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A REVIEW ON GENERATIVE CONVERSATIONAL MODEL

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ABSTRACT

Conversational model or chatbot are the humanlike machine conversational agents. Conversational agents with generative model learn from past conversation to improve the intelligence in responses. In the modern era the conversational agents with generative based have rapid popularity in all domains. With the rapid advance in the Artificial Intelligence, now the machines mimic some of the human behaviour. The main goal of this review paper is to present the overview of conversational model, recent approaches in conversational model and provide more about generative conversational model in a closed domain, generative based framework.

Keywords:Chatbots, Closed domain, Conversational agents, Generative framework.

I. INTRODUCTION

Conversational agent is an interactive agent that conducts conversation via textual and auditory mode. Chatbots are at the peak point of developing area. The conversational agents explore more possibility in the domain of customer engagement to improve the ways of doing business. It is one of the most useful technologies that replacing the traditional models and making apps and websites inessential. A conversational agent is a computer program that have humanlike conversations in its natural format including text or spoken language using artificial intelligence technique such as image and video processing, Natural Language Processing (NLP) and audio analysis. The most interesting feature of the bots is that they learn from the previous interactions and become smarter over the time. Conversational models work in two ways- rule based and smart machine based. Rule based models follow rules to do job and smart machine models are also called cognitive computing, where it uses machine learning to do job and adapt their behaviour based on experience.

II.CONVERSATIONAL MODEL

Conversational model or chatbot are the software program that conduct conversation via text and spoken language.There are two categories of technology handled by chatbots.First one is the rule based work, where the chatbot can use rules and heuristics to do its job. Alternate one is the smart machine based work, where they use machine learning to do work and can learn on their own. While planning a framework for chatbot, we have to consider mainly two things – the questions should come either under open domain or closed domain and the responses from the chatbot should come either under retrieval based system or generative based system. In closed domain there will be a limited set of questions on specific topics and the open domain deals with the questions that can be of any topics. Therefore, it is clear that open domain is very difficult when compared to

closed domain because the customer can take the conversation anywhere. Once a question is asked, the chatbot needs to generate responses. In retrieval based system, the chatbot contains a set of predefined responses and the generative based system doesn't have predefined response but rather generate responses from scratch.

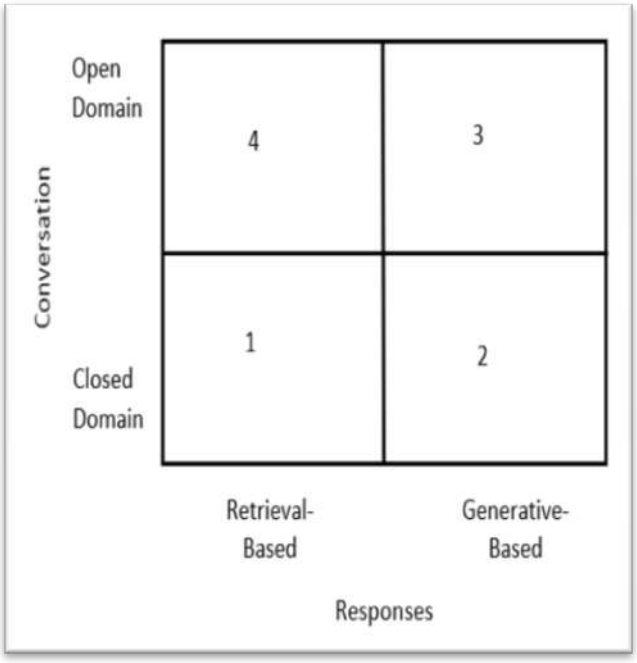

Fig.1 Chatbot Framework

In the above figure, the framework for chatbot conversation can be classified into four quadrants. The first quadrant is the closed domain question with retrieval responses, where these chatbots deliver both business and user value and may not be more intelligent and complex as the smart machines. The second quadrant gives the closed domain question with generative responses, wherethe chatbot has smart machine technology to generates responses for the questions asked from a closed domain. Generated responses allow the chatbot to handle both the common questions and some unforeseen cases for which there are no predefined responses. The third quadrant is the open domain question with generative responses, where we get to ask any question from open domain and not expecting a predefined response. This has been named as Artificial General Intelligence (AGI). The fourth quadrant is the open domain question with retrieval responses, where this is an impossible one because the responses cannot be defined for any questions from the open domain. From this framework we are able to choose the type of chatbot for the specific customer service environment.

