Chatbot using Deep Learning and NLP

Sarthak Kamble[1], Karan Dhanavade[2], Abhishek Dombe[3], Shubham Patil[4],

Prof. A.P. Kulkarni[5]

Student, IT, Sinhgad Institute of Technology, Lonavala, India[1-4]

Professor, IT, Sinhgad Institute of Technology, Lonavala, India[5]

Abstract: In this work we explore a deep learning and natural language processing (NLP) based dialog system that generates responses from a conversation design perspective. We trained a feed forward neural net model on a carefully curated dataset of normal query-based questions related to Ecommerce. We show that end-to-end systems learn patterns very quickly from small datasets and thus, are able to transfer simple linguistic structures representing abstract concepts. We also integrated this chatbot in a simple web application, where users can directly interact with our chatbot. As we are using NLP our chatbot model is getting familiar to user's responses and training itself to respond with better responses.

Keywords: Chatbot, AI Chatbot, Natural Language Processing, Deep Learning.

I.INTRODUCTION

A chatbot is a computer program designed to simulate conversation with a real person. They represent a text-based dialog system. The chatbot reacts to the programmed commands with predefined commands that simulate conversation with a real person. Around 63% of users would consider using a chatbot to obtain customer service. Seeing the statistics chatbots will have replaced 50% of the applications used in the workplace. A deep learning chatbot learns everything from data based on human-to-human dialogue. The more data you feed in, the more effective its learning will be. Training chatbots as thoroughly as possible will improve their accuracy. The two main types of deep learning chatbot are retrieval-based and generative. Deep learning chatbots can be trained using existing interactions between customers and support staff; preferably as detailed and varied as possible. The training process also includes data reshaping (creating message-response pairs that the machine will recognise) and pre-processing (adding grammar so that the chatbot can understand errors correctly). There are 3 types of chatbots: Intellectually Independent chatbots, Artificial Intelligence chatbots & Rule-Based chatbots. So, the type we are going to see is Artificial Intelligence chatbot. Artificial intelligence chatbots are text- or voice-based interfaces that provide support and connect human users with the services or information they need by simulating a traditional person-to-person conversation.

II.PROBLEM STATEMENT

As we know the technology is increasing day by day concepts like machine learning and artificial intelligence is constantly being implemented in various sectors like medical, engineering, ecommerce etc. and our topic i.e., chatbot using deep learning and NLP is completely focused on building chatbots that will train itself and get familiar to human responses and train itself to respond in more human format i.e., using natural language as possible. Chatbot technologies are implemented for multiple purposes like business, medical, ecommerce, engineering etc. Our chatbot is based on ecommerce website where it will interact with users querying about delivery, products and different categories etc. So, let's create a chatbot that will interact with the users in natural language possible.

III.PROPOSED METHOD

Our Chatbot application contains three modules as follows:
A)   Chatbot Web Application.
B)   NLP Pre-processing pipeline.
C)   Deep Learning model.

A) Chatbot Web Application:
So, the first module is our chatbot application i.e., our frontend application which is developed using python Flask and we are using JavaScript to fetch data from our chatbot model to display it on our web application.
1. Basic query in English related to products, delivery timings and different categories related to e-commerce website.
2. Our chatbot model will generate response according to user's query.

B) NLP Pre-processing pipeline:

So, this NLP pre-processing pipeline comes under our backend where before training the model we have to process our data through this pipeline. In this pre-processing pipeline three process are done on our data i.e., Tokenization, Stemming and Bag of words.

1. **Tokenization** split sentence into array of words/tokens a token can be a word or punctuation character, or number.

2. **Stemming** is finding the root form of the word.
Example:
words = ["organize", "organizes", "organizing"]
words = [stem(w) for w in words]
["organ", "organ", "organ"]

3. **Bag of words** returns bag of words array 1 for each known word that exists in the sentence, 0 otherwise.
Example:
sentence = ["hello", "how", "are", "you"]
words = ["hi", "hello", "I", "you", "bye", "thank", "cool"]
bag = [0, 1, 0, 1, 0, 0, 0].

C) Deep Learning model:

We are using Feed-forward neural network in our model. So, A feed-forward neural network is a biologically inspired classification algorithm. It consists of a number of simple neuron-like processing units, organized in layers and every unit in a layer is connected with all the units in the previous layer.
1. Using Deep Learning and NLP, our chatbot can generate responses according to user's query.
2. Our chatbot model also trains itself to respond to user's query with natural language possible.
3. If our chatbot doesn't understands the users query it will simply return a message "I do not understand your query…".

IV.DISCUSSIONS

Advantages and Disadvantages:

Advantages:
- Enhancing user experience.
- Customer care improvement.
- Personalized service.
- Resource saving.
- Chatbot helps us to know our customers.

