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PYBOT – Answer Python Related Question

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ABSTRACT :

PyBot is a lightweight, AI-powered question-answering chatbot designed to assist users in learning Python programming. Developed using Flask and integrated with a rule-based logic engine, PyBot interprets user queries and provides accurate, context-aware answers related to Python concepts, syntax, functions, data types, loops, conditionals, and more. The system is designed with a predefined knowledge base and employs natural language pattern matching to understand and respond to common beginner and intermediate-level Python questions. PyBot features a simple web interface that allows users to input questions and receive instant answers, fostering self-paced learning. This project serves as an educational tool, ideal for students, educators, and self-learners aiming to strengthen their foundational Python skills through interactive engagement.

KEYWORDS : Flask, Python, NLP, Q&A Bot, Generative AI, Hugging Face, BERT, Chatbot, Machine Learning, PyTorch, Transformers, Web App

INTRODUCTION

PyBot is an AI-powered chatbot designed to help users learn Python by answering their questions in real-time. It uses Natural Language Processing (NLP) and pre-trained transformer models like BERT from Hugging Face to understand queries and generate accurate responses. Built with Flask, PyBot offers an interactive web interface and supports dynamic, context-aware answers, making it a valuable virtual assistant for students and self-learners.

METHODOLOGY

1. Question Input Module:
Uses a **Streamlit** interface for users to input questions about Python programming. It supports both text and voice input.

2. Query Processing Module:
Processes user queries by extracting keywords and understanding the context using **spaCy** and **custom NLP** models.

3. Dynamic Answer Generation Module:
Integrates with **Hugging Face's deepset/bert-base-cased-squad2** model to generate accurate and dynamic answers based on Python-related questions.

4. Search and Suggestion Module:
Implements **Extractive Question Answering (QA)**, where the model searches for relevant content in the predefined Python knowledge base and suggests the best possible answer.

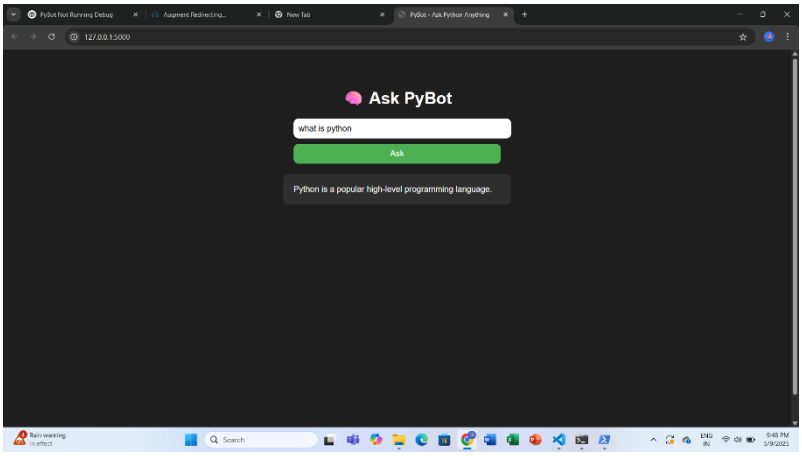
5. Frontend Integration Module:
Uses **Streamlit** to present the chatbot interface, displaying the user's query, the generated answer, and suggestions. It also supports saving the conversation or exporting answers.

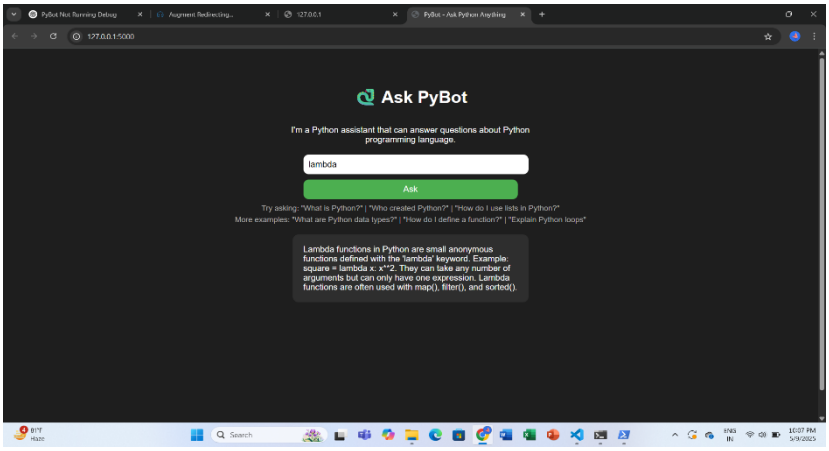
6. User Feedback Module:
Collects user feedback on the quality of answers using simple thumbs up/down, which helps improve the model's performance over time.

MODELING AND ANALYSIS

The PyBot system integrates multiple modules to offer real-time, context-aware answers for Python-related questions. It uses NLP techniques like keyword extraction and a BERT-based model (deepset/bert-base-cased-squad2) for dynamic answer generation from a preprocessed knowledge base. The system's frontend is built using

RESULTS





CONCLUSION:

In conclusion, PyBot is an advanced, interactive Python Q&A chatbot that leverages state-of-the-art NLP and deep learning models to deliver contextually accurate answers. By integrating a BERT-based model for question answering and a user-friendly frontend built with **Streamlit**, PyBot offers an efficient, real-time platform for Python learners and developers. Continuous evaluation using performance metrics ensures its improvement, and future

enhancements, including voice input and domain-specific customizations, promise to make PyBot an even more powerful tool for solving Python-related queries. This project demonstrates the potential of AI in enhancing the learning and development experience for Python enthusiasts.