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Methods of automated content-based answer search for automation first level of technical support

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Abstract – **Automated content-based answer search is proposed to use at the implementation of the first-line technical support for the product.**

The main task is to inform users about product and to solve the most common problems in product work. Question-answering system and intelligent chat bot are proposed as technologies that can be used in implementing this task.

Keywords – **automated search, question answering system, chat bot, technical support**

I. THE ACTUALITY OF THE THEME THE TOPIC

The search of answers according to the contents is kind of informational search when it is possible to find the short answer on the question that is set by user in native language. Contemporary search systems for the network Internet let us to get the list of documents (pages), that contain necessary information and are regulated by relevance. Herewith the receiving of necessary information from the pages is let by the user. The systems of automated answers search, in contrast to traditional search systems, get question in native language (Ukrainian, English, etc.) but not the set of key words and return short answer, not the list of documents and references.

Consider the question of actuality of automated content-based answer search is worth to define the particularities in sphere, where such software can be used. The features of sphere of usage of automated search of finding answers are the next points:

• Limited basic of answers, the sphere where questions can be put should be limited by some frameworks (by subject, connection with some object or other);

• The possibility to formulate definitely correct answer on the question that can arise in the user of system;

• The possibility to reduce communication of user with software to creation of inquiries and reflection of answers in written form;

• The understanding of user that fact, that he communicates with automated system, but not with living being, that factor is necessary for increasing of effectiveness such kind of communication.

To all this requests correspond the part of existing system of technical support for different kinds of productions, including software. The essence of technical support of the first level goes to taking the question from the user, filtration of this question from unconnected information, summarizing to the form of one of the known question in the database and presenting of this answer to the user.

II. GENERAL SCHEME OF THE WORK

The general scheme of the work of automated content-based answer search can be presented by following steps:

Step 1. Getting the question from the users. User inserts the question in written form in the window of the chat.

Step 2. Checking is the question is not the instruction. The questions that include some words that fulfill the expressions that are defined in system as regular expressions can be interpreted as instructions. These instructions are made on the level of bot.

Step 3. The analysis of the question. The analysis of text that is introduced by user is held and is checked if introduced text can be interpreted as question.

Step 4. Reconstruction of the question. The question is reconstructed in suitable for work with questions-answering system format with taking into the consideration the contents of the conversation.

Step 5. The search of answer. Transference of the question to question-answer system and getting answers or informing about the absents of answer.

Step 6. Outputting the answer. Outputting the answer to the user. [2]

The basic descriptive scheme of work of automated content-based answer search is represented on the figure 1.[4]

III. THE SEARCH OF ANSWERS

In getting question from the user, the first global stage is search of answers on the question. The search of answer is the sphere of responsibility of question-

answering system, which is the component of general model of automated content-based answer search. For this is suggested the usage of aim searched system for searching by key words. From the question of user, putting in the native language, is necessary to pick out key words that form the essence of question. After receiving the key words it is necessary to settle the following problems: the search of answer on the question and formulation the answer for the user. For formalization of problems of both groups is offered to use the math set of discrete math, syntactical analysis and neuron's network.

The general scheme of the work of answer search is represented on the figure 2. [3] In this stage can be depicted the following stages:
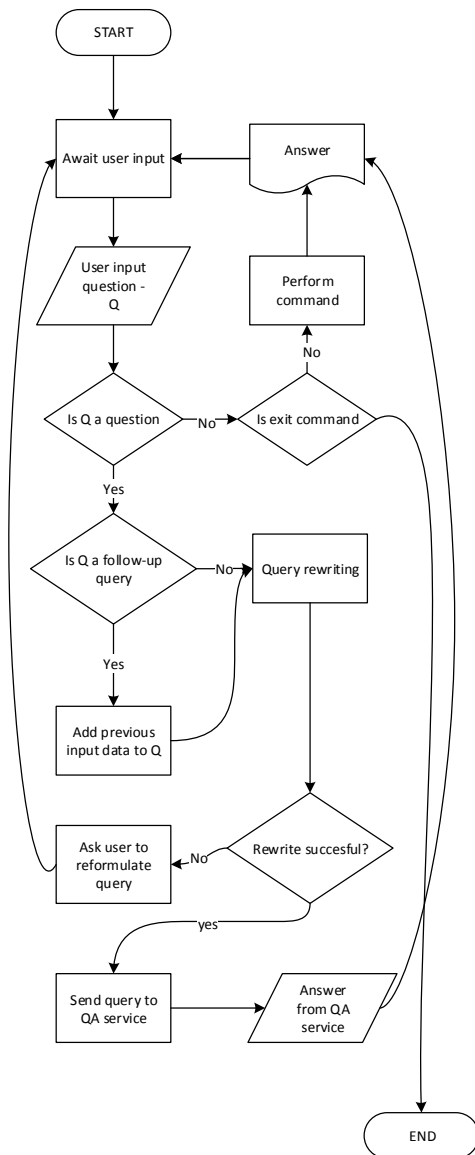
Step 1. The analysis of the question. On this stage it is necessary to settle of searching requirements for subtask of informational search. As a rule for this is used the parts of the sentence without interrogative parts. Also the search requests are formed with help of paraphrasing of interrogative to statement sentence.

