AI Chatbot to Realize Sophistication of Customer Contact Points

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Digitalization has advanced, spreading to all industries. Companies are required to improve marketing efficiency and strengthen engagement with customers more than ever by utilizing digital technology. Promoting emotional value through the customers service user experience is important and contact centers play a key role in the experience as customer contact points for companies. However, contact centers currently face a mountain of problems, including labor shortages, support for diversifying channels, and the need to improve efficiency by making use of AI. To solve these problems, Fujitsu has started offering the Customer Engagement Solution CHORDSHIP, a contact point sophistication solution. The CHORDSHIP Digital Agent, which is at the core of CHORDSHIP, is equipped with an AI technology ideal for contact centers: conversation-machine learning hybrid AI. Its biggest feature is the capability to deliver highly accurate automatic answers simply by using existing FAQ data, in addition to its realization of support for diversifying channels and 24/7 service availability. This paper outlines the contact point sophistication solution offered by Fujitsu and describes the AI chatbot technology behind the solution.

1.   Introduction

Since the start of the 2010s, relationships between companies and customers have been undergoing changes with the evolution of digital technology. Philip Kotler says regarding Marketing 4.0, which he proposed in 2014, that modern marketing has changed to the "marketing of self-actualization," which makes the utilization of digital technology critical. Accordingly, companies should provide customers with "emotional value" that further strengthens engagement with customers, rather than making logical value such as product features understood by customers as they have been doing up until now.

To provide customers with this emotional value, simply improving product features and advertising logical value, as was conventionally done, is insufficient. Offering logical value alone is prone to replacement by other products in the end and does not lead to enduring profits. From now on, creating a virtuous cycle of increasing customers who are emotionally satisfied through positive service user experiences will gain importance (**Table 1**).[1]

Table 1
Customer contact points in the age of Marketing 4.0.

	Marketing 2.0	Marketing 4.0
Key feature	Consumer-centric marketing	Human-centric marketing
Purpose	To satisfy and secure consumers	To gain the trust of consumers
Concept	Differentiation	Engagement
Value offered	Logical value (rational satisfaction)	Emotional value (emotional satisfaction)
Customer engagement	1-to-1 relationship	n-to-n co-creation and growth (connected world)

Source: Created by IS-LAB and Fujitsu based on Reference 1).

Required for improving this service user experience (customer experience) is the "elimination of negative experiences through prompt responses" and "quick feedback based on the identification of needs." Contact centers, which act as customer contact points for companies, are attracting increasing attention recently as a means of realizing these.

Fujitsu started offering a contact point sophistication solution. It allows prompt and accurate 24/7 customer handling by using AI chatbot technology and multi-channel linking by omnichannel provision. Fujitsu has developed a new chatbot equipped with "conversation-machine learning hybrid AI" that does not require preparation and improves the correct answer rate through automatic learning of customer handling conversation logs in addition to the conventional prior learning-based AI that makes use of deep learning.

This paper outlines the contact point sophistication solution offered by Fujitsu and describes the AI chatbot technology behind the solution.

2. Present state of contact centers

Expectations are placed on contact centers as departments for improving contact points. However, they are faced with various problems and many of them are unable to meet the expectations in their present state.

1) Problem 1: Labor shortages

Contact centers are working on a daily basis to secure competent human resources capable of responding to a variety of inquiries within limited budgets. However, these work environments are not necessarily comfortable in view of the need to handle many complaints from customers, and sufficient human resources cannot be secured in their present state. As a result, as much as about 80% of contact centers suffer a shortage of operators.[2] The personnel turnover of novice operators are also high and labor shortages are a constant problem.

2) Problem 2: Improvement of business processes

Meanwhile, call centers are managed by using various key performance indicators (KPIs), such as the connection rate and resolution rate, and operator productivity improvements are required on a continual basis. Support for new channels, such as chat and messenger in addition to phone and e-mail, is also desired as variations in inquiries grow in number and complexity.

3) Problem 3: Continuous brush-up of FAQs

Contact centers have promoted the disclosure of collections of answers to inquiries from customers in the form of FAQs. The intentions behind this included decreasing the number of inquiries from customers to ease the burden on operators and improving customer satisfaction by enabling customers to resolve questions at any time.

