ARTIFICIAL INTELLIEGENCE AND EXPERT SYSTEMS (CT-361)

REPORT

BUILD CHATBOT IN 5 MINUTES

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AI Report

Abstract:

The goal of this project is to create a conversational AI chatbot that can engage with users in a natural, interactive, and personalized manner. By using Hugging Face's pre-trained models, such as **DialoGPT**, the chatbot is designed to analyze user input, respond appropriately, and adapt based on sentiment analysis, user preferences, and past interactions. The chatbot will also include features like humor (jokes), sentiment analysis, language detection, and memory retention to provide a more engaging and customized experience for each user. The application is designed to be easily deployable with minimal setup time (approximately 5 minutes), leveraging the power of Gradio for front-end interaction and Hugging Face's transformers for back-end processing.

Platform:

The platform chosen for this project is web-based, utilizing **Gradio** for the user interface and **Hugging Face**'s **transformers** library for natural language processing. The system is designed to run on any modern web browser with an internet connection, allowing quick deployment and accessibility. Given that the application only requires lightweight interaction and a conversational model, it is not resource-intensive, making it suitable for usage on various platforms (desktops, tablets, or smartphones). However, the computational load (model inference) is offloaded to the cloud, ensuring that users experience minimal latency in their interactions.

The conversational AI model used in this project is **DialoGPT**, a variant of GPT fine-tuned on conversational data. This model is capable of generating human-like text responses to user input, and the overall interaction is streamlined by Gradio's web-based interface, which allows seamless communication between the backend AI model and the front-end user.

Data:

The primary data used in this project consists of user input in the form of text and the conversational responses generated by the **DialoGPT** model. The chatbot does not require specific training data but instead uses pre-trained models to engage in conversation. However, the system also incorporates additional data sources for sentiment analysis and emotion detection, using models like **distilbert-base-uncased-finetuned-sst-2-english** for sentiment analysis and **facebook/bart-large-mnli** for emotion classification.

The user input is dynamically handled by the chatbot, with the system processing text in real-time. The conversational history is stored locally in memory (in a **JSON** file) to allow for context retention, which can later be utilized to enhance interactions.

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- **General requirements**: The chatbot will work with any text-based input and provide responses based on the content, including emotions, jokes, and personalized responses based on sentiment analysis.
- **Positive example**: "I'm feeling really happy today!"
- **Negative example**: "I'm feeling down and could use a chat."
- **Data volume**: The system can handle user conversations of varying lengths, from single-sentence inquiries to multi-turn interactions. For testing purposes, interactions should cover various emotions (happy, sad, angry, neutral) and language inputs (English, French, etc.).

Testing:

The results of the chatbot project are tested by simulating user interactions. Since this is a conversational AI model, testing includes evaluating the chatbot's ability to:

- Respond to diverse queries across multiple languages.

- Identify and react to different emotional tones in user inputs (using sentiment analysis).

- Engage in natural-sounding conversations (with appropriate responses).

- Retain memory of past interactions and respond in a contextually appropriate manner.

- Provide jokes or humorous responses when prompted.

- Rate the interaction when requested by the user.

Testing conditions:

- **Sentiment Testing**:

   Provide a mix of positive, negative, and neutral inputs and assess if the bot's response aligns with the sentiment detected.

- **Joke Testing**:

   Ask the chatbot to tell a joke to ensure it delivers humor appropriately.

- **Memory Retention**:

   Ask the chatbot to remember the user's name and verify if it recalls the name in later interactions.

- **Language Testing**:

   Provide input in different languages (e.g., French, Spanish, German) to test the chatbot's language detection and response capability.

   Test Example 1:

- **Input:** "I am happy"
- **Expected Output:** The chatbot should respond positively, such as: "Great to hear you're feeling good! How can I make your day even better?"

  Test Example 2:

- **Input:** "Tell me a joke."
- **Expected Output:** The chatbot should return a joke: "Why don't skeletons fight each other? They don't have the guts!"

  Test Example 3:

- **Input:** "Remember my name is Alex."
- **Expected Output:** The chatbot should store the name and confirm: "Got it! Nice to meet you, Alex!"

  Test Example 4:

- **Input:** "I want to rate you."
- **Expected Output:** The chatbot should offer empathetic feedback, such as: "Please rate this chat on a scale of 1-5."

  Test Example 5:

- **Input***:* "Hola, ¿cómo estás?"
- **Expected Output:** The chatbot should be able to detect the Spanish language and respond appropriately, acknowledging the input language.

Future Use and Maintenance:

- **Retraining**:

  The system is designed to evolve with additional data, particularly regarding new jokes or improved responses based on user feedback. To improve the quality and personalization of interactions, future versions of the chatbot may incorporate user-provided ratings and more advanced natural language processing techniques.

- **Expansion**:

  The chatbot can be expanded to include additional features, such as deeper integration with other platforms (e.g., voice interaction, integration with other chat services like WhatsApp or Slack).

- **Maintenance**:

The application should be regularly updated with new conversational data, improvements in sentiment analysis accuracy, and model optimizations. The chatbot should also have the capability to "relearn" new behaviors or facts from user interactions, potentially through reinforcement learning techniques.

Projected Maintenance Plan:

1. **Monthly updates** to add new jokes or responses based on popular requests.
2. **Quarterly reviews** of sentiment analysis and emotion detection accuracy to ensure the chatbot adapts effectively to user moods.
3. **Bi-annual model retraining** to improve conversational fluency and adapt to evolving language usage.

Conclusion:

This project demonstrates the practical and efficient use of Hugging Face's pre-trained models and Gradio to create a highly interactive and customizable AI chatbot. It provides an engaging user experience through sentiment-based responses, memory retention, and humorous interactions. The deployment is quick, allowing users to interact with the chatbot almost immediately, and the underlying technology ensures smooth functionality across different languages and emotional contexts. With continuous updates and future expansions, this AI chatbot has the potential to be further optimized and adapted for more advanced use cases.