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Data Closed Loop and Marketing Transformation in the Context of Computational Advertising (Postprint)

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Abstract

Programmatic advertising constitutes a typical application and primary manifestation of computational advertising. It primarily utilizes big data thinking and technology to enhance the precision of user profiling, accurately predict user demands, and thereby execute dynamic, intelligent targeted advertising placement. Enhancing advertising effectiveness necessitates integrating data across different enterprises and dimensions, and innovating new retail business models while creating new service models on the foundation of a data closed loop. In this context, a growing number of enterprises and media organizations are accelerating the organizational process of data assetization.

Full Text

Preamble

Data Closed Loops and Marketing Transformation in the Context of Computational Advertising

Abstract: Programmatic advertising represents a typical application and primary manifestation of computational advertising, leveraging big data thinking and technologies to enhance the precision of user profiling, accurately predict user needs, and enable dynamic, intelligent targeted advertising delivery. Improving advertising effectiveness requires 打通 (打通) data across different enterprises and dimensions, and innovating new retail formats and service models on the basis of data closed loops. Against this backdrop, an increasing number of enterprises and media organizations are accelerating the process of data assetization.

Keywords: data closed loop; computational advertising; new retail; programmatic advertising

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For advertising and marketing campaigns, whether market segmentation or integrated marketing communications, these have traditionally been more theoretical ideals. The fundamental objective remains influencing consumer attitudes and purchasing behavior, which necessitates monitoring and evaluating campaign effectiveness. Performance marketing and precision marketing have become mainstream models [1]. Against the broader context of new technologies, new media, and new marketing, at what levels have advertising activities undergone fundamental transformation? How should we redefine media, marketing, and advertising? Beyond effectiveness monitoring, at what other levels will programmatic or computational advertising transform advertising and marketing? Exploring these questions helps us better understand advertising, marketing, and communication activities in this new landscape.

1. A Brief Development History of Programmatic Advertising in China

Before the turn of the millennium, the United States already had the rudiments of programmatic advertising. In fact, traditional media advertising placements there already exhibited characteristics of programmatic precision targeting. For example, sending different DM (Direct Mail) advertisements based on zip codes demonstrated strong targeting capabilities, and digital television technology enabled customized, personalized ad placements during certain broadcast slots. We simply didn' t call it programmatic advertising back then.

Many view precision as programmatic' s most promising feature, yet precision can sometimes be paradoxical. For fast-moving consumer goods, IT, and automotive clients, the primary goal is often reach rate—but high reach doesn' t necessarily mean high precision. Therefore, when discussing advertising and marketing, we must clearly understand the advertiser' s KPI (Key Performance Indicator). Programmatic buying today must be closely aligned with these KPIs.

Five or six years ago, programmatic buying' s primary advantage was its clear price benefit, while simultaneously meeting advertisers' reach rate KPIs. If ads could reach broader audiences at lower unit costs, allowing advertisers to connect with more consumers for the same budget, everyone was satisfied. This represented the first stage of programmatic advertising in China.

However, advertisers and agencies gradually discovered "invalid traffic," prompting a Chinese company called ADMaster to begin publishing its "Invalid Traffic White Paper" five years ago. While all advertisers want to purchase better media resources at lower prices, do these low-cost resources truly fulfill their fundamental expectations for advertising campaigns? Perhaps not entirely. Consequently, the programmatic advertising market gradually returned to rationality, with the entire ecosystem maturing and giving rise to service organizations like DSP

(Demand-Side Platform), SSP (Supply-Side Platform), Ad Exchange, and DMP (Data Management Platform). This marked the second stage.

We are now experiencing the third stage, where the entire marketing industry is exploring whether advertising resources beyond online ads—and indeed potentially all advertising resources—can be programmatically purchased, and how to achieve this. Outdoor advertising, building signage, television advertising, and many emerging media and service providers have already undertaken deep experimentation in this area. Theoretically, every media type can support programmatic trading of its advertising resources after digitization and datafication. The practical challenge for real-world advertising campaigns lies in how to 打通 (打通) data across different media to serve entire marketing activities. Data can only create value through closed loops when it flows freely.