To solve the problems described above, including labor shortages and operator productivity improvements, the realization of automatic responses by utilizing AI that makes use of collected FAQs is expected. To produce results with this approach, regular analysis of the details of inquiries and continuous brush-up of FAQs based on the results of the analysis are required. However, in the present state of chronic labor shortages, continuing with this approach poses a burden.

Under these circumstances, expectations are raised for the utilization of AI that realizes automatic responses at contact points with customers to achieve improvements in efficiency of contact center operations.

3. Contact point sophistication solution CHORDSHIP

We thought that, in addition to solving the serious labor shortages, improvements in service user experiences to strengthen engagement with customers would provide the cornerstone for solutions to the problems mentioned above.

Accordingly, Fujitsu started offering its Customer Engagement Solution CHORDSHIP, a contact point sophistication solution, in December 2017. CHORDSHIP is a solution capable of solving labor shortages, dramatically improving productivity, and achieving stronger customer engagement. CHORDSHIP offers three benefits:

1) Provides a total service maximizing customer experiences

Everything from consulting on the application of AI, deployment, and operations support to center operations is provided. Distinctive AI Application Consulting Service and AI Tuning Service are also included.

The AI Application Consulting Service makes use of live data from the customer's contact center to verify

FUJITSU Sci. Tech. J., Vol. 54, No. 3 (July 2018)
Software Technologies to Support Digital Innovation

3

the AI chatbot's automatic responses to inquiries from customers and the correct answer rate and determines its adequacy for practical use.

The AI Tuning Service uses the results of AI application verification to make additions to and improve insufficient knowledge as required. It also implements tuning to ensure the correct answer rate adequate for operation.

2) Achieves high answer accuracy through "conversation-machine learning hybrid AI"

For CHORDSHIP, we have developed a new "conversation-machine learning hybrid AI" capable of automatic responses by utilizing existing FAQs as they are, in addition to prior learning-based AI through deep learning. Based on the recognition of variations in wording and synonyms in inquiries from customers, relevant information is extracted from the knowledge base of inquiry responses and FAQs collected by the company. Correct answers are identified from the FAQs while inquiries are narrowed down, thereby achieving automatic responses with high accuracy. This technology will be explained in detail later.

3) Realizes optimum AI-human hybrid operation

With current AI technology, automatic responses to all inquiries from customers pose a difficult obstacle to overcome. CHORDSHIP realizes seamless AI-human linking. In cases where automatic responses were inadequate to answer inquiries, operators take over to provide answers. In addition, inquiries dealt with by operators are closely refined and accumulated as actual knowledge to allow utilization in automatic responses by the chatbot in the future. Operation of this manned chat is also provided as business process outsourcing (BPO) manned chat operation service.

4. AI Technology incorporated in CHORDSHIP

This section describes the "conversation-machine learning hybrid AI" technology incorporated in CHORDSHIP.

4.1 AI suited for contact centers

Contact centers are often referred to as a representative example of a field for the application of AI. This involves the replacement of humans answering phone calls with AI automatically answering them. To make this a reality, one technique conventionally used

is inputting an enormous volume of response history and FAQs collected by contact centers for prior learning through deep learning to create knowledge, which is utilized in responses.

However, while deep learning technology requires an enormous amount of teaching data, in reality very few contact centers have that substantial amount of useful teaching data. As described earlier, building knowledge while responding to phone calls is not realistic for contact centers with labor shortages. In addition, response histories collected by contact centers rarely accumulate inquiries from customers in their original state. Response histories are generally inquiries from customers received by telephone operators that are converted into words used in the company, with only key points inputted. In order to achieve contact center KPIs, operations that do not directly contribute to the improvement of KPIs are usually performed in ways to save labor.

A prior learning-based knowledge system like deep learning requires an enormous amount of learning data, but contact centers in reality too often lack this large amount of learning data as explained above. What is now required of contact centers is AI that realizes highly accurate answers even with a small amount of teaching data.

4.2 Features of CHORDSHIP Digital Agent

CHORDSHIP Digital Agent is software as a service (SaaS) equipped with a chatbot suited for inquiries and requests for information received at contact centers and other similar organizations (**Figure 1**). The service provided on FUJITSU Business Platform MetaArc supports front-end interfaces for a variety of channels such as Facebook and Skype in addition to web interfaces. It features the "conversation-machine learning hybrid AI" incorporated, which is suited for contact centers, as well as prior learning-based deep learning AI.