III. GENERATIVE MODEL

Conversational models are the models which maintain conversation with human. Deep Learning is widely used for developing generative conversational model. By using deep learning, it is easy to generate responses from the past interactions between humans. Thus, we can build a generative conversational model capable of generating responses from the result of interactions that already had in the past.Generative models are better than retrieval – based models in a way better that they can generate the responses and not always replies with

one of the answers from a set of answers. This make them more intelligent as they take word by word from the query and generate the responses. It also makes them more prone to errors as they need to take the spelling and grammar into account. To make them better at handling these errors, these models needs to be trained more precisely. Once trained, they outperform the retrieval based models as they can answer complex and unseen queries. Language translation models can be used in creating such a model. Once a question asked from closed domain, the chatbot generate responses using smart machine technology. Thus, the chatbot can handle the common questions as well asthe unforeseen cases for which there are no predefined responses.

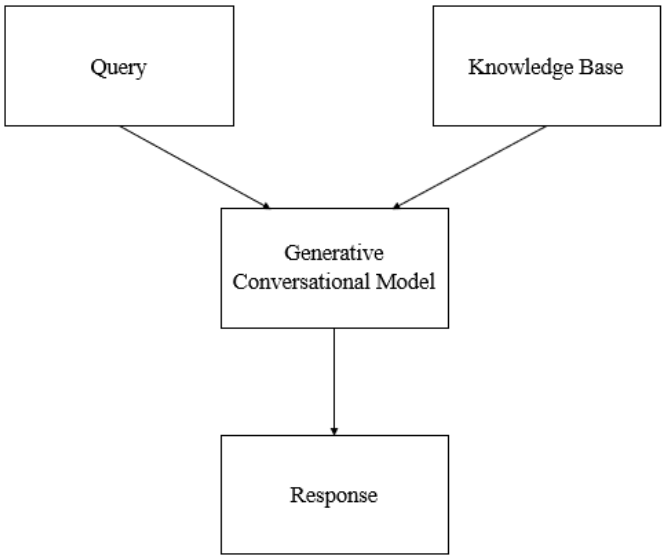

Fig.2 Generative Model

IV. RECENT APPROACHES

One of the approach of implementing conversational model is the smart answering OCR based chatbot. This approach uses the Artificial Intelligence Markup Language (AIML), Optical Character Recognition technology (OCR), Overgenerating transformations and ranking algorithm. Natural language conversational models can be created using AIML.Scanned documents are converted into machine encoded text using OCR technology. Logically equivalent questions for the source sentences are generated by the overgenerating transformation and ranking algorithms. This system has three sections Plain text extraction Question generation and Question and answers. Plain text is extraction is performed by converting the pdf documents using the OCR technology. The generated questions are stored as chatbot knowledge using AIML. The corresponding responses to the user input are retrieved by the pattern matching algorithm to match the user input to the data stored in chatbot knowledge. In this approach, it provides an efficient to convert the pdf documents and stored it as the chatbot knowledge. This system can be used in educational field and call center services for answering frequently asked questions [1].

Another approach for implementing conversational model is the open domain QA system. The knowledge base for the question answering system is obtained from Wikipedia and the system has multiple modules for retrieving responses. The advantagebehind using the semi-structured sources is that it can retrieve answers for specific question types. [2].

An application of conversational model to develop a machine advisor that is able to give simple legal advice to users. In this system, it is using deep learning based dialogue system and provide domain specific answers for user queries. The technique used by this system is encoder attention decoder. The encoder is a block which transform the input into vector representation and use shorter messages as input. The attention is also a LSTM block which focus important words in input and it check through the sequence both left to right. The decoder is also another LSTM block which generate translation from input and the output from this LSTM block may be longer or shorter sentences. The dataset is developed from some online textbooks about criminal law, property rights, family divorce and company rights as the chatbot knowledge. In dataset we have total of 2400 message and response samples. This model achieved an acceptance score of 48% as evaluated by 3 human judges and use limited amount of data because it requires manual effort for formatting information and copy right issues in the legal domain [3].

V.FUTURE SCOPE

With the rapid advance of technology, the conversation model has more importance in various domains, such as commerce and business. Conversational model can be implemented as artificial tutor in education field, as personal assistants on mobile devices and also as in social networking domain. At present conversational models have limited language support and the generation of responses from the conversational can be implemented by using deep learning architecture to consider the past interaction and the present input query.Thus, a self-learning personal intelligent assistant can be implemented using deep learning architecture which includes Recurrent Neural Network (RNN)that canmaintain memory through time or other sequential inputs.

VI.CONCLUSION

This paper provides a review of generative conversational model. To achieve the generative responses, conversational model uses machine learning and deep learning. It describes the recent approaches such as deep learning based conversational model, which are getting more popular in the modern era. As a future work, self-learning conversational model can also be implement by using deep learning architecture.

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