



IJIRCCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 5, May 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.379

 9940 572 462

 6381 907 438

 ijircce@gmail.com

 www.ijircce.com

AI Chatbot Using Custom Knowledge Base

Ms E Shapna Rani ¹, T Nandhini ², Y Priyadharshan ³, P Srithy ⁴

¹ Assistant Professor, Dept of Computer Science & Engineering, Saranathan College of Engineering, Tiruchirappalli,
Tamil Nadu, India

²⁻⁴ Student, Dept of Computer Science & Engineering, Saranathan College of Engineering, Tiruchirappalli,
Tamil Nadu, India

ABSTRACT: The project presents the development of an AI chatbot using a custom knowledge base. The chatbot is designed to provide quick and accurate responses to customer queries by leveraging a knowledge base that has been tailored specifically to the business in question. The chatbot is trained on this knowledge base using natural language processing techniques to ensure that it can understand and respond to customer queries in a way that feels natural and human-like. The results of our experiments show that the use of a custom knowledge base significantly improves the accuracy and effectiveness of the chatbot, making it a valuable tool for customer service and support. By incorporating a knowledge base specific to a company's products or services, the chatbot can provide accurate and personalized information to customers in real-time, improving customer satisfaction and reducing response time. This technology can be used across a variety of industries, including healthcare, finance, and e-commerce, and has the potential to revolutionize customer service by providing a more efficient and effective way to interact with customers. With continued advancements in natural language processing and machine learning, AI chatbots using custom knowledge bases will likely become increasingly sophisticated, leading to more seamless and human-like interactions with customers. This project involves the development of an AI chatbot that uses a custom knowledge base to provide accurate and relevant responses to user queries. The chatbot is built on the GPT-3.5 architecture and is trained on a large dataset of conversational data.

KEYWORDS: Custom knowledge base, AI chatbot, Natural language processing, Machine learning, GPT 3.5

I. INTRODUCTION

This project discusses the need for businesses to provide seamless customer support through the use of chatbots. However, current chatbots have limited capabilities and do not provide personalized solutions to customers' problems. To solve this problem, the proposed project aims to develop an AI chatbot using a custom knowledge base that can provide personalized support to customers. The chatbot will use machine learning algorithms and natural language processing techniques to provide timely and accurate solutions to queries. It will also learn from customers' interactions and feedback to continually improve its performance. The goal is to provide efficient, personalized, and continually improving customer support.

The objective is to develop a functional AI chatbot that can successfully interact with users and provide accurate information or assistance. And to design a custom knowledge base that allows the chatbot to understand and respond to a variety of user queries and requests. To integrate the chatbot with various platforms, such as websites or messaging apps, to improve accessibility for users. To conduct thorough testing and analysis to identify areas for improvement and refine the chatbot's performance over time. To provide clear and concise documentation and training materials for future maintenance and development of the chatbot. To ultimately improve user satisfaction and engagement through the use of an effective and efficient AI chatbot.

II. LITERATURE SURVEY

There have been several studies and research conducted on AI Chatbots, highlighting their importance and usefulness. Here are a few examples:

End-to-End Open Domain Question Answering with BERTserini" by Yang et al. (2020)

The paper proposes an approach for building an end-to-end open-domain question answering chatbot using the BERT model and a custom knowledge base. The authors use a dense retrieval method to retrieve relevant documents from the

knowledge base, and then fine-tune the BERT model.

The proposed system, called BERTserini, is an end-to-end QA system that uses BERT to encode the question and relevant passages retrieved by Anserini, and then uses a span extraction module to extract the answer from the encoded passages. BERTserini also incorporates a reranker module that reorders the retrieved passages based on their relevance to the question before they are encoded by BERT.

The authors evaluate BERTserini on two popular open-domain QA datasets: Natural Questions and TriviaQA. Their experiments show that BERTserini outperforms existing state-of-the-art open-domain QA systems, achieving a new state-of-the-art performance on both datasets. They also conduct ablation studies to analyze the impact of different components of the system on its overall performance.

The authors conclude that BERTserini is a simple yet effective approach for open-domain QA that achieves strong performance on two challenging QA datasets.

Deep Learning for Chatbot: A Systematic Review by Serban et al. (2018)

It is a research paper published by Serban et al. in 2018. The paper provides a comprehensive survey of the state-of-the-art in using deep learning techniques for building conversational agents, commonly known as chatbots.

