Journal of The Institute of Electronics and Information Engineers Vol.58, NO.10, October 2021 https://doi.org/10.5573/ieie.2021.58.10.35
ISSN 2287-5026(Print) / ISSN 2288-159X(Online)

논문 2021-58-10-5

국내 패션 이커머스 사업자의 디스플레이 광고 실적 개선을 위한 자동 광고 운영 기법

(Automatic Advertising Operation Method for Improving the Display Advertising Performance of Domestic Fashion e-Commerce Operators)

이 정 우*, 김 승 천*

(Jung-Woo Lee and Seung-Cheon Kim©)

요 약

글로벌 소셜 네트워크 서비스들이 광고 매체로 변화하며 제공하고 있는 네이티브 광고 중 Dynamic Ads는 광고를 좌우로 슬라이드하여 볼 수 있는 소재가 카탈로그 형태의 광고로, 이용자들에게 광고의 불쾌감과 거부감 등을 줄일 수 있어 광고 효과가 높은 광고이다. 광고주는 이 광고를 통해 노출하고자 하는 광고 소재들을 묶어 광고 소재 세트를 만들게 되는데, 광고주의 쇼핑몰에서 판매되는 상품들의 상태를 실시간으로 반영하지 못하는 문제가 있다. 본 연구에서는 쇼핑몰에서 판매되는 상품들의 상태를 주기적으로 반영하여 광고 소재를 업데이트 할 수 있는 알고리즘을 제안하고, 프로그램으로 구현한다. 기존 방식의 광고 운영과 제안하는 알고리즘으로 구현된 프로그램을 통한 자동 광고 운영의 광고 성과를 비교하여 제안하는 알고리즘의 유효성을 검증하였다.

Abstract

Among the native advertisements provided by global social network services as an advertising media, Dynamic Ads are catalog-type advertisements that can be viewed by sliding the advertisement left and right. The advertising material set consists of registering products that an advertiser or marketer wants to expose as advertising in advance. There is a problem in that the status of products sold in the advertiser's shopping mall cannot be reflected in real-time. In this study, we propose an algorithm that can update advertising materials by periodically reflecting the status of products sold in shopping malls and implement them as a program. The effectiveness of the proposed algorithm was verified by comparing the advertising performance of the existing advertising operation and the automatic advertising operation through the program implemented with the proposed algorithm.

Keywords : Advertising, Advertising performance, Advertising material, Auto-operation, Data extract

Ⅰ. Introduction

Globally, social network services are serving a large number of users, and they are growing into an advertising medium that provides advertisements to a large number of customers. For example, in the case of Facebook, first developed in 2004, Facebook is available in 70 languages as of 2020 and is the world's largest social network service with about 30 billion contents shared per month[1~3]. In 2019, Facebook's sales recorded $69,655M, an increase of 27% year-on-year, of which advertising sales accounted for 98.5% of total sales[4].

Another reason for global social network service growth as an advertising platform is the introduction of native advertising with high advertising

*정회원, 한성대학교(Hansung University)
© Corresponding Author(E-mail : kimsc@hansung.ac.kr)
Received ; July 28, 2021 Revised ; August 2, 2021
Accepted ; September 29, 2021

effectiveness as it can reduce discomfort and rejection of advertising to users[5~7]. Among global social network service native advertisings, Dynamic Ads are a method of exposing advertisings to users' news feeds as shown in Fig. 1 by gathering several advertising materials into a single advertising set. The user slides the advertising from side to side and can view the advertising as if viewing a catalog. If a user clicks on the advertising image that the user likes, the user can access the destination web page of the advertising material, that is, the product details page, check the details, and make a purchase.

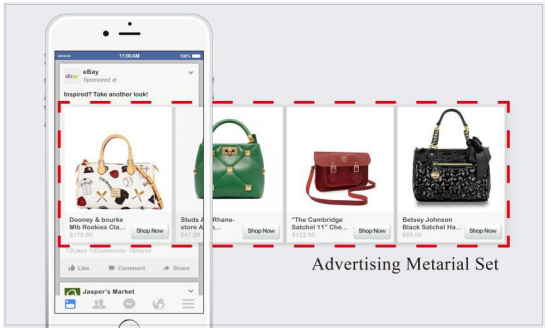

그림 1. Dynamic Ads[8]
Fig. 1. Dynamic Ads[8].

