CHATBOT USING NATURAL LANGUAGE PROCESSING

Amit Santosh Mishra

Department of Information Technology

B. K. Birla collage of Arts, Science & Commerce Kalyan (Autonomous), India

Abstract:

There is no doubt world is changing and artificial intelligence is no longer a future technology we have already experienced in day to day lives. So in this paper, we are going to look about chatbots which is a great part of AI as with the help of this we can now talk to someone who doesn't even exist like Cortana (chatbot created by Microsoft), Alexa (created by Amazon), Google Assistant(Google). Types of chatbots being used and about NLP which made it so easy to understand our languages uses of chatbots and how it gets advanced in the future.

Keywords: Artificial Intelligence, chatbots, NLP, digital communication, digital customer services, bots

Introduction:

Let's think of some intelligent computers which may work for yourself as information provider on your website or answer customer's calls or some part of your work done by computer .Fascinating, isn't it?

The modern chatbots using NLP are no longer different from humans. As we all know that computers can only understand binary language (machine language) but now it is possible that they can understand languages of humans using NLP (Natural Language Processing). NLP is a branch of Informatics, Mathematical linguistics, Machine learning and AI.

Although after numbers of programs and NLP tools. There are two types of chatbots:
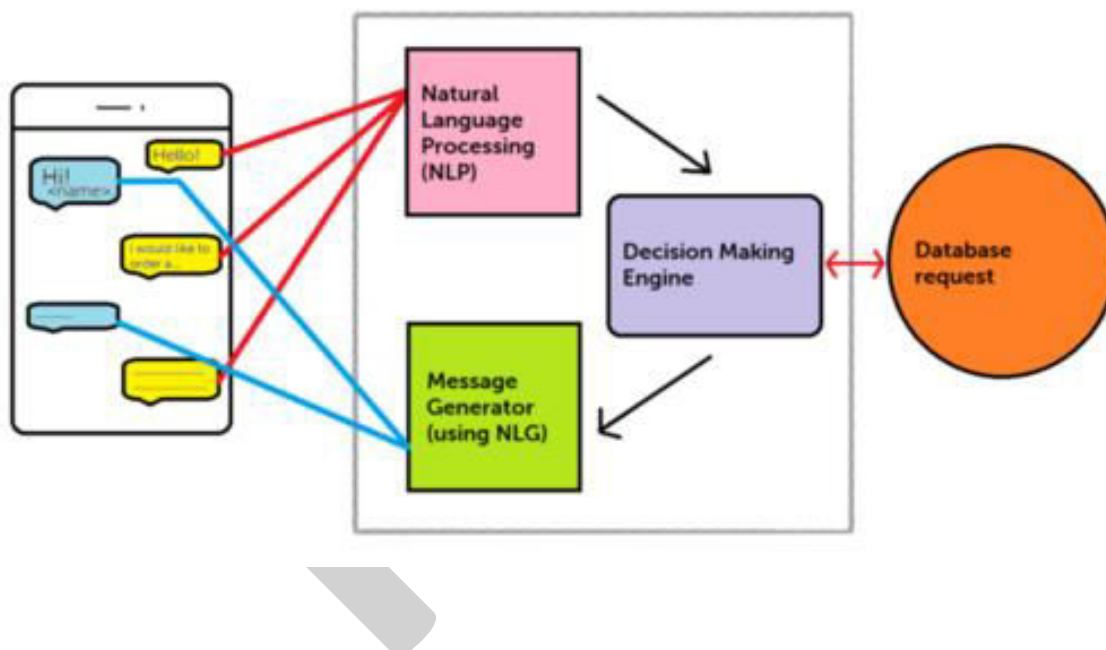
1. Scripted chatbots:

Scripted chatbots are command oriented bots which works as if-else structure. Scripted chatbots are mostly for feedbacks or only dedicated to simple tasks. In this scenario we don't need AI or NLP for processing as it doesn't demand that intelligent bots. The reply of the conversation is predetermined so preprogrammed as well. Such type of bots can be used to provide menu and get

orders in shopper-site which can be a great gesture to treat customers as one on one attention in online stores, even in the virtual education websites to provide each course detail with so much ease.