Step 2. Informational search. In way of source of facts in this work is suggested to use the local database with text's fragment those are the answers on conditional questions. That's way the search of information is settled to the search of key words in indexation basis.

Step 3. Separating the answer. The stage of separating of answer don't need the process of separating the answer from the textual fragment, just as all the fragment is the candidate in the answer on the question. But for the final creation of answer it's necessary to filtrate receiving fragments and to rank the answers that are left after the filtration. [1]
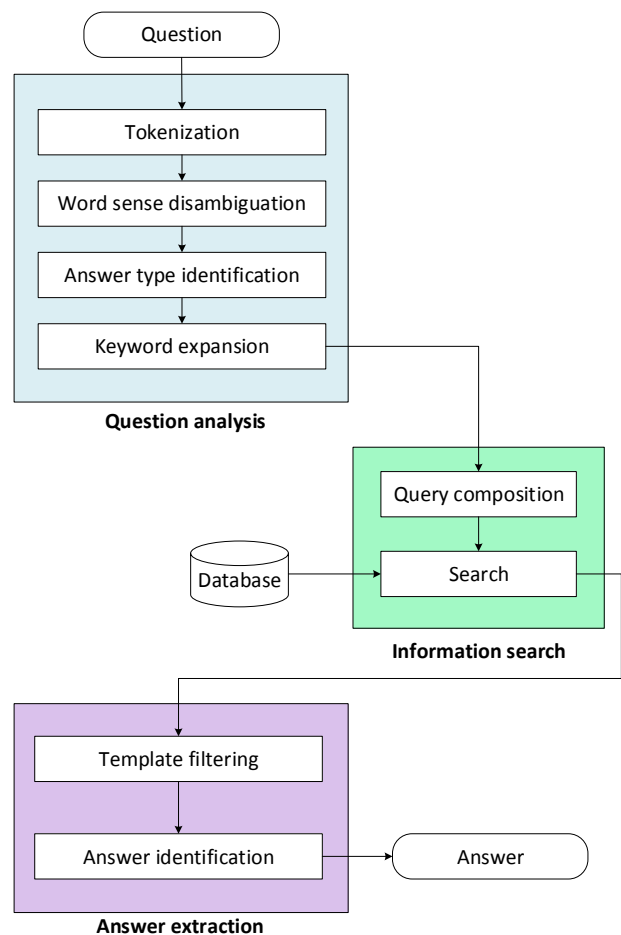

Figure 1 – Flowchart of the algorithm of automated content-based answer search

Figure 2 – The general scheme of search for automated content-based answer search

IV. PECULIARITIES OF REALIZATION OF CHAT BOT

The communication with user is executed in process of written dialogue, for this part is responsible chat bot. Virtual interlocutor or chat bot is computer program, that is created for imitation of communicative behavior of

person during the communication with one or more users. Modern interlocutor-programs are only the attempt of imitation of clever dialogue with machine. Even the most successful program of this form can't think logically as a human, make thinking operations: analyses, synthesis, comparison, classification, abstraction, summing up, concretization of information which is included in its basis of knowledge. But herewith these programs can participate a simple dialogue, that make a wide field for their potential application.

One of the best variants is realization of chat-bot with help of usage of recurrent network. But also possible is the usage of other types of chat-bot, the selection of

maximum effective model will depend on sphere of usage and additional requirements for the work of chat-bot (except the supporting of simple dialogue with users). The scheme of work of chat-bot is pointed on the figure 3. The main steps, which chat-bot should do irrespective of its architecture are the following:

Step 1. Checking, as if introduced text is the command.