In Fig. 1, the bundle of all advertising materials shown when sliding is called an advertising material set. One advertising material in the advertising material set consists of an advertising image, advertising text, and URL of the product detail page that is accessed when clicked. The advertising material set consists of registering products that an advertiser or marketer wants to expose as advertising in advance. Dynamic Ads of the same advertiser may be exposed multiple times while a user is watching a newsfeed. When the number of advertising materials registered in the advertising material set is large, the materials are selected and displayed based on the advertising material exposure algorithm of advertising media, but if the number of registered advertising materials is small, the redundant advertising materials are exposed every time. To prevent this, in some cases, all products in the shopping mall are registered in an advertising material set. In this case, there is a problem that it is not easy for the marketer to directly update the advertising material when the number of products in the shopping mall is large or new products are registered every day. Since marketers can register multiple advertising material sets on advertising media, it also utilizes the method of registering multiple advertising material sets composed of various products. In this case, it is necessary to decide what products each advertising material set is composed of. In general, an advertising material set is composed of popular products, that is, the best products, which are sold a lot in shopping malls. New products are also widely used as advertising material sets. In cases where many products and the customer base are diverse, an advertising material set is created by classifying the best products popular by customer age, region, and gender. They also create an advertising material set by classifying each customer group that wants to introduce new products.

Usually, shopping malls are open 24 hours a day, and changes in the ranking of the best products, registration of new products, and sold out of products occur irregularly. To maximize the advertising performance of the advertising material set, events that occur irregularly must be reflected in the advertising material set in time. For example, although a certain product that is included in advertising material is sold out at a shopping mall, advertising media cannot determine the sold-out situation, advertising of the out-of-stock product is continuously exposed. When a user clicks on the advertising material, the advertising cost is burnt, but the user's purchase does not occur. If the purpose of the advertising is to increase the number of users visiting the shopping mall, there is no problem, but if the purpose is the purchase conversion, then the corresponding advertising material must be deleted or replaced. When looking at the advertising performance, it seems that the overall advertising performance has decreased, but there is no way for the marketer to know that the advertising cost is

wasted due to the out-of-stock of some advertising materials and performance has decreased. It is necessary for the marketer to update the advertising material set by catching up on the product change in real-time, as well as the change in the ranking of the best product or registration of a new product. But it is impossible.

In this study, instead of directly updating the advertising material set by the marketer to catch up with the situation of shopping mall products, we propose an automated algorithm that identifies the situation of shopping mall products every hour and updates the advertising material set when there is a change. To determine the proposed logic is valid, we implement the program, and the effectiveness of this program and the effectiveness of the marketer's direct operation are compared.

Ⅱ. Advertising operation automation program

The automation program consists of DB, data collection script program, change detection program, advertising material extraction program, and advertising material update program. In the shopping mall, a script program that collects product data and sales data in real-time and stores it in a DB located on a separate server is installed. This script program collects all product information, representative images, product details, registration time, and sales information, and additionally collects user's action and purchase information. This script program does not collect data corresponding to the user's personal information.

The change detection program reads the data in the DB at regular intervals and detects the difference from the previously checked content. If there are frequent product changes in the shopping mall, the confirmation interval is shortened. The advertising material update program updates the advertising material of advertising media by reflecting the change detected by the change detection program.

When a new product is registered, the advertising material extraction program that received information about the product through the change detection program extracts the representative image and text of the product and makes it into an advertising material. The advertising material update program adds the relevant advertising material which is made by the advertising material extraction program to the new product advertising material set among the advertising material sets of advertising media. When the number of advertising materials in the advertising material set exceeds the number specified in advance, the oldest advertising material is deleted from the advertising material set.

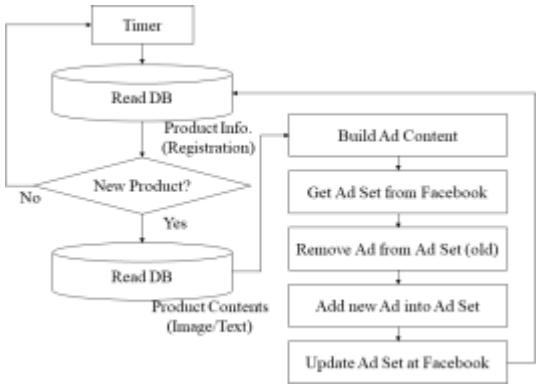

그림 2. 광고 자동 운영 프로그램의 흐름도 - 새로운 상품
Fig. 2. Flowchart of Advertising Auto Operation Program - New Product.

Fig. 2 is a flowchart showing the execution process in which the advertising automation program recognizes the registration of a new product when a new product is registered in the shopping mall and updates the advertising of advertising media by creating advertising material for the new product.

