

Intelligent Chatbot For Automated Assistance

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Github Repository Link : [\[samuvel33i/Intelligent-Chatbot-For-Automated-Assistance\]](https://github.com/samuvel33i/Intelligent-Chatbot-For-Automated-Assistance)

1. Problem Statement

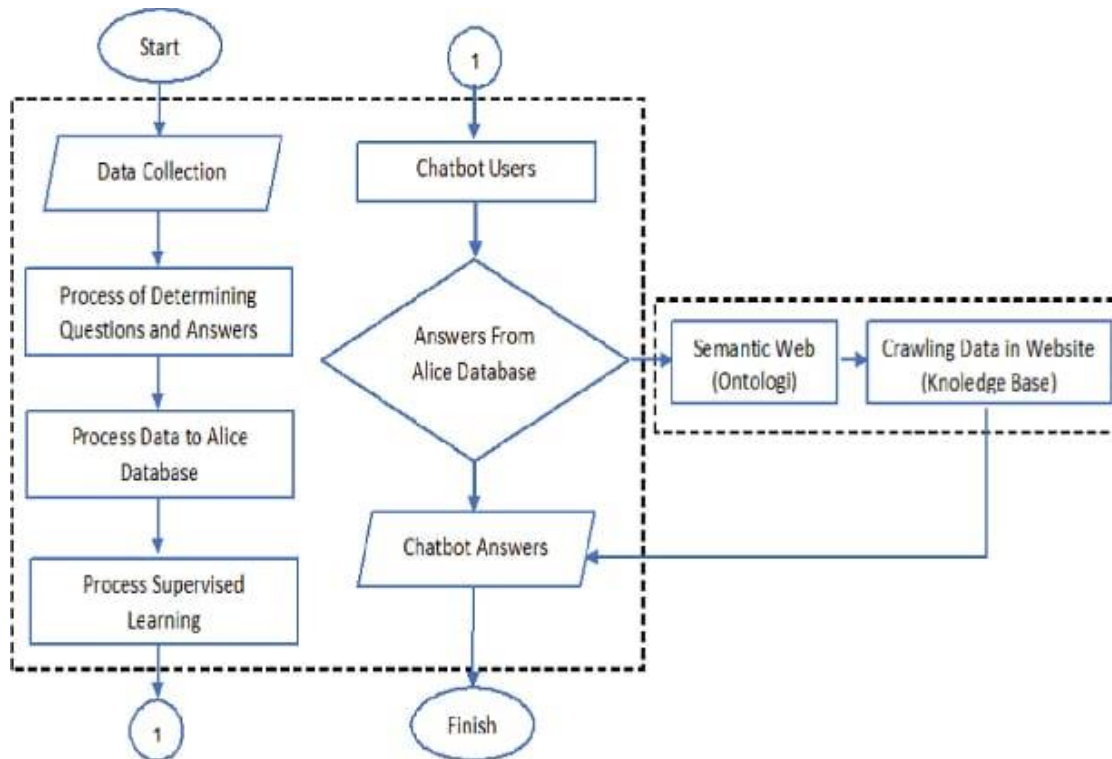
- Customer service is a cornerstone of user satisfaction, yet traditional support systems often struggle with slow response times and inconsistent service quality. This project addresses the need for a more scalable and intelligent solution through the development of a chatbot capable of providing automated, real-time support.
- The core problem is to design a chatbot that not only understands user queries but responds accurately and naturally using AI-driven conversational models. The chatbot will be trained to resolve customer issues, route complex queries to human agents, and continuously improve via feedback.

2. Project Objectives

- Build an intelligent chatbot using NLP and machine learning techniques.
- Enable real-time, automated assistance for frequently asked customer queries.
- Improve response time and reduce manual workload on support staff.
- Train the bot to identify intent, extract relevant entities, and generate appropriate responses.
- Integrate the chatbot with web or mobile platforms via a user-friendly interface.
- Continuously update and improve the chatbot's knowledge b.

3. Flowchart of the Project Workflow

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4. Data Description

- - Source of Data: Chat logs, FAQs, and customer support tickets.
- Type of Data: Textual (structured and unstructured).
- Static or Dynamic: Initially static, evolving to dynamic as real-time queries are collected.
- Key Attributes: User query, intent, response, context, timestamp, feedback

5. Data Preprocessing

- Text cleaning: removed punctuation, stop words, and lowercased all text.
- Tokenization and lemmatization.
- Intent labeling for supervised training.
- Vectorization using TF-IDF or word embeddings.
- Train-test split for supervised learning.
- Data set-<https://www.kaggle.com/datasets/blastchar/telco-customer-churn>

6. Exploratory Data Analysis (EDA)

- Frequency analysis of customer queries.
- Analysis of most common intents and response categories.
- Visualization of word clouds and intent distributions.

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7. Feature Engineering

- Created features such as query length, keyword density, and session duration.
- Encoded intents as categorical labels.
- Incorporated contextual cues for multi-turn conversations.
- Integrated feedback loop for continuous learning.

8. Model Building

- Algorithms Used: Rule-based fallback system.
- Intent classification using Logistic Regression or BERT.
- Response generation using seq2seq models or retrieval-based approach.
- Model Selection Rationale: - Classifiers for intent detection.
- Retrieval or generative models for flexible responses.
- Evaluation Metrics: - Accuracy, Precision, Recall (for intent classification).
- BLEU Score, Perplexity (for response generation).
- User satisfaction rating.

9. Visualization of Results & Model Insights

- Confusion matrix for intent classification.
- Word embeddings visualization for semantic understanding.
- Feedback and error analysis charts.
- Dashboard showing chatbot usage trends and satisfaction levels

10. Tools and Technologies Used

- Programming Language: Python 3.
- Libraries/Frameworks: NLTK, spaCy, scikit-learn, TensorFlow/PyTorch, Rasa/Dialogflow.
- Deployment: Flask/Streamlit/Gradio.
- Others: GitHub, Colab, Postman.

11. Team Members and Contributions

B.Sanjeev - Responsibilities : Oversaw data collection, led model building, integrated the chatbot system, and managed final deployment.

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G.Rithish kumar - Responsibilities: Handled dataset acquisition, data cleaning, and preprocessing, including tokenization and lemmatization.

M.Samuvel - Responsibilities: Focused on model selection and training using BERT/LSTM, performed intent recognition, and fine-tuned response generation.

S.Santhiya - Responsibilities: Developed the web interface using Streamlit or Flask, created the analytics dashboard, and implemented user feedback capture mechanisms.