**Project Title:**

**CHATBOT**

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**Introduction**

A Conversational AI chatbot is an intelligent system designed to understand and respond to user queries using Natural Language Processing (NLP) and Machine Learning (ML) techniques. This document outlines the development process, model architecture, training, evaluation, and deployment of a machine learning-based chatbot.

**Aim**

The objective of this project is to develop a **Conversational AI Chatbot** using **Machine Learning**. The chatbot will be capable of:

* Understanding user inputs via **Natural Language Understanding (NLU)**.
* Recognizing intents and extracting entities.
* Generating human-like responses using advanced **ML models**.
* Maintaining context-aware conversations.
* Integrating with messaging platforms for real-world applications.

**Objective**

The objective of this project is to develop a **Conversational AI Chatbot** using **Machine Learning** that can:

* Understand and process natural language input.
* Recognize user intents and extract relevant entities.
* Generate human-like responses with advanced AI models.
* Maintain context-aware conversations for better engagement.
* Seamlessly integrate with various messaging platforms.

**Architecture**

2.1 System Components

1. Data Collection & Preprocessing
   * Collect dialogue datasets (e.g., Cornell Movie Dialogs, Open Subtitles).
   * Clean and preprocess text (tokenization, stop word removal, lemmatization).
2. Natural Language Understanding (NLU)
   * Implement Intent Recognition using BERT/Roberta.
   * Perform Entity Extraction with Named Entity Recognition (NER).
3. Response Generation
   * Use Sequence-to-Sequence (Seq2Seq) Models.
   * Implement Transformer-based models like GPT or BERT for generating responses.
4. Training & Validation
   * Train models on diverse conversational datasets.
   * Evaluate using BLEU Score, ROUGE, and human evaluation.

**Deployment Steps**

**Model Training**

1. Prepare dataset & preprocess text.
2. Train intent recognition and response generation models.
3. Fine-tune transformers like BERT/GPT on collected dialogues.
4. Save the trained model for deployment.

**Deployment**

1. Implement logging & monitoring for performance tracking.

**Conclusion**

This project showcases the development of a Conversational AI Chatbot using Machine Learning. By leveraging NLP, deep learning models, and scalable deployment strategies, we create a chatbot capable of engaging users in meaningful conversations. Future enhancements include:

* Improving context-awareness with memory-based transformers.
* Integrating with voice assistants.
* Implementing multilingual support for broader accessibility.

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