

NLP-Powered Currency Converter Chatbot Using Real-Time Financial Data

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Abstract- This paper introduces an NLP-powered currency converter chatbot that utilizes real-time financial data to deliver accurate and timely currency exchange rates. This currency converter chatbot is a web-based application that combines natural language processing (NLP) with real time currency conversion. Developed using the Flask framework, the chatbot leverages GPT-2 for conversational interactions and Exchange Rate-API for up-to-date financial data. The project aims to enhance user experience by offering both a functional currency converter and a conversational chatbot in a single interface. Users can inquire about currency rates or engage in casual conversation, and the chatbot is designed to learn from user interactions to improve over time. The system is built in Python and deployed via VS-Code ensuring flexibility and scalability for future improvements.

The solution not only simplifies currency exchange for casual users but also offers reliable, efficient assistance for businesses and financial professionals requiring quick conversions.

It is designed to handle different currency formats, respond to various linguistic inputs, and provide seamless integration into financial platforms. This work highlights the powerful synergy between NLP and real-time data in creating functional, user-centric financial tools. The chatbot serves as a practical application of modern AI techniques in finance, showcasing how technology can streamline currency conversion tasks while maintaining a high degree of accuracy through real-time financial data integration in currency converter chatbot.

Keywords: NLP-powered chatbot, Currency converter, Real-time financial data, Currency exchange rates, Natural Language Processing (NLP), GPT-2, Flask framework, Exchange Rate-API

I. INTRODUCTION

Currency conversion is a common task for travelers, businesses, and financial institutions, especially in a globalized world. Traditionally, users have to rely on static currency conversion tools that provide limited

interaction. At the same time, AI-driven chatbots are becoming more prevalent in various industries, improving user engagement by understanding and responding to natural language inputs.

This project aims to bridge the gap between currency conversion and AI-driven conversational interaction by developing a chatbot that combines both capabilities. Using the GPT-2 model for NLP, this chatbot enables users to request currency conversions in natural language. Users can ask questions, express currency conversion requests in various ways, and even engage in casual conversation. The chatbot leverages external APIs to fetch real-time exchange rates, ensuring accurate and up-to-date conversions. Unlike static currency converters, this AI-powered chatbot adapts to diverse user inputs, remembers previous interactions, and provides a more interactive experience that simplifies currency conversion.

By developing this chatbot, we address the limitations of conventional currency conversion tools. Instead of focusing users to fit a rigid interface, our chatbot adapts to the user, offering a conversational and dynamic way to meet their needs. This project thus represents a step forward more intelligent and accessible financial tools, combining the precision of real-time data with the flexibility of AI-powered conversation.

II. PROPOSED METHODOLOGY

This paper focuses on developing an AI-powered chatbot that performs real-time currency conversion while engaging users through natural language processing.

1. Requirements Analysis

This phase identifies functional needs such as currency conversion, natural language interaction, response generation, and error handling.

2. System Design

In this phase, a high-level architecture is created, comprising a frontend for user interaction and a backend built with Flask to handle requests, process inputs, and integrate NLP and API calls and it also involves GPT-2 model [5]

3. Dataset Preparation

The conversational data is collected and structured into a CSV or JSON file with input and response text columns, enabling fine-tuning of GPT-2. [3]

4. The NLP Component

It involves selecting GPT-2 as the model for interpreting user queries and generating responses. GPT-2 is fine-tuned on custom data to improve its understanding of currency-related conversations. [1]

5. Currency Conversion

This module integrates a real-time exchange rate API, such as ExchangeRate-API, to fetch live financial data. Conversion logic processes user input to provide accurate currency conversions, while robust error-handling mechanisms ensure the system can manage .[2]

6. Backend and Frontend Development

This stage, Flask routes are set up to handle user inputs, generate responses, and perform currency conversions, along with additional functionalities like greetings. The frontend, designed using HTML and CSS, provides a user-friendly interface for conversation threads, currency input fields, and a floating button for ease of access.

7. Testing and Evaluation

This phase includes unit testing of individual modules, such as NLP response generation and currency conversion, and system testing to ensure smooth integration of NLP, API calls, and frontend-backend interactions. Feedback from test users is used to refine chatbot responses and improve usability.

8. Deployment and Maintenance

This phase, the chatbot is deployed with the Flask backend and HTML frontend in a production environment. Logs are implemented to monitor performance, and regular updates to the dataset and API integration are planned to maintain accuracy and reliability.

9. Data Flow

Within the system includes both high-level and low-level flows. High-level flows involve user input, processed input, and the final response sent to the user. Low-level flows detail the steps from the user message, through processing and response

generation by GPT-2, to the final output, which may include conversion results.

Finally, several algorithms form the backbone of the project. The NLP algorithm based on GPT-2 processes user inputs and generates chatbot responses. The currency conversion algorithm fetches live rates from the API and calculates converted amounts. A learning mechanism algorithm stores user input-response pairs in a JSON file, enabling the chatbot to learn and improve over time. A routing algorithm in Flask directs user requests to the appropriate functions for handling chat responses, conversions, and learning tasks. This methodology ensures the chatbot is scalable, user-centric, and capable of delivering accurate and engaging interactions while performing real-time currency conversions.