When a product is registered within the best product ranking due to a change in the best product in the shopping mall, the advertising material extraction program that received information about the product through the change detection program extracts the representative image and text of the product and makes it into an advertising material. The advertising material update program adds the relevant advertising material which is made by the advertising material extraction program to the best product advertising material set among the

advertising material set of advertising media. When the number of advertising materials in the advertising material set exceeds the number previously specified, the advertising material that has been pushed out of the best product ranking is deleted from the advertising material set.

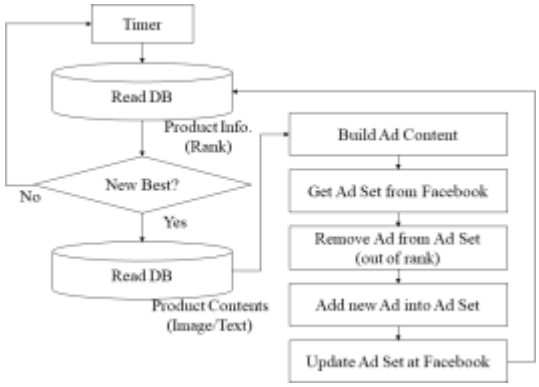

그림 3. 광고 자동 운영 프로그램의 흐름도 - 순위 변경
Fig. 3. Flowchart of Advertising Auto Operation Program - Rank Changed.

Fig. 3 is a flowchart showing the execution process in which the advertising automation program recognizes the change of the best product when the order of the best products in the shopping mall is changed and updates the advertising of advertising media by creating advertising material for the newly registered best product.

When a sold-out product is found through a change detection program, the advertising material update program deletes the advertising material of the product from every advertising material sets of advertising media.

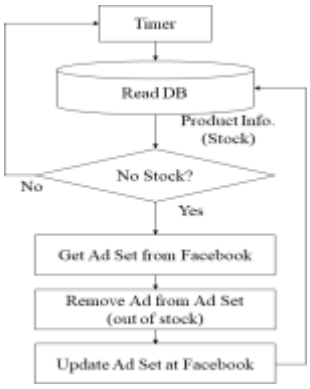

그림 4. 광고 자동 운영 프로그램의 흐름도 - 품절 상품
Fig. 4. Flowchart of Advertising Auto Operation Program - Sold-out Product.

Fig. 4 is a flowchart showing the execution process in which the advertising automation program recognizes the sold-out product and removes the product advertising from the advertising of advertising media when a product registered as advertising is sold out at a shopping mall.

Each program was developed in PHP, and the registration and deletion feature of advertising materials was developed using the API provided by advertising media.

Ⅲ. Experimental method

Most of the previous studies on the advertising effect of native advertisings are related to the user's perception or propensity for advertisings[9~11]. An experiment on advertising performance is not easy due to the problem of executing advertising expenses. In this study, one of the medium and large-sized shopping malls with annual sales of $10M or more among Korean internet fashion shopping malls with the consent of an advertiser was selected as an experimental. The experimental had run an advertising operation that maintains the existing method and automatic advertising operation through the program proposed in this study for 3 months. We collected experimental data to compare the advertising performance of the two cases while operating at the same time. Advertising performance was collected every day during the experiment and compared by weekly performance with recalculated.

In order to compare the advertising performance, an advertising performance index should be selected. At this time, different advertising performance indicators are used to judge the good or bad of performance according to the purpose of the advertising. For example, if the purpose of advertising is to want a large number of visitors through advertising, then the cost per customer visit, CPC (Cost per Click) is the main performance indicator. The calculation of this CPC is as in Equation (1), and since this indicator is an indicator

of cost, the lower is the better. ADS (Advertising Spend) means the whole cost for advertising spend to this purpose[12].

$$CPC = \frac{Clicks}{ADS} \quad (1)$$

A representative advertising performance indicator for this purpose is ROAS (Return on Advertising Spend) to verify conversion sales through advertising, that is, the ratio of the sales through the advertising to the paid advertising cost as the main performance indicator. ROAS can be expressed as Equation (2), and the higher the value of this index the better performance is judged.

$$ROAS(\%) = Sales\,\frac{Sales\,from\,Advertising}{ADS} \times 100 \quad (2)$$

Another main purpose of advertising in online shopping malls is to increase membership registration. For shopping malls, the new member subscription rate is a major advertising indicator because it does not end with a single product sale, but because users who clicked on an advertisement sign up as a shopping mall member to induce additional purchases through customer management in the future. In this case, two indicators are taken as major performance indicators. The one is MRR (Membership Registration Rate) which is the ratio of the number of member sign-ups to the number of impressions used for this purpose through advertising. The other is CPMR (Cost per Membership Registration) which is the advertising cost used to sign up for one member. The calculation method of MRR can be expressed as Equation 3, and the higher the value of this index, the better performance is judged. IMPR (Advertising Impression) refers to the number of times the advertising material is exposed in the advertising medium, that is, the total number of times displayed on the user's screen. It is expressed as "impression" in general advertising terms.