2. Artificially intelligent chatbots:

AI based chatbots are able to understand human languages that can process and even generate reply as a text. It can even train itself by adding some new thing to it by using machine learning. It basically uses NPL tools which helps bots to analyze human language and reply. The core fields of NLP are NLU (Natural language understanding) which process our language by input provides and tokenize them which means to chop into small pieces also called tokens then normalization in which convert it into normal language as we know our language is so unstructured and so much of misspelling, no punctuations which needs to be normalize. NLG (Natural language generation) where response is generated. All the steps in NLU are also followed in NLG .In this step output is generated by chatbot for the input. In figure below, it shows how NLU and NLG work together.

Objectives of the study:

Artificial intelligence is boon for humans and chatbots can be used for many ways to enhance human life as it can automates some of the works which do not need human intelligence. In future it can do more advanced tasks as well so this study is about how chatbots and NLP techniques aids human and also about future scopes.

Methodology:

Chatbots are similar to applications that we use daily as it contains databases, application layer no. of application package interfaces to connect external call. Chatbots are first trained with data. There are three methods to create chatbots.

1. Pattern Matchers:

   In pattern matching text is classified in order to generate a suitable response. The structure for these patterns is Artificial Intelligence Markup Language. So these kinds of bots only respond according to patterns
   Example
   <aiml version=”1.0.1” encoding=”UTF-8”?>
   <category>
   <pattern>Who is Elon Musk</pattern>
   <template>Elon Musk is a South African-born American entrepreneur and businessman
   </template>
   </category>
   </aiml>

2. Algorithms:

   There is a unique pattern available in database to respond each question. Algorithms are used to generate response by eliminating number of classifiers. After an input, scores are assigned to the class for how many times each word occurred. Hence class with highest score is mostly related to the input.
   Example
   CLASS: greeting
   “Good Morning”
   “How are you?”
   “Good Afternoon”
   “Hello”
   INPUT: “Hey, How are you?”
   Term: “Hey” (no matches)
   Term: “How” (class: greeting)
   Term: “are” (class: greeting)
   Term: “you?” (class: greeting)
   CLASSIFICATION: greeting (score = 3)

So now after getting the classification we are good to generate response.

3. Natural Language Processing:

NLP is a form of Artificial intelligence which makes chatbot much easier to understand and respond to user inputs. Artificial intelligence make machines and computers to do tasks that needs human intelligence. So NLP is also a small part of AI but still super important in chatbots building.

NLP is collection of advanced techniques which understand a range of questions. NLP process can be break down into 5 major steps.

1. Tokenize:

Tokenization chops text into small chunks, called tokens, and throw away certain characters and punctuation.

2. Normalization:

We human don't use our language in correct manner we perform a lot of mistakes like using abbreviates, not using perfect punctuation, grammar mistakes and many more. As we use them in same manner regularly we are habituate with it. But machine cannot understand our language like this to process it and find common spelling mistakes to convert it into meaningful input.

3. Recognising Entities:

Recognising Entities is the step where chatbot are provided power to identify objects, like if it is an organization or country or abbreviate or some historical date. It helps to perform in more efficient way.

4. Dependency Parsing:

In this step, sentences are split into such form that it would be easy to distinguish between nouns, verbs, objects, phrases and punctuations. This technique is useful to identify between phrases and works well for grammar.

5. Generation:

This is the final step where response is generated. As we all know about NLP fields i.e. NLU and NLG. Above steps fall under NLU. These steps are used to understand meaning of sentence by bot. But this step fall under NLG as the name suggest that it will generate something which is in response to input processed in upper steps.

Building a NLP based chatbot is now not a tough job. There are 2 main ways to build a chatbot.

1. Custom Development:

   Creating custom bot is quite easy now, if you have little experience of programming and also aware about API integrations (Application Programming Interface). By this, you will be able to create sophisticated chatbot using own API, create solution with custom logic for business needs, we can choose expertise team for proper technologies which provide experts supports and if there are experts for particular technologies they ensure bug-free bot and maintenance in future or technical upgrades. But all of this advantages are quite time consuming as we want to create our custom bot we require some extra hours or weeks, over it is also expensive compared to ready-made tools as it include creation and maintenance cost.

