognize the ad.

Mobile advertising is a form of digital advertising. Therefore, billing schemas need to be based more on artificial regulations than on physical constraints. This can for instance be a scheduling algorithm, mostly according to the business model of the operator. Within such regulations advertisers usually pay for the probability that their ad will be seen, e.g. paying more for pushing an ad to the foremost position on a famous website. This can be referred to as the strength of an advertisement. A similar model is required for mobile advertising.

Mobile computing has the user's location as key function for advertising. Advertisement canvassers can place ads at locations or set boundaries for a better targeting. However, by simply selling spatial regions the notion of advertising strength gets lost (an advantage of digital advertising). Therefore, we propose to add the strength as a new dimension to the geospatial distribution of advertisements.

Figure 1 illustrates our approach. We introduce a virtual layer on the earth's surface. An advertiser can place his ad in a subspace of this sphere. He binds his ad to a three dimensional solid within this layer. While the width and the length of this solid represent the spatial distribution, the advertising strength of the ad can be modeled and visualized as the height of the solid. The latter is not limited and can change within the subspace depending on the location.

This strength can be interpreted and realized in different ways, e.g. as an ordering for the appearance of ads in a list or proportional to display time. Also an observation of the users' click-through rates allows a scheduling of the ads in a priority according to their bought strength. However, the property of strength still needs to relate to the likelihood of an ad to be seen by a user.

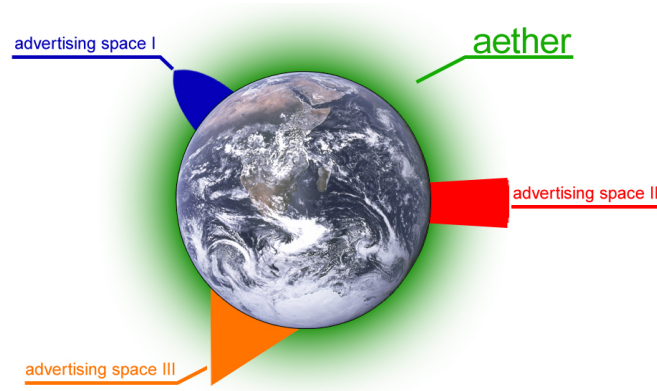


Figure 1: A digital layer covering the earth's surface as space for mobile advertising.

2.2 Pricing the Distribution Volume

In conventional advertising the advertisers pay for the space that an ad occupies (e.g. in newspapers, in magazines) or the time span within an ad is active (e.g. on television, on air) following estimations how many people have been reached.

Our billing schema for mobile advertising has an analogy to the advertising space on the Internet¹. Here, advertisers can bid for the likelihood of their ads to appear and be recognized in a certain content range, e.g. given by the content of a search query or a website, in form of an auction. For mobile advertising, we also want to enable advertisers to tune the likelihood of their ad to be seen and to influence the range by means of spatial distribution. Therefore, in our mobile advertising billing schema, the product of the spatial distribution and the strength represents the volume of the solid as advertising space and relates to the price. If an advertiser wants to reach a certain strength for his ad in a certain area, he has to bid a specific price which results in a certain volume.

A simple way to monetize the volume would be a direct conversion of volume units to price units, e.g. payed once or periodically. More specific and dynamic billing units can be adopted from Internet marketing, e.g. by applying methods like pay per click or pay per lead, while the payment itself still correlates to the volume of the advertising space.

2.3 Different Solids for Customizing Advertising Campaigns

The billing for an ad is estimated according to the volume of the solid the ad is bound to within the advertising layer. For a given amount of marketing budget, an advertiser can decide whether he prefers to cover a larger spatial area, or to have a higher advertising strength at a certain location. Concerning this, he can form the shape of his advertising

¹Most prominent example is Google AdWords, <https://adwords.google.com/>

space. From a geometrical point of view, the only constraint is that the floor of the solid is planar.

Based on the introduced model, advertisers can become creative in spreading their ads into the aether. They can form different spheres for running mobile advertisement campaigns. Especially, they are able to adapt their campaign to the geographic characteristics of a region, e.g. their point of sale.

Figure 2 shows the use of primitive geometric solids for running mobile advertisements. Cuboids and cylinders can be used for running widespread campaigns for covering large areas as well as to place precise and focused ads. In contrast to solids with a constant height, solids with falling off edges also seem to be useful, e.g. cones, pyramids and hemispheres. They allow to place ads in a certain area with a peak at the center and decreasing advertising strength to the edges. Also the superposition of basic solids can be interesting for modeling campaigns, e.g. to widespread an ad to a large area (e.g. using a flat cuboid) and lay spots at some places (e.g. using high cones).

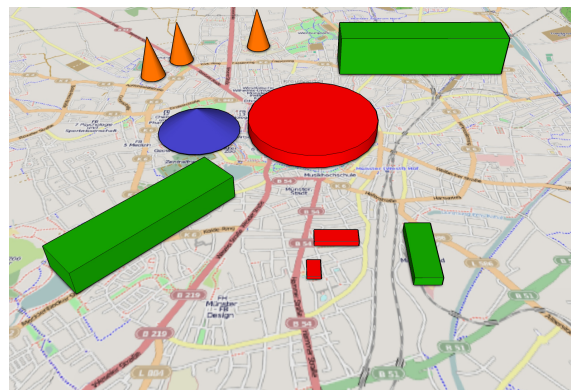


Figure 2: Basic geometric solids for building advertising spaces.

The use of polygons even provides a higher degree of freedom for advertisers. Figure 3 shows a scenario, where the advertiser is able to model his advertising space according to his geographical circumstances. The sketched iceman of course does not want to pay for advertising above the water, because there is no potential customer. Those are at the beach, wherefore the iceman focuses on this area. However, he also knows that his catchment area is limited – even if people from far away saw his ad, they would not walk too far for getting an ice. So the iceman does not invest very much to promote his ice far beyond the beach across the street.