The authors review the literature on various aspects of chatbot development, including natural language processing, dialogue management, and user engagement. They also analyze the use of deep learning techniques in these areas, such as recurrent neural networks (RNNs), convolutional neural networks (CNNs), and generative adversarial networks (GANs).

The paper highlights the challenges and limitations of using deep learning techniques for chatbot development, such as the need for large amounts of training data and the difficulty in handling long-term dependencies in conversational contexts. The authors also discuss the ethical implications of using chatbots in various domains, such as healthcare and customer service.

The authors conclude that deep learning techniques have shown great potential in improving the performance of chatbots in various domains. However, they also note that there is still much work to be done in addressing the limitations of these techniques and developing more robust and reliable chatbot systems.

Overall, this paper provides a valuable overview of the current state of research in deep learning for chatbots and highlights the challenges and opportunities in this field.

“Knowledge based question answering as Machine Translation” by Zhou et al (2020)

It is a research paper published by Zhou et al. in 2020. The paper proposes a new approach for question answering (QA) that treats it as a machine translation task, where the question is translated into a sequence of tokens representing the answer.

The authors leverage the knowledge graph (KG) to improve the accuracy of their system. They use the KG to extract relevant facts and entities related to the question and use them to generate candidate answers. They then use a neural machine translation model to select the most probable answer from the candidate answers.

The authors evaluate their system on several benchmark datasets, including the popular SQuAD and TriviaQA datasets. Their experiments show that their approach outperforms several state-of-the-art QA systems, including those that use advanced deep learning techniques like attention mechanisms and memory networks.

The authors also conduct a thorough analysis of the impact of different components of their system on its overall performance. They show that incorporating the KG significantly improves the accuracy of the system, and that their approach is robust to noise and irrelevant information in the KG.

Overall, the authors conclude that their approach is a promising direction for QA, as it effectively leverages external knowledge sources to improve the accuracy of the system.

“Designing a Conversational Agent with open Domain dialogue capability” by Zhang et al.

"Designing a Conversational Agent with Open Domain Dialogue Capability" is a research paper published by Zhang et al. in 2020. The paper presents a framework for building a conversational agent with open domain dialogue capability, which means the agent can engage in conversations on a wide range of topics, rather than being limited to a specific

domain.

The authors propose a two-stage approach for building the agent. In the first stage, they use a large corpus of text to train a language model, specifically a transformer-based model called GPT-2. The trained model is used to generate responses to user input, based on the context of the conversation.

In the second stage, the authors use an external knowledge base, specifically a knowledge graph, to provide more informative and accurate responses to user input. The knowledge graph is used to extract relevant information related to the user's input, which is then used to enhance the response generated by the language model.

The authors evaluate their system on a benchmark dataset of open domain dialogue, and show that their approach outperforms several existing state-of-the-art systems in terms of response quality and diversity.

The authors also conduct a user study to evaluate the effectiveness of their system in engaging users in conversations. The results of the study show that users perceive the system as more engaging and informative than existing systems.

Overall, the authors conclude that their approach is a promising direction for building conversational agents with open domain dialogue capability, as it effectively combines the strengths of language models and external knowledge sources.

III. METHODOLOGY

This AI chatbot is trained on this knowledge base using natural language processing techniques to ensure that it can understand and respond to customer queries in a way that feels natural and human-like.

Input Data:

The custom knowledge base module is responsible for providing input to the bot. Either text files or pdf files can be used to provide input.

Indexing:

The LLM (Large Language Model) is responsible for analysing the input PDF files and indexing the same into a json format file, say index.json. Using this LLM, we can produce human-like responses. It processes, analyzes and makes predictions with complex data.

Output:

After the processing of the input pdf file, we can find a local URL. There we can have our output. The Web UI module contains the output UI screen using the gradio library where the user can query the bot and get responses. To start, you can ask the AI chatbot what the document is about. You can ask further questions, and the ChatGPT bot will answer from the data you provided to the AI. So this is how you can build a custom-trained AI chatbot with your own dataset. You can now train and create an AI chatbot based on any kind of information you want.

Architectural Diagram:

Architecture diagramming is the process of creating visual representations of software system components. In a software system, the term architecture refers to various functions, their implementations, and their interactions with each other.