4.3 Conversation-machine learning hybrid AI

For CHORDSHIP, we have independently developed "conversation-machine learning hybrid AI" for contact centers (**Figure 2**). This AI technology does not require a substantial amount of teaching data but is capable of automatic responses by using FAQs and other existing data.

4

FUJITSU Sci. Tech. J., Vol. 54, No. 3 (July 2018)
Software Technologies to Support Digital Innovation

It uses machine learning to automatically generate a dictionary that absorbs variations in wording to realize a high correct answer rate. To create FAQs, expressions used by seasoned operators in day-to-day customer handling (vendor terms) are often used for entry. However, users do not necessarily use those expressions to make inquiries. For example, suppose the term "smartphone" is used in FAQs to provide explanations. Assuming that the term "phone" or "mobile phone" is used by a user as a keyword in a search, seasoned operators would be able to reach the optimum response by converting in their head the user's expression into an expression used in FAQs. However, a simple search system is incapable of replacing users' expressions with expressions in FAQs, meaning appropriate answers cannot be reached. This may lead to a response that does not answer the question asked or a failure to give an answer.

In order to deal with these variations in terms, we have implemented a function for automatically extracting expressions likely to be used by users for expressions in FAQs and registering them in the dictionary as synonyms and related terms. This allows appropriate inquiries registered with FAQs to be reached even when expressions not in FAQs are used, resulting in the capability to reach appropriate answers to the respective inquiries. CHORDSHIP is also equipped with a function for learning expressions in inquiries from users for re-ranking, or giving higher ranks to answers to more frequently asked questions.

Furthermore, CHORDSHIP provides a function for

defining scripts in advance to control conversation rules and conversation flows. This allows for the definition of response control with a high degree of freedom according to the form of contact center utilization. This includes the definition of a conversation flow that shows as options a list of results for a search using the FAQ search engine in response to chat inquiries from users and the branching of a conservation flow based on judgments of specific conditions. In this way, contact centers' customer handling know-how can be saved and utilized in conversation rules and conversation flows, which allows the customer handling operation know-how owned by contact centers to be applied in day-to-day operation to continuously make improvements.

In fact, in demonstration experiments with multiple customers who adopted this technology, the probability that the correct answer is ranked within the
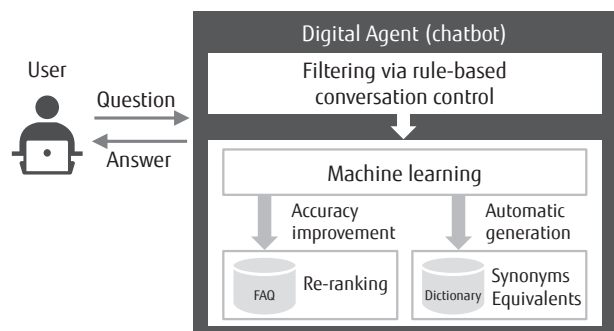

Figure 2
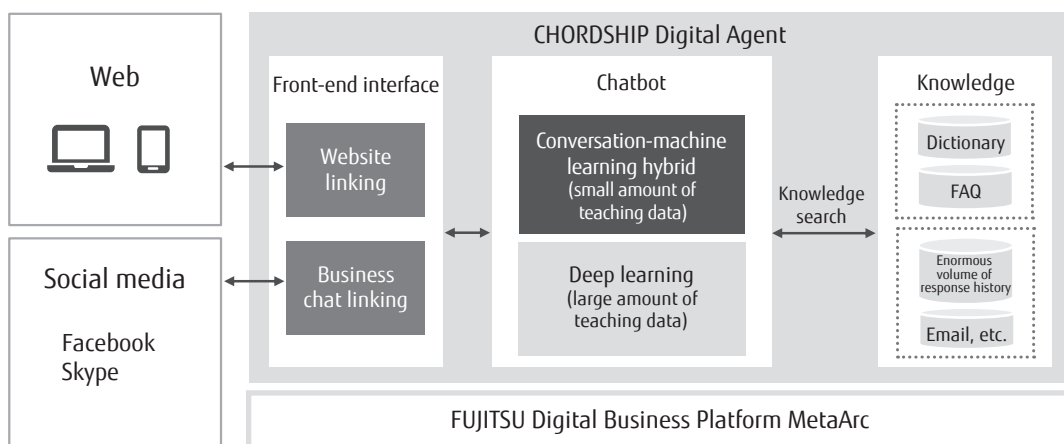Conversation-machine learning hybrid AI.

