A Study on Data Monitoring and Effect Optimization of Programmed Advertising Platform: Taking “Ocean Engine” as an Example

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Abstract. Currently, programmatic advertising has become the most popular way to purchase online media in our country. More and more Internet companies are beginning to use their own data and technological advantages to build their own programmatic advertising service platforms. This article takes the programmatic advertising service platform of Bytedance Company-the "Ocean Engine" as the research object, and explores the strategy of data collection and effect optimization of programmatic advertising.

1. Introduction

1.1. Research Background
Programmatic advertising refers to a form of advertising that uses technical means to conduct advertising transactions and management. In the era of big data, the massive quantification of data resources and the intelligence of data analysis technology have had a profound impact on the advertising industry. Advertising transactions have been upgraded from relying on the purchase of media resources to reach the crowd to a model of using algorithms and technology to accurately purchase target audiences, achieving the automation and digital sales of media resources.

Since 2012, China’s programmatic advertising market has entered an exploratory period. Baidu, Tencent, Sina, etc. have launched advertising trading platforms, and the programmatic market has shown explosive growth. More and more Internet companies have begun to build their own programmatic advertising platforms within their companies to hold the sales and push of high-quality advertising resources in their own hands. In this process, ByteDance's algorithm has become a rising star in the advertising market with extremely high accuracy, strong learning ability and a large number of advertisers.

1.2. Shortcomings of current research
At present, there are three main types of related research in the academic circle: the first type is macro-analysis, based on the overall perspective of the programmatic advertising market, comprehensively discussing China's programmatic ecological structure, development stages, problems and challenges. The second category is based on corporate entities in the specific programmatic advertising market, and analyses the respective characteristics and business structures of program advertising platforms such as
Baidu Wangmeng, Alimama, and Tencent Guangdiantong. The third category focuses on the technology of programmatic advertising, discussing the transaction logic and platform characteristics of platforms such as SSP, DMP, DSP, etc.

Although programmatic advertising transactions have received increasing attention in academic circles at home and abroad, and considerable research results have been achieved. However, it should be noted that due to the late entry of massive engines into the programmatic trading market, there are still fewer relevant studies. "Ocean Engine" has mastered the media resources such as Toutiao, Douyin short video, volcano video, watermelon video, etc., covering about 550 million daily active users, and the access traffic covers up to 12% of the total mobile Internet users. How to use the "Ocean Engine" to achieve Programmatic advertising has very important practical significance.

1.3 Main research questions
The functions of data collection, analysis and mining, intelligent optimization, programmatic creativity and management provided by "Ocean Engine" have provided a one-stop full-link solution for corporate digital marketing from exposure, drainage to deep conversion. Questions of this study include but are not limited to:

1) Data acquisition of "Ocean Engine"
2) Information flow advertising strategy and effect optimization channel
3) Compared with custom creativity, the actual effect of intelligent programmatic creativity

2. Materials and Methods

2.1 A/B testing of information flow advertising
In July 2020, the author carried out a one-week advertising on the information flow of the characteristic agricultural product "Wushan Crispy Plum" on the "Ocean Engine", and optimized traffic targeting and creative materials based on the delivery data. Relying on the A/B testing function supported by "Ocean Engine" at the creative level of advertising, the users are divided into a control group indiscriminately, which can quickly test the effect data of different variables at the creative and targeted levels.

1) Full test period (days 1-3)
   The advertising budget is 1,000 yuan, and the advertising material is a product poster. The main purpose is to test the distribution of potential users of Wushan crisp plum in age, region, occupation, and interest, and obtain a user portrait of the product.

2) Creative comparison period (days 4-7)
   The advertising budget at this stage is 4,000 yuan, the placement strategy is balanced delivery, and the target conversion bid is 25 yuan. The main purpose is to test the difference in click effects of creatives with different appeal points.

2.2 Main data analysis methods

2.2.1 Segmentation analysis of advertising data
1) Segmentation of demographic characteristics: Divide users into different demographic groups based on their needs, gender, age, behavior, interests, consumption level, or different stages in the user journey, which can be a single level or a combination of multiple levels, and then Further analyse the data of different sub-groups. For example, subdivide into male users and female users, and subdivide into new users and old users.

2) Media segmentation: data segmentation for advertising channels, media, advertising positions, etc.

3) Creative subdivision: subdivide multiple sets of creatives and versions.

4) Segmentation by other dimensions: for example, segmentation according to dimensions such as region.
2.2.2 Creative Attribution Analysis
Creative attribution refers to the contribution rate of each creative and version in the advertising process to conversion. Through data observation, we can discover the law or the causal relationship between data, and infer the cause and verify it on this basis.

3. Results & Discussion

3.1 Research process analysis and data results

3.1.1. The overall data of the information flow advertising test
The bidding mode of massive engines can effectively achieve cost control, and the optimal mode can effectively lock short-term traffic. The combination of the two modes at intervals can effectively achieve the effect of brand exposure and store drainage, while controlling costs. Judging from the performance data of display-click-conversion, this placement consumed a total of 5,000 yuan in advertising costs, received a total of 2.5137 million impressions, and received 34,700 clicks, resulting in 188 conversions and a turnover of 12,972 yuan. The overall ROI meets expectations.

Table 1. The core indicators of this advertisement

| Display data | Click data | Conversion data |
|--------------|------------|----------------|
| Impressions (251.37w) | Clicks (3.47w) | Conversions (188) |
| CPM (¥1.99) | Click cost (¥0.14) | Conversion cost (¥26.6) |
| Click-through rate (1.38%) | Conversion rate (0.54%) |

3.1.2 User portrait data
In order to accurately find target users and show them interesting advertisements in a timely manner, the definition of target users is very important. This requires analysing the user’s gender, age, social identity, use of equipment, browsing history, payment habits, etc. to trace the user’s portrait and set tags for the user.