Algorithm:

- 1) Define the purpose and scope of your chatbot. Determine the purpose of your chatbot and what types of questions or tasks it will be able to handle.
- 2) Collect and organize your data. Start collecting and organizing the data that will be used to build your knowledge base.
- 3) Develop a natural language processing (NLP) model: NLP models help the chatbot understand and interpret user input, and generate appropriate responses.
- 4) Build the knowledge base: This may involve creating a database, organizing the data into categories, and creating responses for common questions or tasks.
- 5) Train the chatbot: Train your chatbot using your NLP model. This will help the chatbot understand user input and generate appropriate responses.

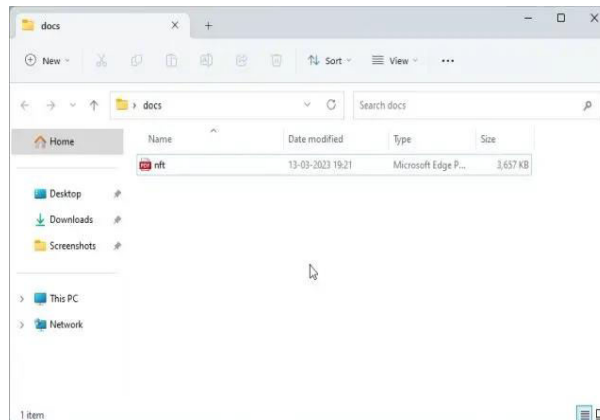
6) Test and refine the chatbot: Test your chatbot with a variety of sample inputs to identify any areas that need improvement.

7) Deploy and maintain the chatbot: Deploy it to your chosen platform or channels, such as a website, mobile app, or messaging platform. Continue to monitor and maintain the chatbot, making updates and improvements as necessary.

IV. EXPERIMENTAL ANALYSIS

Input:

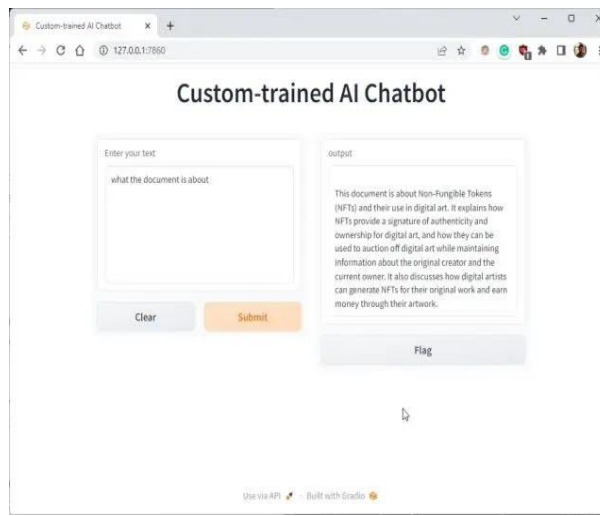
The PDF file to be analyzed is the input data. If you want to train the AI chatbot with new data, you can delete the file inside the “docs” folder and add new ones.



Output:

```
Command Prompt - python 4 x + v
C:\Users\arjun\Desktop>python app.py
INFO:root:> [build_index_from_documents] Total LLM token usage: 0 tokens
INFO:root:> [build_index_from_documents] Total embedding token usage: 5258 to
kens
Running on local URL: http://127.0.0.1:7860
Running on public URL: https://54f0157c023154be26.gradio.live

This share link expires in 72 hours. For free permanent hosting and GPU upgra
des (NEW!), check out Spaces: https://huggingface.co/spaces
```



V. CONCLUSION

In conclusion, building an AI chatbot using a custom knowledge base can be a highly effective approach for creating a conversational agent that can provide accurate and informative responses to user input. By leveraging a custom knowledge base, developers can ensure that the chatbot has access to the specific information and expertise required for a particular domain or application.

Once the knowledge base is built, it can be integrated with a conversational agent using a range of AI techniques, such as natural language understanding, dialogue management, and response generation. The chatbot can then be trained and tested to ensure that it can effectively handle user queries and provide accurate and informative responses.

Overall, building an AI chatbot using a custom knowledge base can be a challenging but rewarding project, as it allows developers to create a highly tailored conversational agent that can provide value and utility to users in a specific domain or application.

REFERENCES

1. <https://openai.com/blog/chatgpt>
2. <https://www.mygreatlearning.com/blog/basics-of-building-an-artificial-intelligence-chatbot/>
3. <https://www.analyticsvidhya.com/blog/2023/03/an-introduction-to-large-language-models-llms/>



SJIF Scientific Journal Impact Factor

Impact Factor: 8.379



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 9940 572 462  6381 907 438  ijircce@gmail.com



www.ijircce.com

Scan to save the contact details