AI for Matching Company-Owned Content with Consumer Needs

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It has long been said that we are in an age of oversupply and information overload. In a time like this, one key issue for companies is the appropriate provision of various types of company-owned products and content according to consumer needs. There are many marketing operations support tools available for resolving these issues. Even with these tools, however, it is difficult to accurately identify consumer preferences and standardize know-how that depends on individual marketers. To address these issues, Fujitsu offers the big data analysis and utilization platform Marketing AI Container (hereafter, Marketing AI Container). This is intended for learning consumer preferences and marketers' know-how by making use of AI technology to propose optimum products and content to individual consumers while reducing the burden on marketers. Accordingly, issues facing consumers and companies in content matching can be resolved. Working jointly with Fujitsu, Nippon Shuppan Hanbai Inc. (hereafter, Nippan) developed SeleBoo, a service that utilizes Marketing AI Container to facilitate improvement of the appeal of sales floors. This paper presents issues regarding content matching and an outline of Marketing AI Container together with Nippan's work as an example of adoption of the service.

1. Introduction

It has long been said that we are in an age of oversupply and information overload. The spread of smartphones and other digital devices that allow individuals to easily transmit and receive information also contributes to the increase in the volume of information. In marketing, especially digital marketing, in a time like this, the appropriate provision of various types of company-owned products and content according to consumer needs is one key issue for companies to continue to grow as competition involving different industries is becoming increasingly intensified. Recently, marketing operations support tools such as marketing automation and recommendation engines are the mainstream tools used for resolving this issue.

However, even companies that are actively using these tools still have many tasks that require marketers' know-how and techniques. Examples of these tasks include designing marketing scenarios in view of the processes for consumers to purchase goods (customer journeys), setting individual tools, formulating content matching rules for providing the optimum content for individual customers, and using the plan-do-check-act (PDCA) cycle for improvements.

This results in a problem involving the hindered provision of satisfactory customer experience (CX) when the marketing scenarios assumed by companies do not apply to customers, such as the delivery of messages in which customers have no interest. Meanwhile, companies see problems such as the exhaustion of marketers and the dependency on individuals for know-how. This is because marketers are required to continuously make improvements by revising scenario designs and rules and reviewing targets while evaluating the effect of the respective measures.

In addition, marketers are faced with business issues including the targeting of customers who are potentially cost-effective (estimation of prospective customers) at the time of advertisement (ad) delivery and the provision of offerings in the timeliest manner based on customer behavior on the website (provision of information about new product releases and discounts).

To address these issues, Fujitsu offers the big data analysis and utilization platform Marketing AI

Container (hereafter, Marketing AI Container). This can be used to have the AI automatically analyze a large quantity of products and content as well as customer information owned by companies for optimum matching, thereby resolving the issues.

This paper first describes the issues with content matching. Then, it goes on to outline Marketing AI Container and finally presents an example of its introduction.

2. Issues with content matching

This section presents the issues with content matching from the perspectives of both consumers and companies.

2.1 Issues as seen by consumers

Present-day consumers receive offers from many companies every day through various contact points, such as newspaper ads, TV commercials, email newsletters, and smartphone app notifications. This forces consumers to pick and choose from a large volume of information.

This much information about products and content is known to be a possible burden on consumers, as described in the jam study.[1)] This experiment, where jams were offered for sampling, showed that only 3% of the consumers purchased any jam when given a choice of 24 jams on display, but 30% purchased jam when the choice was reduced to 6 jams. This experiment, in other words, says that consumers can find what they want or need more easily out of carefully selected products and content. This law highlights consumers' psychology of being less likely to show interest in products and content presented at random.

Most of the offers that consumers receive from companies are sent in a uniform manner according to marketing scenarios predefined by the companies. Even if email or direct mail messages contain words like "only for you" or "special," often the content is not personalized for the recipients. There are even some offers that give unfavorable impressions of the companies sending them.

In this way, information offered in large volumes that does not interest consumers not only annoys them but also buries the desired information in junk so that it will not be communicated, which produces adverse effects. In light of this, consumers are looking for services and CX that offer personalized recommendations.

2.2 Issues as seen by companies

On the other hand, companies have always had a question of "which" of their products and content to appropriately offer "to whom," "when," "where," and "how" according to the diversifying preferences and needs of consumers.

For content matching, which corresponds to "which" and "to whom," optimization and matching of offerings are becoming automated through the analysis of big data, such as purchase history and website access logs.

However, realizing personalization for each consumer means a tremendous cost. This is because it requires human resources to be secured who have advanced skills in supporting rational judgment based on data, such as data scientists and data engineers, as well as the building and operation of the platform for conducting the analysis.