2. Can the Data Silo Dilemma Be Easily Broken?

Data serves as the key element in programmatic placement and all aspects of advertising activities. Open data forms the foundation for full-media advertising trading platforms, representing a crucial means to make advertising resource allocation and usage more transparent, efficient, and innovative. By collecting, analyzing, exploring, and applying data, precision marketing becomes possible, guiding advertisers to invest in specific audiences with actual needs. This not only saves substantial budget investments but also enhances advertising effectiveness through precisely defined market demands, while helping users quickly find needed information and satisfying personalized consumption needs promptly [2]. In the past, however, different media types and organizations formed isolated data silos. Can these data barriers be broken?

From a marketing perspective, a closed loop within a single enterprise' s ecosystem cannot be considered a true data closed loop, because marketing success depends primarily on the actual value delivered to clients. Clients spend large budgets annually advertising across different media. Whether data from these various media sources can be matched with each other, and whether online and offline data can mutually complement each other, directly determines whether this data can effectively serve the client's data management system and advertising campaigns. This is crucial and matters greatly to advertisers. For instance, BAT companies are now massively investing in new retail, which requires 打通 (打通) data across different platforms, online and offline channels, and all process stages. How these internet giants resolve the issue of free data flow in the coming period is a major concern for large, medium, and small enterprises across China and globally.

This is not a problem unique to the Chinese market. The U.S. market faces similar dilemmas: Google and Facebook each have their own ecosystems, much like China' s BAT. Currently, no U.S. internet company has yet proposed a universally accepted solution, as each company has its own interests to protect. How to 破解 (破解) this challenge remains unresolved, and no product or company

dares claim it has truly achieved a solution. Based on existing data, marketers can basically understand users' past consumption behaviors, establish models through consumption tags, and use these models to estimate users' potential interests. However, the difficulty of accurately predicting consumption needs far exceeds the basic 套路 (套路) of mining historical data and building user models. In fact, a key direction for future breakthroughs in marketing is the unlimited improvement of prediction accuracy for user behavior.

4. Accelerating Data Assetization to Build New Retail and New Services

A New York-based online public opinion management company offers an interesting reference point. Traditionally, public opinion monitoring and management both domestically and internationally typically traced back through brand crisis events to examine their fermentation, origins, outbreaks, and responses —yet many brands' PR measures during crises proved terrible. This company broke with convention by focusing on predicting potential public opinion crises a brand might face in the future. Based on all currently available data, it predicts possible negative crises for a brand, even precisely telling clients which media might be affected by a crisis event within 24, 48, or 72 hours, and how it might spread or even erupt. This approach resembles weather forecasting, where meteorologists use real-time satellite cloud images to determine a typhoon' s current location and predict its path for the next hour and which areas will be severely impacted.

Following this logic, we can call this future-oriented public opinion forecasting "opinion forecasting," and the prediction of future consumer behavior "consumption forecasting." Such concepts and applications will prove highly valuable in future advertising and marketing activities. In automotive marketing, for example, historical data often struggles to predict whether a user will genuinely need to purchase or replace a car in the near future, as such data only reveals their past transportation methods or recent automotive website browsing habits. Using this to precisely predict real needs is difficult. Precisely because accurate prediction is so challenging, this crystal ball holds such magical appeal. Against the backdrop of rapid programmatic advertising development both domestically and internationally, an increasing number of enterprises and research institutions are investing in this field, attempting to build more valuable models or systems to 攻克 (攻克) the precision prediction challenge—a topic that will remain important in advertising for the foreseeable future.