$$MRR(\%) = \frac{Number\,of\,sign-ups}{IMPR} \times 100 \quad (3)$$

The CPMR can be expressed as Equation 4, and since this indicator is a cost indicator, the lower is the better.

$$CPMR(\%) = \frac{Number\,of\,sign-ups}{ADS} \times 100 \quad (4)$$

In this study, the results of the existing advertising operation method and the automatic advertising operation method were compared through the comparison of these four advertising performance indicators.

Ⅳ. Experimental result

The experimental results can be checked through the graphs of Figures 5 to 8. The green graph is the advertising performance data of the existing advertising operation method, and it was seen that there is no significant difference between the previous and this experiment period. The blue graph is the advertising performance data of the automatic advertising operation method through the program proposed in this study.

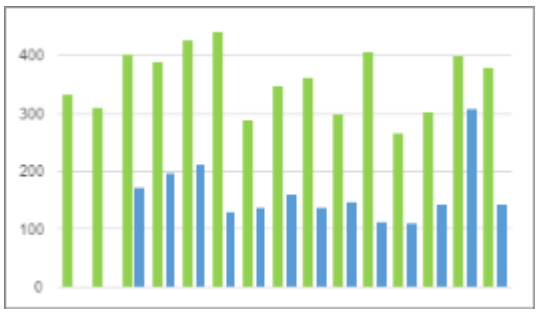

그림 5. 고객당 방문 비용 비교
Fig. 5. Cost per Customer Visit Comparison.

Fig. 5 is CPC (cost per click) comparison graphs. Because it is a comparison of costs, a low value means better advertising performance[13]. It was seen that the advertising cost of the automatic advertising operation method through the program proposed in this study is lower compared to the advertising cost of the existing advertising operation method.

Fig. 6 is the cost per member subscription comparison graphs. It is also cost comparison, a low

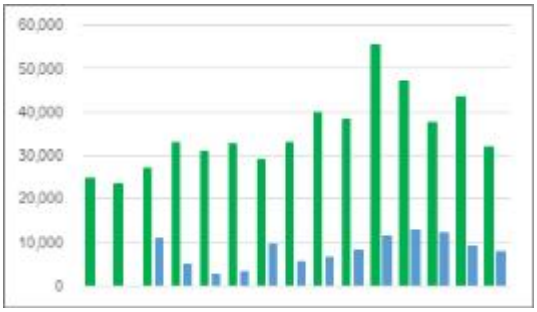

그림 6. 고객당 회원가입 비용 비교
Fig. 6. Cost per Membership Registration Comparison.

value means better performance. It was seen that the cost per member registration of the automatic advertising operation method through the program proposed in this study is significantly lower cost compared to the advertising performance of the existing advertising operation method.

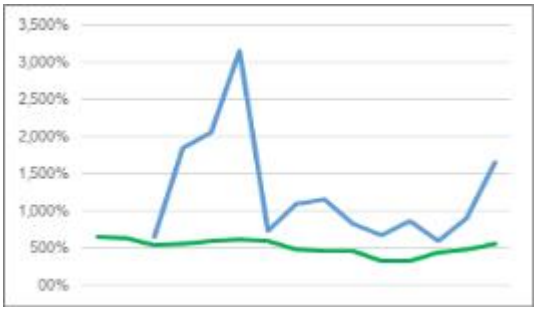

그림 7. 광고비 대비 매출 비교
Fig. 7. ROAS Comparison.

Fig. 7 compare sales versus advertising expenses, ROAS. Higher values indicate better advertising performance. It was seen that the advertising performance of the automatic advertising operation method through the program proposed in this study is higher than the existing advertising operation method. Although there are differences by period, it was seen that the advertising performance of the automatic advertising operation method through the program proposed in this study differs up to 5 times.

Fig. 8 compare the number of member subscribers versus advertising impressions. Higher values indicate better advertising performance, too. It was also seen that the advertising performance of the automatic advertising operation method through the

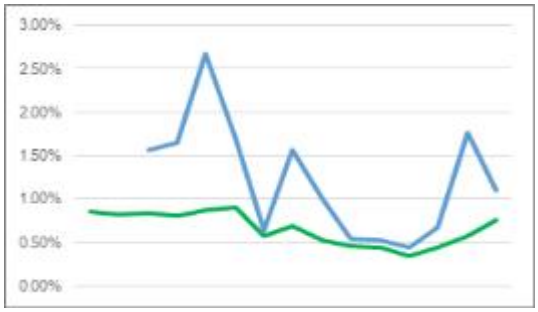

그림 8. 회원가입률 비교
Fig. 8. Membership Registration Rate Comparison.

program proposed in this study is higher than that of the existing advertising operation method.