Therefore, many companies do not go as far as personalization, instead using conventional persona-based or segment-based marketing. In persona-based marketing, companies draw a virtual picture of representative examples of their customers and carry out marketing measures intended for those virtual customers. In segment-based marketing, on the other hand, companies do not implement uniform measures for their entire customer base. Instead, they classify the customers into several groups according to customer characteristics and implement measures for the individual groups.

There are also services such as recommendation engines capable of matching by analyzing correlations in purchase histories. These services use the results of consumer behavior, such as purchasing and browsing, as the basis for matching. For that reason, they facilitate the grasping of tangible needs, but potential consumer needs in the background remain difficult to understand. With recommendation engines and search sites, continued filtering of information to be proposed and shown to certain consumers based on the speculation of the types of information that interest them will eventually cause only the results that the consumers themselves are aware of to be proposed and shown. Therefore, unexpected products and content to fill potential needs that even the consumers themselves

are unaware of will no longer be proposed, leading to consumers' loss of interest in the sites and loss of sales opportunities, which is a problem.

3. Outline of Marketing AI Container

Since the dawn of AI, Fujitsu has been conducting research and development of the technology and supporting customers in solving various issues by making use of technologies and know-how accumulated over three decades.

In digital marketing, Fujitsu provides the big data analysis and utilization platform Marketing AI Container (**Figure 1**) for resolving the issues mentioned in the previous section. This Marketing AI Container is a collection of data analysis and utilization know-how required for marketing, which Fujitsu has continued to cultivate.

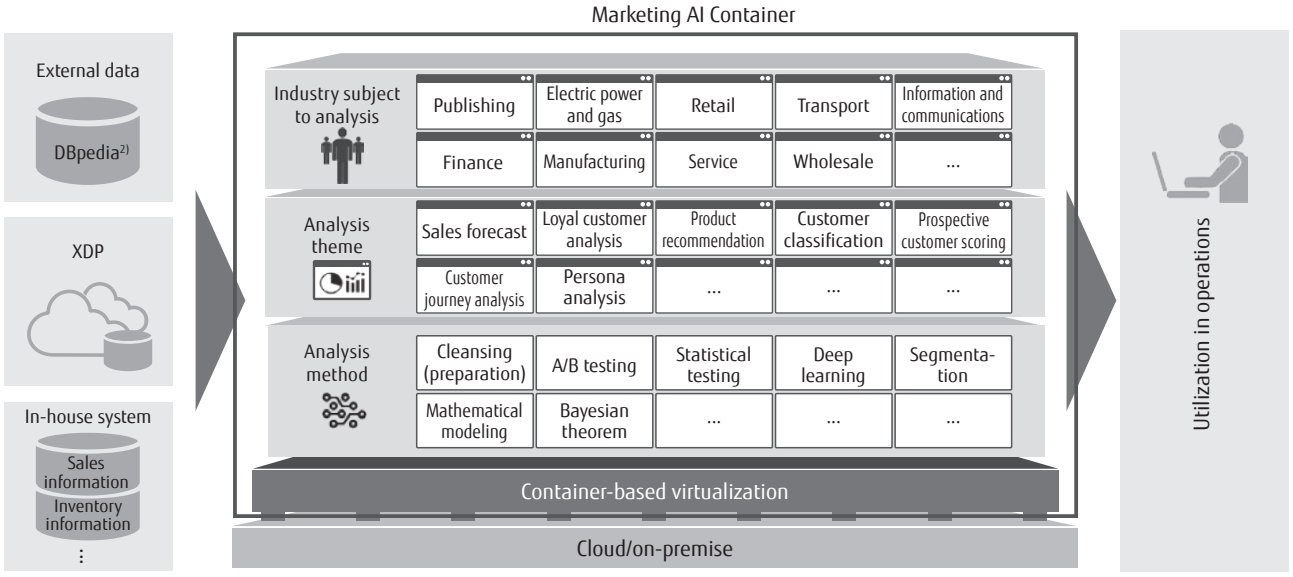
Fujitsu's data scientists have so far undertaken more than 200 advanced analysis projects and supported the growth and data-driven marketing activities of various companies. The analysis platform, which was actually used by Fujitsu's data scientists in those analysis projects to continuously strengthen analysis logic and techniques, has been reconstituted to allow for use by companies. The result is Marketing AI Container.

