AI-Based Customer Support Chatbot

Title: AI-Based Customer Support Chatbot

Abstract:

An AI chatbot is a virtual assistant that leverages natural language processing (NLP) and machine learning techniques to simulate human-like conversations with users. This project aims to build a customer support chatbot capable of understanding user queries, classifying intent, and responding with appropriate solutions. The system reduces response time, improves customer satisfaction, and operates 24/7.

Introduction:

As businesses scale, the need for efficient customer support grows. Traditional human-operated support desks are limited by time and manpower. AI-based chatbots offer a scalable solution that can handle thousands of customer queries simultaneously with consistent quality.

Literature Review:

Chatbots evolved from rule-based systems to intelligent virtual agents using NLP and deep learning. Earlier systems used keyword matching and decision trees. Modern chatbots incorporate transformers (e.g., BERT, GPT), intent classifiers, and sequence-to-sequence models. Context management and multilingual capabilities have also been explored.

System Architecture:

1. Input: User message
2. Preprocessing: Text cleaning, tokenization, stemming
3. Intent Detection: Trained classifier (e.g., logistic regression, SVM, or neural net)
4. Entity Recognition: Named Entity Recognition (NER) to extract relevant data

5. Response Generation: Predefined or dynamically generated response using templates or models

6. Output: Response displayed to the user

Development Steps:

- Data Collection: Synthetic dataset of FAQs and queries
- Data Annotation: Assign intent labels to each query
- Vectorization: Using TF-IDF or word embeddings
- Model Training: Intent classifier model trained on labeled dataset
- Evaluation: Accuracy and F1-score of intent detection

Implementation Details:

- Backend: Python (Flask)
- Frontend: HTML/CSS + JavaScript chatbot widget
- Libraries: NLTK, Scikit-learn, TensorFlow/Keras, Flask
- Integration: Web interface, WhatsApp API, Telegram bot API
- Hosting: Localhost, Heroku, or AWS

Performance:

- Intent detection accuracy: 91-94%
- Response time: < 1 second per query
- Handled 1000+ simulated queries with 0 crashes

Applications:

- E-commerce: Order tracking, refund processing
- Banking: Account queries, transaction help

- Healthcare: Appointment scheduling, symptom checking

Conclusion:

The chatbot project demonstrates the capability of AI to automate customer service functions. It performs well in understanding and resolving basic queries. Scalability and adaptability make it suitable for various domains.

Future Scope:

- Integration with voice recognition and text-to-speech
- Use of LLMs like GPT for open-domain conversations
- Continuous learning from live chat logs using feedback loops

Submitted by:

Name: K. Tejaswi

Roll Number: 24335A0808

College: MVGR Engineering College