Pieces of the space in the advertising layer can be taken several times. Especially when the owners of the ads are competitors in business this might lead to an interesting phenomenon. In conventional advertising, this is somehow similar e.g. to over-pasting posters on billboards. In our mobile advertising model, this corresponds to the height of the solids as the strength of the ads. For example, it is imaginable that pizza baker Alfredo sets up a mobile advertisement in his hometown bound to a cone. Ads for his restaurant will be shown on devices of people within this space. However, when Pizza baker Beppo places another ad

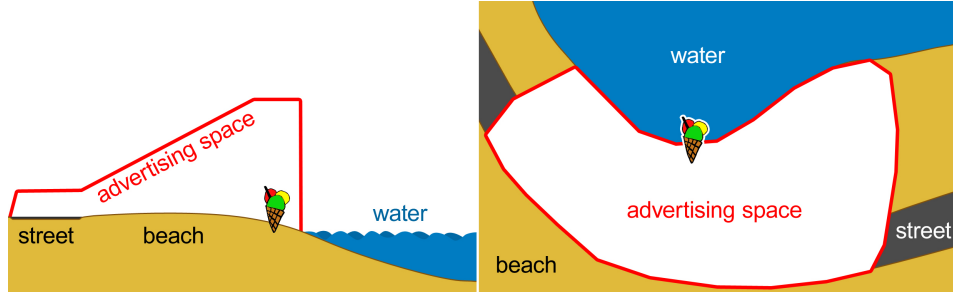


Figure 3: Profile (left) and top view (right) of the mobile advertising space for ice cream at a beach.

bound to a bigger, especially higher solid at the same location, people will more likely see his ad. This would lead to some kind of competition with the advertising budgets as upper barrier. Figure 4 shows this phenomenon as intersection of solids within the advertising layer. Of course, the forms of feasible solids have a large impact on advertising campaigns, not only because of the possibility of intersections.

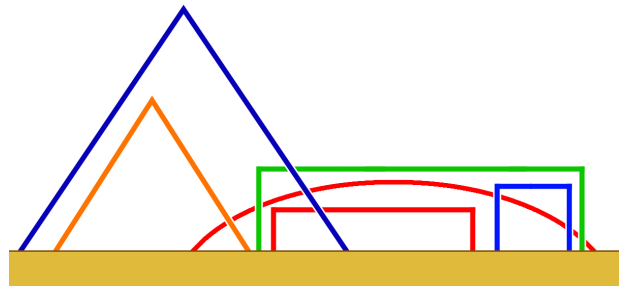


Figure 4: Profile view of the advertising layer showing competition as a result of reselling the space.

We assume, that this form of competition will also lead to different prices for different areas in the world. Places which are worth much more than others for mobile advertising and which guarantee a higher revenue will accommodate higher advertising solids. At places where the usage of mobile devices is sparse and therefore advertising not very worthwhile, presumably no peaks will emerge. This competition will further lead to economic price levels for different areas, which will only be limited by the cost-benefit calculation that each advertiser estimates on his own.

3 Mobile Devices as Advertising Medium

Mobile advertising uses mobile devices as medium for displaying ads. The described model was especially designed for mobile phones. Figure 5 shows different opportunities



Figure 5: Today's ads on a mobile phone: within a website [ZEI09] (left), within an application [myM09] (middle), and as a standalone application [Poi09] (right).

for presenting ads on such devices. Adapted from classical advertising on the Internet, ads can be embedded in mobile websites. Small banners, text ads or videos can also be placed inside applications. These two forms of mobile advertising are already common on today's devices, also in a location-aware manner. A third way are standalone applications, which are shown by an icon in the main menu of a device. Such marketing applications also already exist, but are not pushed onto devices depending on the user's location. Regarding the presented billing schema for location-aware advertising, the presented ads on a mobile device will change when the user is on the move.

Another, hitherto not explored way of mobile marketing could use the idle screens of mobile phones as ad space in form of a screen saver. Private phones lying around e.g. on tables in a café or at desktops are not only visible to their owners, but also to people sitting nearby or passing. The proposed model might also work for billing advertisements on other mobile displays like for example on cars [AES09] or clothes.

4 Conclusion

There is a strong consensus in the research community, that location aware advertising is reasonable and beneficial. However, from an advertiser's point of view, why should he fence his ad in specific location areas, when there is no reason given a priori. Introducing a price per area is a first approach for designing a billing schema. In this paper, we presented an extended model for billing space for mobile advertising. Combining the spatial distribution of an ad with a measure for the likelihood of an ad to be seen by customers we set up a three dimensional space covering the earth surface. This space forms a digital layer as advertising space. Within this layer, advertisers can buy subspaces for running mobile campaigns with a price predetermined by the advertisers depending on the volume of the solid. By competition for the best advertising spaces economic prices will emerge.

A first extension of the presented proposal includes an additional dimension for modeling the strength of ads at certain times. This is imaginable as pulsing advertising spaces or waves, with an interpolation of the shape between given timestamps. Methods like pay per

click allows an easy billing, because they are discrete and every ad has a price at a certain location and time.

Having designed a billing schema for mobile advertising, one question remains open: who should earn the money? It would be possible for network providers or device manufacturers to implement an appropriate platform. However, as long as there is no standard for connecting these, there obviously will be a very dispersive and heterogeneous marketing scenery. Instead, the proposed digital aether should be a common infrastructure, similar for example to the domain name system of the Internet. Real posters can also only be put up in our unique and common environment.

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