ABSTRACT

A chatbot is an artificial intelligence (AI) programme that simulates a conversation with a user. They communicate in natural language through messaging apps, websites, and other communication platforms. Some chatbots utilise complex word categorization techniques, Natural Language processors, and advanced AI, while others just scan for generic keywords and generate responses using common phrases from a library or database. In our project, we created a model in which the user can communicate with a chatbot based on a fictional character such as Harry Potter.

KEYWORDS

chatbot, natural language processing, artificial intelligence, fictional character chatbot

1. INTRODUCTION:

Chatbots are sophisticated conversational computer systems that are programmed to mimic human communication in order to provide automatic online guidance and assistance. Since the launch of the ELIZA chatbot in 1966, a lot of effort has gone into designing a chatbot system that can pass the Turing Test. These efforts have resulted in the development of a wide range of technologies and methodologies. Chatbots utilise methods and algorithms from two Artificial Intelligence domains: Natural Language Processing and Machine Learning. Because of the rising benefits of chatbots, numerous sectors have adopted them to provide virtual assistance to clients. Many companies' chatbots are available via messaging applications or SMS. Many banks, insurers, media businesses, e-commerce companies, airlines, hotel chains, merchants, health care providers, government entities, and restaurant chains have utilised chatbots to answer simple queries, enhance customer engagement, offer more methods to order from them, and more. According to a 2017 research, about 4% of businesses use chatbots. According to a 2016 research, 80% of companies said they planned to have one by 2020. Chatbot programmes have become more prevalent in recent years, thanks to the commoditization of computing power and the sharing of open source tools and frameworks. Chatbots have become easier to construct, more flexible in terms of applicability and maintainability, and increasingly capable of mimicking human communication thanks to recent advances in Artificial Intelligence and Natural Language Processing techniques. In addition to support and assistance to customers, chatbots can also be used for providing entertainment and companionship for the end user. Our proposed chatbot is trained to converse like a fictional character(Harry Potter), and is made for entertainment purposes for the user. We make use of the DialoGPT model for this, which is open source.

DialoGPT (dialogue generative pre-trained transformer) is a a large, tunable neural conversational response generation model. DialoGPT extends the Hugging Face PyTorch transformer, which was trained on 147 million conversation-like exchanges taken from Reddit comment chains from 2005 to 2017, to achieve human-like performance in single-turn discussion scenarios, both in terms of automatic and human evaluation. DialoGPT-enabled conversational systems produce more relevant, contentful, and context-consistent responses than strong baseline systems. To aid research into neural response creation and the development of more intelligent open domain discussion systems, the pre-trained model and training pipeline have been made public. We hosted the chatbot on the Huggingface API.

2. LITERATURE REVIEW:

In DIALOGPT : Large-Scale Generative Pre-training for Conversational Response Generation[1], Zhang et al have released an open-domain pre-trained model, DIALOGPT, trained on massive real-world Reddit dataset. The package includes a distributed training process as well as many pre-trained models that can be fine-tuned to produce a conversation model on a fairly sized bespoke dataset in a matter of hours. Users can expand the pre-trained conversational system to bootstrap training using multiple datasets utilising DIALOGPT, which is totally open sourced and easy to deploy. It can be used to create new applications and methodologies. Future research will concentrate on detecting and controlling egregious outputs. They'll also conduct research about using reinforcement learning to enhance the relevancy of the model's generated responses and prevent it from producing obnoxious responses.

In A Literature Survey of Recent Advances in Chatbots[2], Caldarini et al have provided a survey of relevant works of literature on the subject of chatbots, and have studied the current state of the art in terms of language models, applications, datasets utilised, and evaluation frameworks. Current issues and constraints, as well as gaps in the literature, were also highlighted. They concluded that despite breakthroughs in technology, AI chatbots are still unable to mimic human speech. This is due to a flawed approach to dialogue modelling and a lack of open-access domain-specific data. Since there is no universal framework for evaluating chatbots, they say that a new, reliable automatic evaluation approach should be provided to overcome the restrictions of the current evaluation methods. They concluded that improved, scalable, and flexible language models for industry specific applications, more human-like model architectures, and improved evaluation frameworks would surely represent great steps forward in the field.

3. METHODOLOGY

3.1 OVERVIEW

1. Gather text data for the character using one of these two methods: find pre-made datasets on Kaggle or make custom datasets from raw transcripts.
2. Train the model in Google Colab, a cloud-based Jupyter Notebook environment with free GPUs.
3. Deploy the model to Hugging Face, an AI model hosting service.

For our chatbot to learn to converse, we need text data in the form of dialogues. This is essentially how our chatbot is going to respond to different exchanges and contexts.

We used a Harry Potter transcripts dataset from Kaggle[3].

Harry Potter and the Sorcerer's Stone Movie Script

Character	Sentence
1529 unique values	[null] 65% Harry. 1% Other (545) 34%
Dumbledore	I should've known that you would be here, Professor McGonagall.
McGonagall	Good evening, Professor Dumbledore.
McGonagall	Are the rumors true, Albus?

Fig 1: Harry Potter transcripts dataset

3.2 TRAINING

Our model is a Generative Pre-trained Transfomer (GPT), the most popular language model these days. Instead of training from scratch, we loaded Microsoft's pre-trained GPT, DialoGPT-small, and fine-tuned it using our dataset.
We may train a larger model like DialoGPT-medium or even DialoGPT-large. Model size here refers to the number of parameters in the model. More parameters will allow the model to pick up more complexity from the dataset.
We may also increase the number of training epochs by searching for num_train_epochs in the notebook. This is the number of times that the model will cycle through the training dataset. The model will generally get smarter when it has more exposure to the dataset. However, we shall not overfit the model: If the model is trained for too many epochs, it may memorize the dataset and recite back lines from the dataset when we try to converse with it. This isn't ideal as we want the conversation to be more organic.

3.3 HOSTING

We hosted the model on Hugging Face, which provides a free API for us to query the model.

4. CONCLUSION

Thus we have built a chatbot that converses like Harry Potter with the help of DialoGPT, and hosted it on the Huggingface API. In the future we wish to host our chatbot on various other platforms such as Discord, Instagram, Whatsapp etc.

5. REFERENCES

1. Zhang, Yizhe, et al. "Dialogpt: Large-scale generative pre-training for conversational response generation." *arXiv preprint arXiv:1911.00536* (2019).

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3. https://www.kaggle.com/gulsahdemiryurek/harry-potter-dataset?select=Harry+Potter+1.csv