Marketing AI Container offers as services various AI analysis templates to solve issues according to the industry and analysis infrastructure optimized for data processing to companies. In the past, building of an analysis platform like this entirely in-house required time for securing human resources with the necessary know-how and infrastructure procurement and building, in addition to a large amount of initial investment. Use of Marketing AI Container allows the analysis platform to be launched more quickly at lower cost than before, resolving these issues.

Marketing AI Container has the following three strengths:

1) Makes available a platform with the AI technology incorporated into operations by building the algorithms derived from the analysis results into a form suitable for the operations of individual companies.
2) Allows flexible expansion of the platform, addition of algorithms, and linking with other services, in addition to the ability to start small.
3) Provides an analysis platform as a service, which is extremely costly if built on a from scratch development basis.

Marketing AI Container also makes available several of Fujitsu's proprietary technologies, which will be described in the following section.



XDP: eXperience data platform

Figure 1
Outline of Marketing AI Container.

Fujitsu uses this Marketing AI Container to support operations that require marketers' know-how and techniques (such as improvement through scenario design and PDCA cycle and formulation of content matching rules), which could not be realized by conventional tools, with AI technology. Furthermore, we aim to optimize digital marketing of companies and improve consumer CX.

4. Fujitsu's proprietary technologies

This section presents examples of Fujitsu's proprietary technologies that can be used in Marketing AI Container.

1) Similar product extraction technology

Fujitsu's similar product extraction technology is applicable to the extraction of products and content that can be recommended or proposed as sets. This technology learns text information (such as product descriptions) included in product and content masters to develop models of relations between words. These word relation models can be used to calculate the degrees of similarity between arbitrary words and between text data for the individual products and content included in masters. Selecting specific products and content by using this technology allows similar products to be extracted based on the degrees of similarity between text data. In addition, the technology can be applied to various purposes of utilization, such as proposal of unexpected products and content, by changing the logic for calculating the degrees of similarity from the word relation models.

2) Questionnaire response estimation technology

Fujitsu's questionnaire response estimation technology uses the purchase history of consumers who responded to a questionnaire (Group A) and the results of the questionnaire survey to estimate the responses of consumers for whom only purchase information is available (Group B). First, the response distribution of consumers in Group A for each question in the questionnaire is calculated. Next, the response distributions for each product and each number of items purchased are also obtained. From these response distributions, a model is developed to calculate the degree of influence each item of a product purchased has on each question. The responses of consumers in Group B to the questionnaire can be estimated by applying the purchase information of consumers in Group B to this model. By using the estimation result, an overall picture of consumers' preferences can be grasped without the need to use time and money to conduct a questionnaire survey for all consumers.

5. Example of introduction of Marketing AI Container

This section presents an approach taken together with Nippon Shuppan Hanbai Inc. (hereafter, Nippan), the largest book wholesaler in Japan, as an example of the introduction of Marketing AI Container.

5.1 Issues with conventional methods

The publishing industry in Japan is facing the pressure of major changes due to young people's loss of interest in reading books and the digitization of books. Recently, a large majority of bookstores have offered a uniform selection, mainly including best-selling books, and only a limited number of bookstores have explored themes according to the characteristics and customer base of the store to provide a distinctive selection.

At present, the number of books on sale in Japan reaches about 600,000. In addition, about 80,000 new books are published every year. Making selections according to themes out of such an enormous number of books uses staff working hours. It also requires in-depth knowledge about the respective fields and broad knowledge about new and old books. This has made it difficult to make well-thought-out selections when the staff is busy with day-to-day tasks.

This problem is not confined to general bookstores. At Nippan, they have been giving suggestions of books to their affiliated bookstores nationwide so that the suggestions can be used to select books for in-store promotions and events. However, the workload involved in selecting books manually was considerable.

5.2 Outline of SeleBoo service

To solve the problem mentioned in the previous subsection, Nippan developed SeleBoo, an AI-based book selection service for bookstores and retail stores, together with Fujitsu (**Figure 2**). The provision of the service started for some bookstores in September 2018. The plan is to expand the service to 3,000 bookstores across Japan that have dealings with Nippan in the future