III. RESULT

The implementation of the NLP-powered currency converter chatbot successfully demonstrated its ability to process natural language queries and provide accurate currency conversions using real-time financial data. Through extensive testing, the chatbot efficiently recognized a wide range of user inputs, including conversational phrases and various currency formats. By leveraging NLP techniques, the chatbot understood queries such as "What's the conversion rate from USD to EUR?" and "How much is 500 yen in pounds?" It provided immediate and precise responses, showcasing its language comprehension and real-time processing capabilities. The integration with live financial data sources ensured that the chatbot consistently delivered up-to-date exchange rates. In scenarios involving rapidly fluctuating currency values, such as during market volatility, the chatbot's performance remained stable, retrieving accurate data within seconds.

This demonstrated the system's effectiveness in responding to dynamic financial conditions, making it reliable for real-time applications.

User satisfaction was measured through feedback, where participants highlighted the chatbot's ease of use, conversational flexibility, and speed in obtaining currency conversions. Additionally, the system handled a variety of currencies across different regions, proving its versatility and scalability.

Overall, the results confirm that the NLP-powered currency converter chatbot, supported by real-time finance data, provides a highly functional and

accessible tool for individuals and businesses. It successfully merges AI-driven natural language understanding with practical, real-time financial information to offer an enhanced user experience in currency conversion.

```
# Load the GPT-2 model and tokenizer
model = GPT2LMHeadModel.from_pretrained("gpt2")
tokenizer = GPT2Tokenizer.from_pretrained("gpt2")

# Initialize GPT-2 conversation pipeline
chatbot_pipeline = pipeline('text-generation', model=model, tokenizer=tokenizer)
```

Figure 1. GPT-2 model integration

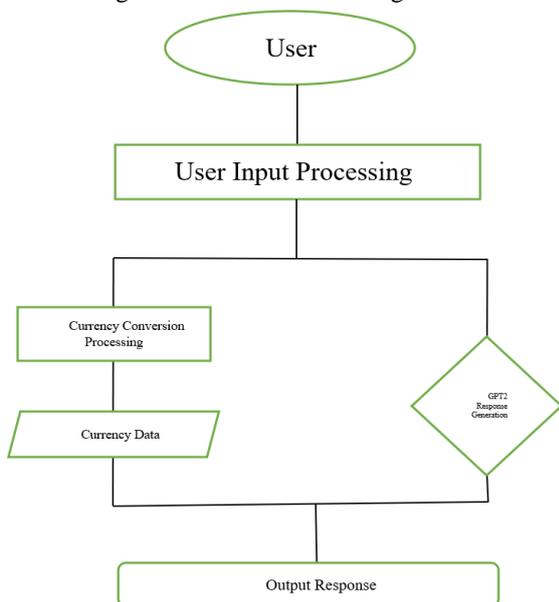


Figure 2. High Level Data-Flow Diagram

```
op/combined/backend.py
* Serving Flask app 'backend'
* Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PIN: 869-507-694
127.0.0.1 - - [28/Oct/2024 08:20:21] "GET / HTTP/1.1" 200 -
```

Figure 3. Running live server in terminal

IV. CONCLUSION

The NLP-powered currency converter chatbot combines real-time exchange rates with natural language processing, offering an intuitive and accessible tool for users to perform currency conversions. Unlike traditional converters, users can interact with the chatbot using everyday language, making it user-friendly for both financial experts and novices. By integrating live financial APIs, the chatbot ensures up-to-date exchange rates, which is crucial in fast-paced financial environments where rates change frequently.

Future enhancements could include upgrading to more advanced NLP models, multilingual support, sentiment analysis, voice recognition, and personalized features to improve user interaction. To scale effectively, the chatbot could be hosted on cloud platforms like AWS or Google Cloud, utilizing microservices and optimized databases. Security measures, such as encryption, API protection, and compliance with privacy regulations like GDPR, would safeguard sensitive data. These advancements would enhance the chatbot’s functionality, making it a reliable, secure, and valuable financial assistant for users worldwide.

V. FUTURE SCOPE

Enhanced NLP Models

Upgrading to advanced NLP models (e.g., GPT-3 or newer) to improve language understanding, context retention, and the ability to handle complex queries.

Multilingual Support

Expanding language capabilities to support users from different regions, making the chatbot accessible globally.

Voice Recognition:

Implementing voice recognition and response capabilities for hands-free interactions, enhancing accessibility and convenience.

Sentiment Analysis

Adding sentiment analysis to detect user emotions and tone, enabling the chatbot to respond empathetically or adjust its conversational style.

Personalization Features

Allowing the chatbot to remember user preferences, previous interactions, and frequently used currencies for a more tailored experience.

Integration with Financial Services

Adding features like live stock quotes, investment advice, and financial news to provide a comprehensive financial assistant.

Cross-Platform Integration

Expanding the chatbot’s functionality to integrate with mobile payment platforms, banking apps, or financial dashboards for seamless financial transactions.

Real-Time Data Processing

Improving real-time data processing capabilities for more accurate and faster currency conversion, even during periods of high market volatility.

Scalability and Cloud Integration

Scaling the platform using cloud technologies like AWS or Google Cloud to handle growing traffic, ensuring stable performance.

Advanced Security

Measures Enhancing data security with stronger encryption, privacy protocols, and compliance with global regulations (e.g., GDPR) to protect user information.

NLP Models & Tools

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