Step 2. Search of answer on introduced text in the part of chat-bot.

Step 3. Formation of final question and transmission of it to question-answer system. [5]
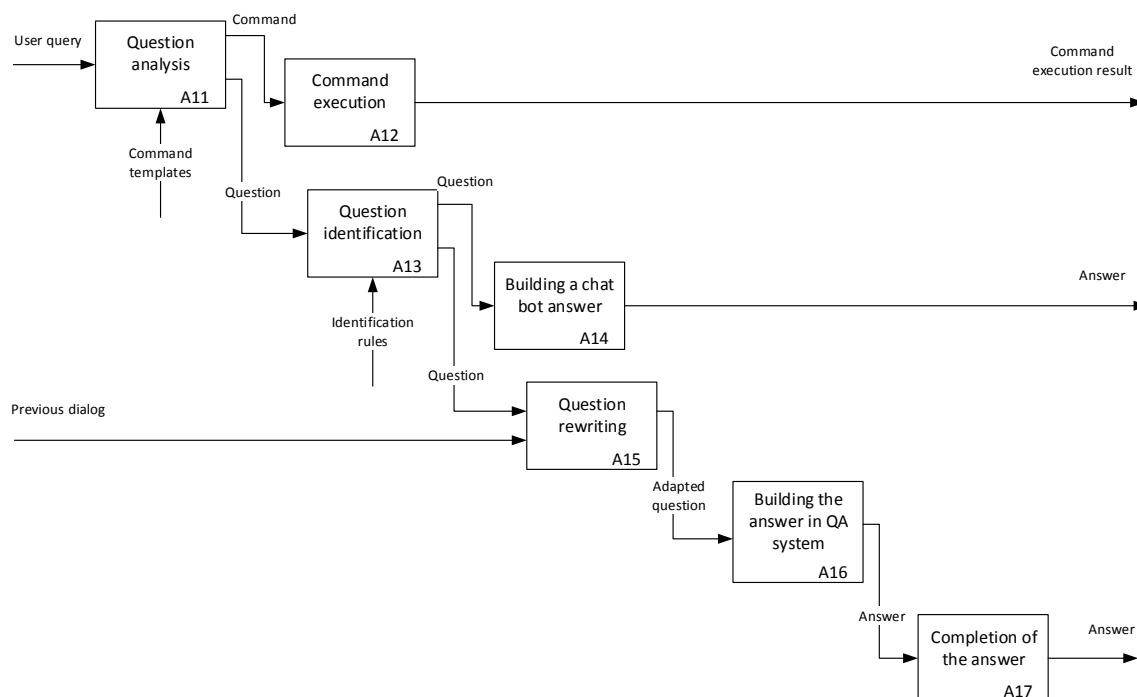

Figure 3 – Chat bot work scheme

CONCLUSIONS

Proposed method of work of automated content-based search with usage of chat-bot will let to automatize the process of work of the first level of technical support and substantially reduce expenses of company on this kind of work.

Communication with user is held in written form with means of chat-bot. Chat-bot is responsible for communication with user, and it makes main three problems: identification of commands, answering on not thematic questions and final formulation of request to question-answering system.

For search of answer is responsible question-answering system. Method is included in three stages: the analysis of the question, informational search and separating of answer.

REFERENCES

[1] А.А. Соловьёв, "Синтаксические и семантические модели и алгоритмы в задаче вопросно-ответного поиска" *Conference: Proceedings of the 13th All-Russian Scientific Conference "Digital libraries: Advanced Methods and Technologies, Digital Collections"*, RCDL 2011, Voronezh, Russia, October 19-22, 2011.

[2] Y. Liu, M. Liu, X. Wang, L. Wang, J. Li, "PAL: A Chatterbot System for Answering Domain-specific Questions," *Proceedings of the 51st Annual Meeting of the Association for Computational Linguistics: System Demonstrations*, pp. 67–72, August 2013.

[3] B. M. Matteo; M. Negri; R. Prevete; H. Tanev, "Multilingual Question/Answering: the DIOGENE System," *10th Text Retrieval Conference proceedings*, pp. 313–321,2001

[4] J. Smith, "IQABOT : A Chatbot-Based Interactive Question-Answering System", Techical report, 2010
S. Quarteroni, S. Manandhar,"A Chatbot-based Interactive Question Answering System" *Proceedings of the 11th Workshop on the Semantics and Pragmatics of Dialogue,* pp.83-90, 30 May – 1 June 2007