SeleBoo is the industry's first AI-based book

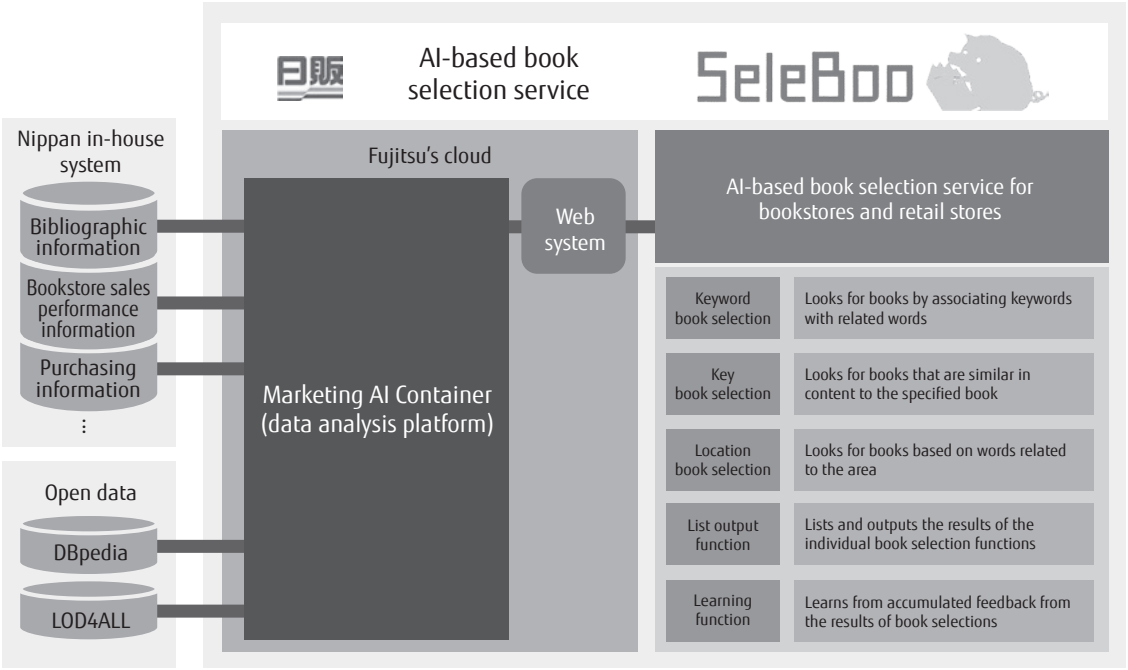


Figure 2
Overview of AI-based book selection service "SeleBoo."

selection service that uses Fujitsu's AI technology to derive lists of books out of about 600,000 books on sale in Japan according to section themes and the customer bases of bookstores. The execution environment utilizes Marketing AI Container in Fujitsu's cloud. Nippan uses these lists of books as the basis to give suggestions to its affiliated bookstores nationwide so that they can be used to select books for in-store promotions and events, thereby supporting the creation of more appealing stores.

5.3 Functions of SeleBoo

Nippan has the bibliographic data of 3.5 million items of books and magazines and the sales data of affiliated bookstores. SeleBoo uses those and DBpedia[2)] and LOD4ALL[3)], a linked open data retrieval service provided by Fujitsu Laboratories.

The service has a function for analyzing these different types of information using Marketing AI Container and making lists from book selection results suited to different themes and customer bases for bookstores and retail stores. The results of book selections are evaluated according to multiple grades using bookstore staff assessments for each book according to the degree of appropriateness. These evaluations are in turn fed back into SeleBoo. This also provides a function for enhancing book selection capabilities through machine learning of the knowledge and sensitivity of the bookstore staff.

As of September 2018, the book selection and listing functions offered are: "keyword book selection" to select by keywords, "key book selection" to select books similar to specified books, and "location book selection" to select books related to specified areas.

In the future, we plan to further strengthen the service by adding functions such as "bookstore feature book selection" to select books that match the characteristics of bookstores and "cover book selection" to select by visual images of book covers. We intend to use these to support the creation of more appealing stores.

6. Conclusion

This paper described the usefulness of the Fujitsu's

Marketing AI Container in content matching operations. It has also presented SeleBoo, Nippan's AI-based book selection service, as an example of the application of Marketing AI Container.

In today's world, there is a wealth of products and content that require matching such as consumer electronics and food, in addition to books, which are handled by SeleBoo. Fujitsu intends to generalize the interface to make Marketing AI Container available to operations of even more companies and realize a system that allows for the selection of content that suits consumers' tastes, preferences, and needs with greater accuracy and efficiency.

In addition to content matching operations, Marketing AI Container is a service that can also be utilized in the wide field of marketing. For example, it has already been introduced and utilized to improve CX by estimating lifestyle patterns of customers and providing each customer with optimum service and for targeting customers who are potentially cost-effective at the time of ad delivery.

In the future, we aim to provide a full-stack solution that supports the entire digital marketing operations of companies by linking Marketing AI Container with various digital marketing tools provided by Fujitsu and different vendors and using it as an advanced infrastructure that leverages the AI technology.

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