In fact, achieving more accurate predictions requires 打通 (打通) data across different enterprises and dimensions. The current reality is that each company exists as a data island. Only when diverse data is truly 打通 (打通) can user profiles become clearer and more complete. For example, why can we accurately predict that a particular user will purchase a new car within three months? Because data from different dimensions reveals this inevitability: government open data shows their new energy vehicle quota will expire in three months; instant

messaging data reveals they posted car purchase plans a week ago on social media; social network data shows they frequently discuss with close friends which car types suit them best; automotive website data shows they frequently log in to several sites to inquire and compare three specific models; combined with additional dimensions like e-commerce transaction records, we can construct a dynamic consumption prediction model similar to weather satellite cloud maps. Building such highly accurate predictive models requires relying on third-party data service institutions or data alliances focused on 打通 (打通) multi-party data. After all, any single company' s data struggles to achieve truly persuasive and credible closed loops. As user profiles become increasingly clear, programmatic advertising' s target audiences become more precise, and advertisers' expected marketing effectiveness becomes more apparent.

Today, as marketing decisions increasingly rely on data and user profiles built upon it, virtually all enterprises, companies, stores, and media have deeply recognized the disruptive impact of data as an asset and are exploring ways to accelerate their data assetization and DMP construction processes. DMP platforms classify and tag crowd data and identify similar audiences, aiming to precisely locate users through data processing to make advertising more targeted. DMP platforms can provide brands with effective user portraits, consumer insights, and marketing recommendations [3]. However, in the process of data assetization and DMP construction, significant differences exist between large organizations and small enterprises. While large enterprises may have started their data assetization earlier with greater investment, they are not necessarily the fastest or best examples. Many large enterprises achieve good results, but many others accomplish nothing because they fail to truly recognize data' s importance in their marketing processes and overall business models, making them less effective than SMEs that genuinely commit to building DMPs. Some SMEs, due to simpler internal structures and product categories, can achieve immediate results from DMP implementation. Thus, in data assetization, large enterprises face their own difficulties while SMEs have their advantages.

In fact, advertisers, agencies, and media are all actively promoting internal data assetization and multi-party data openness. For any enterprise, however, the greatest challenge first comes from whether its decision-makers are determined to build this data platform well, followed by financial investment and implementation steps, and finally technical solutions. Many technical problems are easily solved, but the key issue lies in whether enterprises can clarify their marketing objectives, user needs, consumption scenarios, and the human and financial investments involved in data assetization. Only when these are clearly sorted out can they effectively communicate with technical teams or third parties to implement and execute.

Today, on the path to data assetization, all enterprises and individuals are continuously learning and contemplating what the big data revolution has brought us. From another perspective, data assetization may also be a crucial component of the emerging new retail formats. Currently, many large and small enterprises,

including BAT, are 布局 (布局) in this field, fundamentally transforming or even completely 颠覆 (颠覆) traditional retail. What role will datafication play in this process? Marketing studies typically mention the concept of target market—how enterprises can better serve their target users, including both existing and new customers. Whether new retail or smart retail, this target user market remains the core issue they must address, albeit through entirely new methods based on data analysis. For example, coffee shops can mine and analyze all users' historical consumption records and conduct different advertising and marketing campaigns targeting different users at different times, thereby increasing repeat purchase rates or per-customer transaction values. We can also call this data-intensive business model "new services," which holds significant meaning for many offline retail stores. In the past, increasing per-customer transaction value depended heavily on individual service staff' s diligence and emotional intelligence, but today, data tools are helping us standardize, systematize, and scale this personalized service for different users.

In future new retail scenarios, will DMP systems or other intelligent data systems assume the role of commanders issuing orders to in-store service staff? Can they instruct staff on how to better improve customer satisfaction and per-customer transaction value? This is data' s meaning and value: before achieving consumption upgrading, we must first complete the upgrading of data thinking and data systems. For example, food review apps in commercial districts can use LBS to obtain users' specific geographic locations, such as near Guomao. Will this user remain nearby in the evening? By combining the user' s current scenario, mobile search and browsing content, and more extensive dining consumption data, we can push more precise advertisements or discount information for nearby restaurants. This is also a typical application of datafication and programmatic advertising, helping us solve more specific problems in new retail and new services. This is the core issue facing computational advertising: how to achieve perfect matching among users, scenarios, content, and advertisements.