Disadvantages:
- Chatbots require constant maintenance.
- They can cost more if implementation is complex.
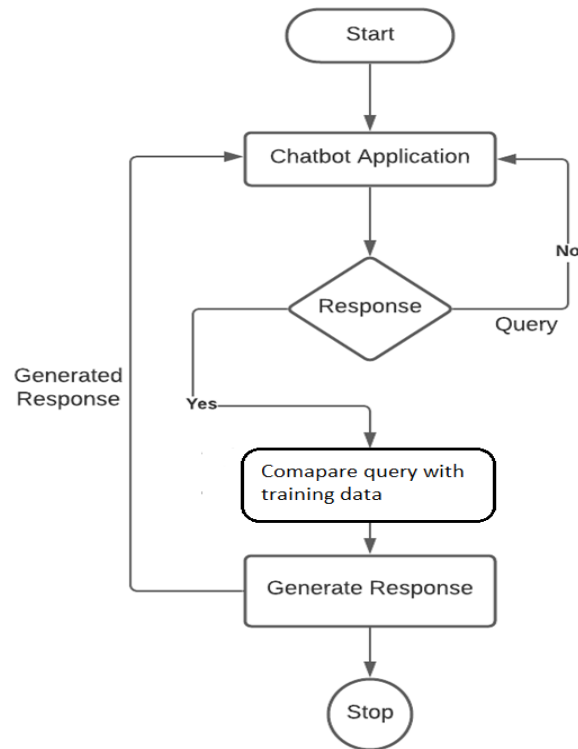
Limitations:
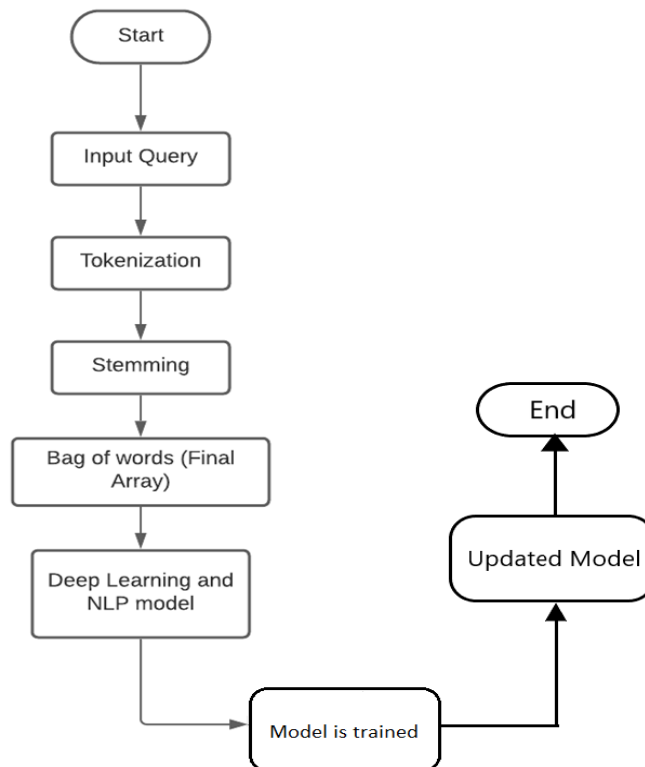- Decisioning.
- Lack of human context.

Future scope:
- Training on larger dataset.
- UI enhancement.
- Integrating with modern web technologies.
- Voice assistant response.

V.FIGURES

A)   Frontend Process of Chatbot

B) Backend Process of Chatbot

VI.CONCLUSION

This research paper presents a conversational AI system, which aims to maintain the conversation between man and machine using natural language possible. This system is convenient and affordable to multiple sectors like business, medical and engineering where customer satisfaction is the most important part. And as we know our chatbot uses natural language processing user experience gets better because its similar as talking to a human. Chatbots with artificial intelligence are continuously changing businesses. Our main aim was to implement a system that can reach out to a larger audience on messaging apps and be more effective than humans. They may develop into more capable information collecting tool in the near future. With our training data, NLP pre-processing pipeline and Deep learning model we can train our chatbot to interact with the user in human way possible. These features are then integrated into a web application where user can ask queries. This results in further research on this topic of conversational AI system and its business applications.

VII.ACKNOWLEDGEMENT

REFERENCES

[1] G. Krishna Vamsi; Akhtar Rasool; Gaurav Hajela, "Chatbot: A Deep Neural Network Based Human to Machine Conversation Model, pp. 2020".

[2] Manyu Dhyani and Rajiv Kumar, "An intelligent Chatbot using deep learning with Bidirectional RNN and attention model, pp.2020".

[3] Deepti Chopra, Jacob Perkins and Nitin Hardeniya, "Natural Language Processing: Python and NLTK, pp. 21-33, 2016."

[4] B. Setiaji and F. W. Wibowo, "Chatbot Using a Knowledge in Database: Conversation Modeling, pp. 71-78, 2016.".

[5] M. T. Mutiwokuziva, M. W. Chanda, P. Kadebu, A. Mukwazvure and T. T. Gotora, "A neural-network based chat bot", 2017 2nd International Conference on Communication and Electronics Systems, pp. 211-217, 2017."

[6] Naeun Lee, Kirak Kim and Taeseon Yoon, "Implementation of robot journalism by programming custom bot using tokenization and custom tagging, pp.2017".

[7] B. Setiaji and F. W. Wibowo, "Chatbot Using a Knowledge in Database: Conversation Modeling, pp. 71-78, 2016."