Table 2. User portrait of Wushan crisp plum

| Gender | Female (43.2%) Male (56.8%) |
|--------|----------------------------|
| Age    | 18-23 years old (7.5%) 24-30 years old (18.2%) 31-40 years old (34.5%) 41-50 years old (24.1%) Over 50 years old (15%) Under 18 years old (0.7%) |
| Province(TOP5) | Guangdong, Jiangsu, Sichuan, Zhejiang, Chongqing |
| Interests (TOP5) | Beauty and makeup, life services, education and training, home improvement department stores, travel |

3.1.3 Optimization of the bidding model
There are currently three bidding methods in the "Ocean Engine", namely CPC (Cost Per Click), CPA (Cost Per Action) and oCPM (optimization Cost Per Mille). CPC refers to pay per click; CPA refers to charging based on user behavior, and only pays when certain specific behaviors are completed, such as registering information, making calls, etc.; traditional CPM targets exposure, and every time a user sees an advertisement, the advertisement The owner has to pay an advertising fee, and oCPM refers to the upgraded version of the target conversion bid, which has a more accurate estimation mechanism. Advertisers can first set optimization goals according to their own needs, but still charge based on the number of exposures. The author comprehensively compared the data in the previous and two Toutiao digital marketing actual projects. After a certain period of data accumulation, the conversion cost has been reduced from 35 yuan in the previous period to about 18-25 yuan.
3.1.4. Comparison data of custom and programmatic ideas
Programmatic creativity is the process of automating and programmatic expression of creativity. The essence is to solve the problem of matching users, environment and creative content with algorithm as the core. By delineating groups of similar users to form a specific group portrait, programmatic creativity is intelligently matched with users under the recommendation of an intelligent algorithm mechanism, which significantly improves the advertising effect. Taking the intelligent creativity of the geographical latitude as an example, the system replaces the instructional content with a clear geographical area into the creativity, which directly improves the advertising effect. The ad click rate rose from 1.78% to 2.31%, an increase of nearly 30%.

Table 3. Advertising data of different appeal points

| Appeal point                  | Impressions | Clicks | Click-through rate (%) |
|------------------------------|-------------|--------|------------------------|
| 1 Authoritative endorsement | 287119      | 5111   | 1.78                   |
| 2 Unique taste               | 303327      | 4186   | 1.38                   |
| 3 Effect of beauty           | 296208      | 4325   | 1.46                   |
| 4 Seasonal food              | 283416      | 3628   | 1.28                   |
| 5 Dynamic word pack {location} | 273833    | 6326   | 2.31                   |
| Total                        | 1443903     | 23575  | 1.63                   |

3.2. Discussion on the results of the study

3.2.1. Data acquisition and monitoring based on visual reports
Companies often do not have the ability to build their own intelligent data analysis platforms, but there are data-driven needs. They can use third-party data service platforms to reduce development costs and improve operational efficiency. The data report function of "Ocean Engine" supports the customization of up to 175 data indicators, which can be customized according to different account characteristics, including display data, conversion data, application download advertising data, landing page and store data, and additional Creativity, video data, interactive data, such as video completion rate, conversion number, order volume, ROI, LTV, etc., to meet a variety of data monitoring needs.

3.2.2. Main optimization channels for programmatic advertising
Programmatic advertising based on big data analysis technology solves the pain point that the advertising effect cannot be measured. In terms of effect monitoring, "Ocean Engine" can basically achieve real-time monitoring and strengthen advertising and marketing prediction. In terms of performance optimization, it mainly focuses on three items: orientation optimization, bid optimization, and material optimization.

1) Targeted optimization
   In the optimization of targeting methods, advertisers can independently set audience tags according to their own marketing goals, and then can make adjustments in the background based on real-time feedback data.

2) Bid optimization
   In terms of bid optimization, generally follow the following path: if the data trend rises or stabilizes, try to gradually reduce the price; if it is lower than the normal level, you can increase the price and re-observe it. If the data still does not improve after the price increase, it is recommended to abandon the price adjustment and switch to Update the material.

3) Material optimization
   Material optimization refers to the accurate analysis of user interests and needs through rapid trial and error of elements and user feedback during the advertising process.
After the entire process is completed, programmatic creativity has also opened up a new thinking of "feedback creativity", that is, after an advertisement idea is placed programmatically, a large number of creative elements will form "data" and be dynamically tracked, and the creative subject will be monitored. Analyze the effectiveness of advertising creatives.

4. Conclusions
Programmatic buying of digital advertising uses big data technology, targeted technology, and programmatic buying to realize a series of advertising operation processes such as discovering users, submitting purchase intentions, advertising transactions, and going online in a very short time. The implementation of technical thinking and the reengineering of operational processes have solved the problem of low efficiency of online advertising. A batch of programmatic trading platforms provides a one-stop service for companies to carry out precision marketing. Advertisers can see from the beginning of advertising to the generation of purchase conversion, and all behaviors in the life cycle can be recorded and traced, and communicating with users 24 hours a day through Retargeting and dynamic creativity to achieve the best marketing experience and maximize life cycle value. At present, the development speed and scale of programmatic advertising cannot be underestimated. Using technological means to improve productivity is the ultimate goal of programmatic development, and the form of advertising in the era of comprehensive intelligence is worth looking forward to.

Acknowledgments
This paper is one of the phased achievements of the youth fund project of Wuhan Donghu University "Research on the brand narrative of Hubei agricultural products in the era of digital marketing". This work was also supported by the grants from Hubei Provincial Collaborative Innovation Centre of Agricultural E-Commerce.

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