Chabot for Q&A improvement of virtual assistance

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1. **Research Area**: A Deep learning based Chabot is a software program that acts as a virtual assistant for users to help in purchasing, idea generations, branding, resulting better services and faster response. The Chabot is such an intelligent that able to mimic the human interactions. A virtual Chabot is capable of communicating with the human using Natural Language processing(NLP). Although the advancement of Natural Language processing (NLP), Deep Neural Network, Artificial Intelligent (AI), building a perfect Chabot model is still challenging in this modern era. This Chabot model will be more accurate and user friendly while answering the questions.

2. **Objective**: This paper provides a new method of Chabot using deep neural learning method. In this method, a neural network with multiple layers is built to learn and process the data. The goal is to build such a model that will be very much helpful to train the dataset perfectly in order to get the best possible output. The main goal of this method is to increase the quality of response of the Chabot with more user friendly. There are lot of Q&A sets in a different field and from different viewpoints. This method aims to shorten the time of getting answers with more accurate percentages.

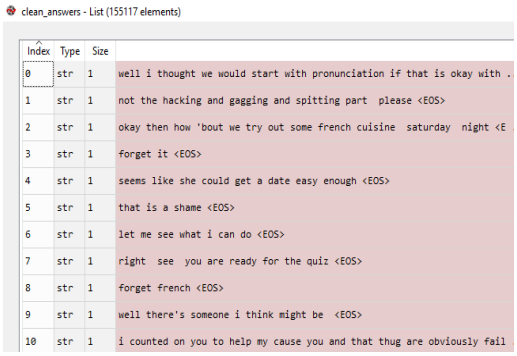
3. Methodology:

3.1. **Choosing the Model**: The study of the procedure was built a Sequence to Sequence (seq2seq) Model. The Sequence To Sequence model introduced in Learning Phrase Representations using RNN Encoder-Decoder for Statistical Machine Translation has since then, become the Go-To model for Dialogue Systems and Machine Translation. It consists of two RNNs (Recurrent Neural Network) : An Encoder and a Decoder. According to the initial result, it was decided that, the model works smoothly and more accurately.[3]

3.2. **Creating a Dataset**: For creating the dataset "Cornell Movie-Dialogue corpus" was used from Kaggle which is an open source dataset site in Google.

3.3. **Data Pre-processing**: Data Pre-processing is one kind of step in which data gets transformed or Encoded to bring it such a state that the machine can easily parse it. Moreover, the features of the data can now be easily interpreted by the seq2seq model. For Pre-processing the data, needed to imported the dataset, created a dictionary that maps each line and its id, created a list of all conversations in order to getting the questions and answers separately.

3.4. **Cleaning the Questions and Answers**: For cleaning the questions and answers, processing the data Anaconda Spyder was used for writing the code and cleaning the texts.


clean_answers - List (155117 elements)

Index	Type	Size	
0	str	1	well i thought we would start with pronunciation if that is okay with .
1	str	1	not the hacking and gagging and spitting part please <EOS>
2	str	1	okay then how 'bout we try out some french cuisine saturday night <E
3	str	1	forget it <EOS>
4	str	1	seems like she could get a date easy enough <EOS>
5	str	1	that is a shame <EOS>
6	str	1	let me see what i can do <EOS>
7	str	1	right see you are ready for the quiz <EOS>
8	str	1	forget french <EOS>
9	str	1	well there's someone i think might be <EOS>
10	str	1	i counted on you to help my cause you and that thug are obviously fail

clean_questions - List (155117 elements)

Index	Type	Size	Value
0	str	1	can we make this quick roxanne korrine and andrew barrett are having ...
1	str	1	well i thought we would start with pronunciation if that is okay with ...
2	str	1	not the hacking and gagging and spitting part please
3	str	1	you are asking me out that is so cute what is your name again
4	str	1	the thing is cameron i am at the mercy of a particularly hideous bree ...
5	str	1	unsolved mystery she used to be really popular when she started high ...
6	str	1	gosh if only we could find kat a boyfriend
7	str	1	c'esc ma tete this is my head
8	str	1	that is because it's such a nice one
9	str	1	how is our little find the wench a date plan progressing
10	str	1	you got something on your mind

Fig a&b: Clean answers and clean questions

3.5. **Building the Seq2Seq Model**: For building the seq2seq Model, needed to create the Placeholder for inputs and the targets, preprocessed the target, created the Encoder RNN, Decoded the Training Set, Decoded the validation set, created the Decoder RNN and finally built the Seq2seq model.

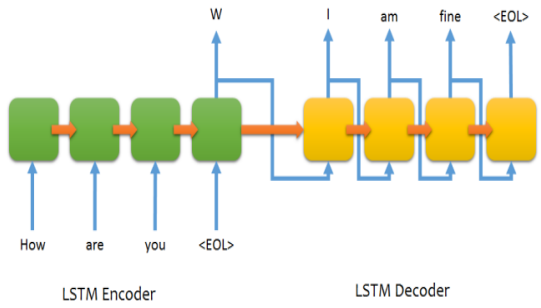


Fig 1: Initial Process of Seq2seq model

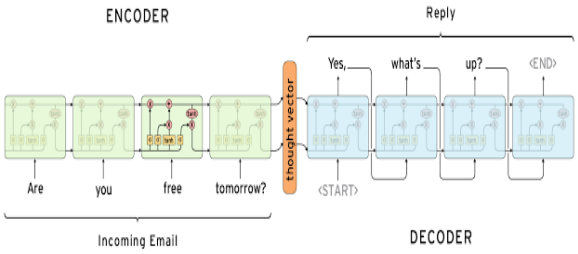


Fig 2: Encoding and Decoding process

3.6. Training the seq2seq model: For better performance and getting the feedback quickly, needed to train the model. For training the model, needed to setting the Hyper parameters, Loaded the model inputs, setting the sequence length, getting the training and testing predictions. Before training, needed to work on the dataset to convert the variable length sequences into fixed length sequences which is called padding. After trained the model had to test test the seq2seq model.

3.7. **Testing the seq2seq Model**: Testing the trained seq2seq model is one of the vital part of this whole procedure. To making the Chabot more familiar and more user friendly, the model have to be tested. There was necessary to loading the weight and running the session, converted the questions from string to list of encoding integers. And Finally setting up the chat for the result and analysis.

4. **Result and Analysis**: The main purpose of this project is to build a system that will interact with the human and help the people to get the services in their specific field. This project is completed based on the NLP and Deep neural network. The research discovered that a Chatbots' performance could be improved by using neural networks and different algorithms. This Chatbot will give the companies innovative opportunities to maximizing the customer services, will be shorten the customer response duration.

```
You: Hi
ChatBot: how is it going?

You: good, how are you?
ChatBot: great.

You: --beamlenpenalty=2
[Beam length penalty weight set to 2.0.]
You: --maxanswerlen=5
[Max words in answer set to 5.]
You: --reset
[Reset to default settings.]
You:
```

Fig3: Expected conversation between chatbot and Users.

References :

[1] B. Setiaji and F. W. Wibowo, "*Chatbot Using a Knowledge in Database: Conversation Modeling*" pp.71–78,*2019.*

[2] G Krishna Vamsi and Gaurav Hajela, "Chatbot : A Deep Neural Network Based Human to Machine Conversation Model", july 1-3, 2020

[3] Neelkumar P. Patel, Devangi R. Parikh, Prof. Darshan A. Patel, Prof. Ronak R. Patel, "AI and Web Based Human like intercative University Chatbot (UNIBOT), ICECA 2019