Through the experimental results, it was confirmed that the automatic advertising operation through the program proposed in this study is shown better performance than the existing advertising operation method in all advertising performance indicators.

Ⅴ. Conclusion

The online shopping mall operates 24 hours a day, and in the case of a large online shopping mall, the condition of the product such as the ranking of products, brand new product, and out-of-stock changes continuously. However, it is impossible for marketers to directly detect changes in the state of products in the shopping mall and update the advertising material. In this study, we propose a program that automatically updates the advertising material in the advertising material set used by the Internet shopping mall for Dynamic Ads of global social network service platforms as advertising media according to the status of the product in the shopping mall. An experiment was conducted to compare the difference in advertising performance of the advertising operation method by executing and operating advertising expenses. As a result of the experiment, it was confirmed that the advertising operation through the advertising operation automation program proposed in this study was shown better performance than the existing advertising operation method. By utilizing the proposed algorithm and using an automated program,

the waste of advertising expenses will be reduced and highly efficient advertising operation will be possible.

REFERENCES

[1] Cassidy J., "Me Media: How Hanging out on the Internet Became Big Business," The New Yorker, pp.50-59, May. 2006.
[2] Krasnova Hanna, Wenninger Helena, Widjaja Thomas, and Buxmann Peter, "Envy on Facebook: A Hidden Threat to Users' Life Satisfaction," in Proc. of Wirtschaftsinformatik 2013, 92. pp. 1477-1491, 2013.
[3] Chang-Jun Jeong, "Effects of Facebook Advertisement Message's Convergence Type and SNS Trait on Brand Attitude, Purchasing Intention," Journal of the Korea Convergence Society, vol.9, no.3, pp.187-201, 2018.
[4] Facebook, "Facebook Reports Fourth Quarter and Full Year 2019 Results," 2020.
[5] Lieb R, Szymanski J, Etlinger S., "Defining and mapping the native advertising landscape," Altimeter Research, 2013.
[6] Lab IM, "Infographic: Exploring the effectiveness of native advertising," Marketing Magazine, 2013.
[7] E-Marketer, "All Eyes on Native Advertising, Despite Uncertainties," E-Marketer, 2013.
[8] Facebook, "Drive Conversions on Every Device with Dynamic Product Ads," Facebook for Business, 2015.
[9] Van Reijmersdal EA, Fransen ML, van Noort G, Opree SJ, Vandeberg L, Reusch S, et al., "Effects of disclosing sponsored content in blogs: How the use of resistance strategies mediates effects on persuasion," American Behavioral Scientist, Vol. 60, Issue 12, pp. 1458-1474. 2016.
[10] Wojdynski BW., "The deceptiveness of sponsored news articles: How readers recognize and perceive native advertising," American Behavioral Scientist, Vol. 60, Issue 12, pp. 1475-1491. 2016.
[11] Wojdynski BW, Evans NJ., "Going native: Effects of disclosure position and language on the recognition and evaluation of online native advertising," Journal of Advertising, Vol. 45, Issue 2, pp. 157-168, 2016.
[12] Li Tian, Kyoung Jun Lee, "Evaluation of Conversion Action Data Mechanisms in Cost-Per-Action Advertising." Information Systems Review, Vol. 10, No. 2, pp. 123-135, 2008
[13] Aguilar J, Garcia G., "An Adaptive Intelligent Management System of Advertising for Social Networks: A Case Study of Facebook," in IEEE Transactions on Computational Social Systems, Vol. 5, No. 1, pp. 20-32, March 2018.

저 자 소 개

이 정 우(정회원)
1995년 한남대학교 전자공학과 학사 졸업.
1997년 한남대학교 전자공학과 석사 졸업.
2011년 Aalto Univ. 경영학 석사 졸업.
<주관심분야 : 온라인 광고, 인공지능>

김 승 천(정회원)
1994년 연세대학교 전자공학과 학사 졸업.
1996년 연세대학교 전자공학과 석사 졸업.
1999년 연세대학교 전기컴퓨터 공학과 박사 졸업.
<주관심분야 : 네트워크 보안, 블록체인 서비스, 사물인터넷 보안, 5G 이동통신망 서비스>