

Implementation of Chatbot Using NLP

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Learning Objectives

- Understand **intent-based chatbots** and **NLP techniques**
- Learn how to use **Logistic Regression** for text classification
- Implement a **Streamlit-based chatbot interface**
- Extract **intents** and **entities** from user input
- Improve chatbot responses using **ML techniques**



Tools and Technology used

The chatbot is built using **Natural Language Processing (NLP)** and **Machine Learning (ML)**, with the help of various Python libraries.

Below is a breakdown of the key tools and technologies used:

* Libraries & Technologies

Technology	Purpose
NLTK (Natural Language Toolkit) 	Used for text preprocessing like tokenization, stemming, and stopword removal.
TfidfVectorizer (from Scikit-learn) 	Converts text into numerical format for ML models using TF-IDF (Term Frequency - Inverse Document Frequency).
Logistic Regression (from Scikit-learn) 	A classification algorithm used to predict the intent of user input.
JSON & CSV 	Stores chatbot training data (intents, entities, and responses).
Streamlit 	A Python framework used to create a simple, interactive chatbot interface.
Random Module 	Helps in selecting randomized responses for a more human-like interaction.
OS & Datetime 	Handles file operations and time-based functions.

Methodology

- 1 Data Collection & Preparation** – A dataset containing labeled intents, entities, and responses is created and stored in a structured format like JSON or CSV.
- 2 Text Preprocessing** – User input is cleaned by converting text to lowercase, removing stopwords, and applying stemming to extract meaningful words.
- 3 Feature Extraction** – The processed text is converted into numerical format using TF-IDF vectorization to help the machine learning model understand patterns.
- 4 Model Training** – A Logistic Regression model is trained to classify user inputs into predefined intents based on the extracted features.
- 5 Response Generation** – Once an intent is identified, the chatbot selects an appropriate response from a predefined set to maintain natural conversation flow.
- 6 Building the Chatbot Interface** – A simple and interactive web interface is developed using Streamlit to allow users to communicate with the chatbot in real time.
- 7 Testing & Optimization** – The chatbot is tested with different inputs, and improvements are made by refining the dataset and adjusting model parameters.
- 8 Future Enhancements** – Plans for integrating deep learning models, contextual memory, and voice-based interactions to improve chatbot performance and user experience.

Problem Statement:

Traditional rule-based chatbots struggle to understand natural language and lack flexibility in responding to user queries. There is a need for an AI-powered chatbot that can accurately classify user intents, extract relevant entities, and generate meaningful responses using NLP and Machine Learning techniques.

✖ Problem:

- Traditional rule-based chatbots lack **flexibility**
- Need for an **AI-driven chatbot** to understand **intents**
- Improving **user interaction** with **NLP techniques**

Solution:

To address this issue, we developed an **AI-powered chatbot** using **Natural Language Processing (NLP) and Logistic Regression**. The chatbot:

-  **Understands user intents** by processing text with NLP techniques.
-  **Extracts key entities** to improve response accuracy.
-  **Uses TF-IDF vectorization** for better text representation.
-  **Classifies user queries** using a trained Logistic Regression model.
-  **Provides dynamic responses** based on predefined intent-based datasets.
-  **Features a user-friendly web interface** built with Streamlit for real-time interaction.

Screenshot of Output:

Menu

About

Home

 **AI Chatbot - NLP Implementation**

Welcome! Ask me anything, and I'll respond intelligently.

You:
latest tech news

Chatbot: Technology is constantly evolving. Stay updated with tech blogs and news sites to know about the latest advancements!

Deploy 

 **AI Chatbot - NLP Implementation**

Welcome! Ask me anything, and I'll respond intelligently.

The goal of this project is to create a chatbot that understands and responds to user input using NLP and Logistic Regression.

Project Overview:

- Uses NLP techniques and Logistic Regression for intent recognition.
- Built with Streamlit for an interactive chatbot interface.
- Supports real-time user interaction with dynamic responses.

Dataset:

- Contains labeled intents and entities.
- Helps classify user inputs into predefined categories.

Conclusion:

This chatbot can be expanded with more data and advanced AI techniques for improved interaction. Developed by Mayank 

Developed by 

Conversation History

User: hi

Chatbot: Hey

Timestamp: 2025-03-12 21:50:29

User: What is credit score

Chatbot: A credit score is a number that represents your creditworthiness. It is based on your credit history and is used by lenders to determine whether or not to lend you money. The higher your credit score, the more likely you are to be approved for credit.

Timestamp: 2025-03-12 21:50:43

Developed by Mayank 

Conclusion:

- Successfully built a chatbot that understands user **intents**
- Integrated **NLP techniques** with **Logistic Regression**
- Deployed using **Streamlit** for real-time user interaction

Future Enhancements:

- Add **deep learning models** (LSTMs, Transformers) for better accuracy
- Use **pretrained language models** (BERT, GPT)
- Enhance chatbot's **conversation memory**