   Steps:-

   a. A programming language is used to build an architecture of the chatbots. There many programming languages which can be used for it but most appropriate are Python, Clojure and Java.

   b. Any data manipulation and analysis library or support.

   c. API support for receiving and sending text messages or making phone calls.

   d. A machine learning library for the bot to train itself and neural network tasks.

   e. An open-source software for Natural Language Processing or library.

   f. An open source API for the chatbot to connect with websites or different platforms.

2. Ready-made Solutions:

   Ready-made chatbot platform allows you to make a bot for yourself for this you do not require complex programming knowledge. This ready-made tools also use NLP for the processing of the chatbot, but they do not provide to write code. You need not to worry about API integrations as this tools are

   Built-in integrated platforms like messenger, telegram. This tools are budget-friendly or even for free sometimes. But as we do not have the

customization benefit we are provided with some basic and simple logic bots which can cause poor functionality.

Ready-made chatbots:

- HubSpot's Chatbot builder:
  HubSpot Chatbot builder provide NLP based chatbot to book meetings, answers to customers questions
- Botsify:
  Botsify allows user to create AI powered chatbots. Service can be integrated on website as well as on messenger without any coding skills. Also integrated with wordpress, slack, Alexa, etc
- Botkit:
  Botkit is a developer tool for building chatbots and custom integrations for many messaging platforms. It is an open-source developer tool.
- Tars:
  TARS help create chatbots for both individual and business. Such bots can be made without any programming knowledge. It can make messenger bots or even website chatbots.

There are many ready-made chatbot builder which can help with your minimal tasks to be done by some smart computers.

FUTURE SCOPES:

After so much aid to humans till now we can definately predict about the future scopes of chatbots and NLP technique. But still it is in great use like it is used in healthcare for daily prescription and appointment scheduler, it is used as 24x7 customers support in big firms, order processing, marketing, it can be used by tourism industries which can help their customers to know about ticket prices, places of interests, restaurants. It can be used as an In-app guides or solve customer issues. It can be also used as advertising agent like sending mail regarding product, taking feedbacks and so on. In future, NLP technique will be used to make much smart assistant and even robots which can think, process our languages and even respond us they can train themselves.

Conclusion:

In this paper, we covered about artificial intelligence, Natural Language Processing, types of techniques used for building chatbots, steps to create NLP based chatbot and also usage and future scopes of chatbots. According to our research chatbots are being used in each and every sector to enhance their availability to their customers it also minimizes humans work load by automating some less human intelligence based jobs. In the end, we conclude that Artificial Intelligence, Natural Language Processing and Chatbot have great future ahead and will be very useful and important for day-to-lives and business operations.

References:

- https://towardsdatascience.com/how-to-build-a-chatbot-a-lesson-in-nlp-d0df588afa4b

- https://sloboda-studio.com/blog/how-to-use-nlp-for-building-a-chatbot/

- Paliwal, S., Bharti, V., & Mishra, A. K. (2019). Ai Chatbots: Transforming the Digital World. *Intelligent Systems Reference Library*, 455–482. https://doi.org/10.1007/978-3-030-32644-9_34

- Brandtzaeg, P. B., & Følstad, A. (2017). Why People Use Chatbots. *Internet Science*, 377–392. https://doi.org/10.1007/978-3-319-70284-1_30

- Van den Broeck, E., Zarouali, B., & Poels, K. (2019). Chatbot advertising effectiveness: When does the message get through? *Computers in Human Behavior*, *98*, 150–157. https://doi.org/10.1016/j.chb.2019.04.009

- SCHANK, R. O. G. E. R. C., & SLADE, S. T. E. P. H. E. N. B. (1991). THE FUTURE OF ARTIFICIAL INTELLIGENCE: LEARNING FROM EXPERIENCE. *Applied Artificial Intelligence*, *5*(1), 97–107. https://doi.org/10.1080/08839519108927919

- Veglis, A., & Maniou, T. A. (2019). Chatbots on the Rise: A New Narrative in Journalism. *Studies in Media and Communication*, *7*(1), 1. https://doi.org/10.11114/smc.v7i1.3986

- Shumanov, M., & Johnson, L. (2020). Making conversations with chatbots more personalized. *Computers in Human Behavior*, 106627. https://doi.org/10.1016/j.chb.2020.106627