Figure 1
CHORDSHIP Digital Agent.

FUJITSU Sci. Tech. J., Vol. 54, No. 3 (July 2018)
Software Technologies to Support Digital Innovation

5

top five for general questions from customers reached a minimum of 80%. This technology achieves a high answer accuracy in a short amount of time without requiring the preparation of an enormous amount of teaching data.

4.4 Operation of hybrid chat through AI chatbot and manned chat

Even with the "conversation-machine learning hybrid AI" that realizes a high correct answer rate, giving answers to inquiries from all customers is difficult in reality. Frequently asked questions may be dealt with by automatic response, but some cases still remain in which questions cannot be answered. CHORDSHIP is capable of switching to chat handling by operators depending on the content and situation of the conversation dealt with by the AI chatbot (**Figure 3**). This allows the provision of non-routine responses difficult with AI chatbot alone by switching to handling by seasoned operators, resulting in improved customer experiences. To deal with complaints, for example, in addition to polite responses given by seasoned operators, a QR code can be offered on the spot via chat to serve as a coupon as a token of apology. Turning a negative experience into a positive one allows the customer experience to be improved.

5. Practical examples of CHORDSHIP application

CHORDSHIP is already in the process of deployment verification at multiple customers' sites to realize customer engagement, and service has been started. The following presents representative examples of

deployment at customers' sites.

A customer who has introduced automatic answering via chat offered by CHORDSHIP in addition to published FAQs on the website to deal with inquiries from users says that they have not only benefited from improved efficiency of 24/7 automatic answering but have also "come to receive direct inquiries from users." This is because CHORDSHIP has enabled them to improve their services by analyzing the details of chat inquiries from users.

CHORDSHIP is also increasingly being used in entertainment. J-League (Japan Professional Football League) football team Kawasaki Frontale[3] has equipped their official smartphone application with a "Let's talk with Fronta-kun" icon. They have given the favorable feedback that, by making use of CHORDSHIP, they can "enrich communication with the audience and further deepen exchanges with local communities by collecting and analyzing direct opinions to contribute to the promotion of sports culture."

Both customers have high expectations for CHORDSHIP, using it as a new contact point and achieving improved customer experiences.

6. Future activities

To achieve sophistication of contact points, winning true customer satisfaction is required in addition to a system for automatic responses by AI chatbot, which was mentioned in the introduction of Marketing 4.0 at the beginning. We think that, to turn customer dissatisfaction into positive emotions, design as well as accurate answers are key factors. For CHORDSHIP, we are preparing avatars that give automatic answers.
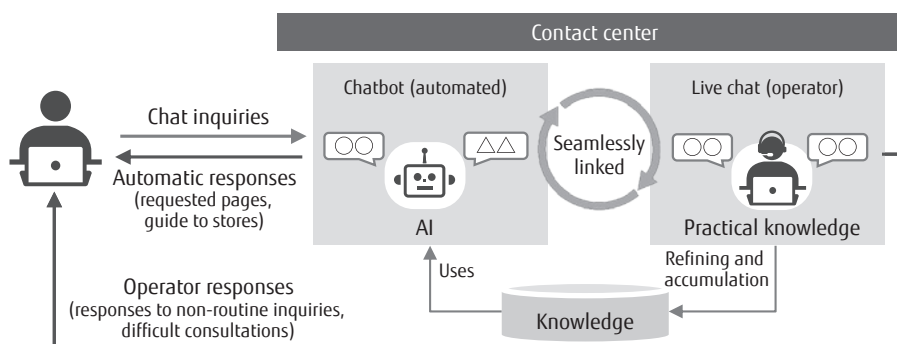

Figure 3
Hybrid operation of AI chatbot and Live chat.

