AI Supporting Call Center Operators
(Development of a System For Call Center Support by AI)

Abstract
Improvement of response rates at our call center has become an important issue. Moreover, we have struggled to train and retain operators there. Therefore, we developed a call center support system that utilizes artificial intelligence (AI) with the aim of improving the response rate and reducing training time. We tested the support system and confirmed its effectiveness, consequently making a decision to introduce it.

Keywords: AI, Call center, Support system, Voice recognition, Machine learning

1. Introduction
Artificial intelligence (AI) systems to assist business tasks or partially perform those tasks for humans have appeared with the advances in AI technology in recent years. Systems utilizing AI, such as those to diagnose images to detect faults, to optimize design, and to predict stock movements are currently being introduced.

The JR East inquires center (hereinafter, the “call center”) may handle more than 10,000 inquiries on a busy day, but the number of inquiries and length of calls mean we cannot receive all of them and the low response rate has become an issue. Also, knowledge of railway business is very diverse, so much time is required to train each operator, meaning the struggle we face in training and retaining operators too has become an issue.

In light of this situation, we developed a system that utilizes AI to support call center operators and reduce the burden on them as well as reduce response time.

2. Call Center Support System
2.1 Overview of Development
In this R&D, we developed a prototype “call center support system” that uses AI to support call center operators. We conducted evaluations through trial uses of that system and extraction of issues in putting it to practical use. There were three tasks we conducted in that.

(1) Building a prototype system that enabled trial use in actual call center business
Extract functional requirements of the call center and build a prototype operator support system that can be used in actual call handling tasks.

(2) Verification of effects of the system through trial use
Have operators use the prototype system in call handling tasks and verify effects from multiple perspectives.

(3) Extraction of issues in actual introduction
Analyze results of use in actual call handling tasks and extract issues in actual introduction.
2.2 System Configuration
An overview of the call center support system built in this R&D is as shown below (Fig. 1).

The system is equipped with the following functions.
- Voice recognition
  Converts to text the voices of operators handling calls and customers.
- Answer support
  Searches and ranks content to be shown to operators based on voice recognition results and text input.
- Feedback recording and saving
  Saves feedback results gathered from operators.
- AI training data input
  Inputs training data of the AI’s answer support function
- AI-input content management
  Manages operator support content.

The system was configured with the functions above built in a cloud environment and used by three seats of the call center for trials via the Internet. The AI used IBM’s Watson as its core function and was supplied with Watson application functions.

2.3 Evaluation of Trials
Evaluation items were classified into “functionality evaluation” and “practicality evaluation”. The answer provision function and voice recognition function were evaluated in terms of functionality, and productivity and operability were evaluated in terms of practicality. Items and methods of evaluations are listed below (Table 1).

2.4 Results and Considerations
2.4.1 Answer Provision Function
In evaluation of the answer provision function, details input were tabulated from operator feedback results as necessary content being “all displayed” or “partially displayed”.

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Fig. 1 Call Center Support System Configuration Diagram
The ratio of necessary content being displayed is tending to increase, with a result of approx. 75% at the end of development in February 2017 (Fig. 2).

This is assumed to be the result of an increase in content in January 2017 and adjustment of internal processing for deciding what is displayed, which were done as needed during the trial period.

2.4.2 Voice Recognition Function

Voice recognition function accuracy was tabulated by comparing transcriptions of call recording data and voice recognition results. Customer voice audio differs greatly by call environment, so comparison was made using only operator voices.

A recognition rate of 67% in November 2016 at the start of use was improved to 86% at the end of the development in February 2017 (Fig. 3). During that period, the voice acquisition method was improved, the voice recognition program was adjusted, and terms were added to the dictionary as needed. Recognition accuracy is assumed to have improved as a result of that adjustment and improvement.

2.4.3 Productivity Evaluation

Evaluation related to productivity improvement was done by tabulating operator call time. Initially, call time was longer due to use of the system when operators were not familiar with its operation. However, difference in call time when using and not using the system is becoming smaller (Fig. 4). It is assumed that call time will be come shorter as utilization of the system proceeds in the future.

2.4.4 Operability Evaluation

We conducted questionnaire surveys for operators on the two perspectives of “operability of the system” and “ease of use of text content shown” and tabulated the results.

For operability, operators had many positive options, confirming that it will be possible for the system to be accepted as a whole by the workplace. On the other hand, differences were seen in favorability of the screen layout, search response, etc., and necessity of studying addition of functions to personalize to some extent was recognized.
Evaluation of ease of use of content differs by type of content. Users felt that the volume of information included was too much for some content but too small for other content. In terms of ease of reading and ease of understanding content, they also felt that it would be difficult to use much of the content as is while handling calls for some types of content. It is thus assumed that we will need to review what form of content display is best for use at the worksite.

2.5 Decision to Introduce
Through verification of the development results, we were able to determine that the system is effective for solving issues faced by the call center. We thus decided to introduce the system and proceeded with development for introducing the system in fiscal 2017.

3. Conclusion
In the R&D covered herein, we built a prototype call center support system and performed trial use in actual business tasks. By performing trial use in call handling tasks with the system, we extracted specific issues that come up while handling actual calls. We were able to judge as a result of evaluations of the trials that the system is effective in solving issues that the call center faces, and we therefore made a decision to introduce it to actual operations.

In the future, we will aim to build an even better system through development for practical application in order for the system to be able to solve issues at an even higher level.