5. Rethinking Advertising Under the Logic of Data Closed Loops

At this point, traditional advertising thinking faces significant limitations in marketing. First, the "broad and 告知 (告知)" mindset becomes increasingly unsuitable for today' s programmatic or computational advertising. Second, crude advertising bombardment not only wastes marketing budgets but also delivers diminishing returns. The social computing thinking mode built upon big data necessarily 颠覆 (颠覆) previous communication models, and once-dominant advertising communication patterns are beginning to change [4]. In fact, digital marketing has shown many new trends in recent years: content as advertising, social marketing, word-of-mouth marketing, etc. Because users are friends online or offline, their product and service recommendations function more like experience sharing, social penetration, or content output. All media and advertisers

are actively expanding beyond traditional hard advertising toward more native marketing directions—how to integrate marketing and content more tightly and organically. This involves issues of relevance or 关联度 (关联度) that we frequently discuss.

For decades, the advertising industry has debated whether consumers actually like watching advertisements. U.S. research shows users typically skip ads when watching recorded programs, while domestic research indicates the highest channel-switching rates occur during ad breaks. Why? Because these ads have no direct relevance to users, so people naturally skip them. The U.S. Super Bowl serves as a notable exception—a 30-second ad for the 52nd Super Bowl sold for a staggering $7.7 million, with Fox earning over $500 million from 104 ad slots during the game, plus an additional $20 million from four ads during overtime. The Super Bowl is arguably the world' s only television program that attracts viewers to watch ads carefully. Beyond well-produced, creative content, a key reason is the high relevance between its ads and user needs. Cola brands, chip brands, and beer brands are major Super Bowl advertisers, and this period coincides with peak sales for such products in the U.S. The relevance principle applies not only to Super Bowl TV advertising but also to internet programmatic advertising. The 粗放 (粗放) model of simply buying traffic and placing ads no longer works. In future programmatic buying and the entire digital marketing field, we must seriously consider the high relevance between advertising and content, and the organic integration with scenarios. Under such logic, the key is to infer user needs based on data management systems, leading to increasingly large-scale, precise, personalized, intelligent, and dynamic advertising activities [5].

In fact, we are today re-examining, rethinking, and redefining advertising from entirely new perspectives. In a sense, future advertising will more closely resemble some form of new service. Users don' t need advertising itself; they need advertising, marketing, content, or other service forms that can solve their difficulties, pain points, or itches regarding information acquisition, product selection, or brand consumption. They don' t want dry, hard, irrelevant ads. New services use massive data, tag systems, user thinking, and other tools to meet each user' s personalized needs and take this to the extreme. Past marketing decisions relied on gut feelings, subjectively assuming which marketing approach was optimal. But increasingly rich data will tell advertisers which other brands, content, or offline activities are highly relevant to their brand, making advertising marketing, content marketing, and cross-border marketing more precise, effective, and purposeful. Under this logic, returning to the topics of redefining advertising, marketing, and media takes on new meaning. Cross-brand marketing opens new possibilities: one brand becomes another brand' s medium, or they become mutual media and marketing channels. For example, a coffee shop' s scene is suitable for hybrid marketing of many other brands or products beyond its own coffee. Therefore, in the era of 万物互联 (万物互联), televisions are media installed in homes, cars are media on wheels, and intelligent robots are media applied in more scenarios. The technical logic and business models

hold true, allowing us to imagine future media and advertising ecosystems more boldly and creatively. What we should do now is better complete enterprises' data closed loops, more accurately predict user consumption needs, and more effectively deliver new advertising and marketing services.

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Note: Figure translations are in progress. See original paper for figures.

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