6

FUJITSU Sci. Tech. J., Vol. 54, No. 3 (July 2018)
Software Technologies to Support Digital Innovation

The avatar of Fronta-kun from Kawasaki Frontale, described above, realizes use of various expressions when answering. TASKAJI, a site that offers a housework sharing service, uses its character Taskappogi-chan to provide responses while showing a variety of emotions. Customers who use CHORDSHIP make use of navigation with avatars that utilize corporate mascots and logos to realize contact points (**Figure 4**). CHORDSHIP also offers a selection of 24 avatars to choose from. These avatars show a happy expression when able to answer correctly and show an apologetic expression when they could not. We believe that contact points with avatars can attract more fans to companies, boost repeat demand, and lead to the establishment of better customer engagement.

7. Conclusion

This paper presented Fujitsu's activities using Customer Engagement Solution CHORDSHIP for sophistication of contact points by mainly describing the AI chatbot technology.
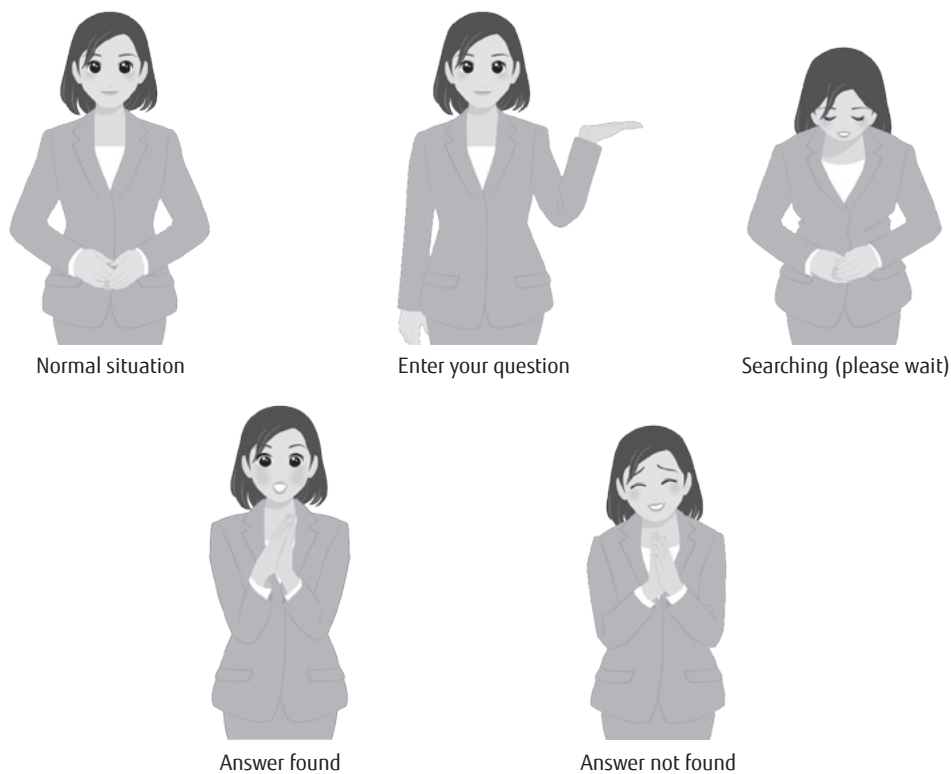
We intend to continue working on strengthening customer engagement by improving user experiences (customer experiences) of services with AI chatbot at the core. Contact points offered by companies are incredibly diverse. Operations such as linking between website and brick-and-mortar stores, sales marketing, and reservations and applications are also important contact points. To realize sophistication of all of these contact points, we are committed to the refinement of AI technology required for the sophistication of contact points through practice with customers and the augmentation of Customer Engagement Solution CHORDSHIP through continuous functional enhancements and service improvements for the further sophistication of contact points.

Normal situation   Enter your question   Searching (please wait)

Answer found   Answer not found

Figure 4
Navigation with avatars.

FUJITSU Sci. Tech. J., Vol. 54, No. 3 (July 2018)
Software Technologies to Support Digital Innovation

7

References

1) P. Kotler et al.: Marketing 4.0: Moving from Traditional to Digital. Wiley, 2016.
2) Feature: Serious Problems with Call Centers Revealed by Data. Call Center Japan, September 2017 issue. RIC TELECOM Co., Ltd. (in Japanese).
3) Kawasaki Frontale: Club Profile.
   http://www.frontale.co.jp/about/club_profile_en.html

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