Currency Exchange Rate Monitor

Problem Statement

Create a dashboard which will allow users to analyse the exchange rates between two currencies over a period of time. Users should have the option to select weekly, monthly, quarterly, and yearly charts. The dashboard should also display the date on which the rate was at its peak (highest) and the date on which it was at its lowest. Users should be able to print the data in a chart. Historically, accessing currency exchange information has been cumbersome and often limited to financial institutions, currency exchange offices, or online financial news outlets. These sources may not always provide the most current or comprehensive data. With the rapid advancement of technology and the rise of financial applications, there is now an opportunity to leverage real-time data from multiple sources, allowing users to have a consolidated view of currency exchange rates at their fingertips.

The primary purpose of the Currency Exchange Dashboard System is to create a user-friendly interface that aggregates currency exchange data from multiple reliable sources, presenting it in a clear and actionable format. By enabling users to view real-time exchange rates, historical trends, and conversion tools, the system aims to empower users to make informed financial decisions, whether they are planning a trip, managing investments, or conducting business transactions across borders.

Target Audience:

- Individuals: Travellers and expatriates
- Businesses: Companies engaged in international trade
- Financial Analysts: Professionals analysing market trends

Objectives

1. Real-Time Data Access: To provide users with instant access to real-time currency exchange rates from multiple reliable sources, ensuring that the information is current and accurate.
2. User-Friendly Interface: To develop an intuitive and visually appealing user interface that enables users of all technical levels to navigate the dashboard easily and efficiently.
3. Currency Conversion Functionality: To implement an effective currency conversion tool that allows users to quickly convert amounts between different currencies with accurate calculations.
4. Graphical Data Representation : To provide graphical representations of exchange rate trends (such as line charts and bar graphs) for better visualisation and understanding of market movements.
5. Multi-Currency Support: To support a wide range of currencies, enabling users to monitor and exchange currencies relevant to their personal or business transactions.

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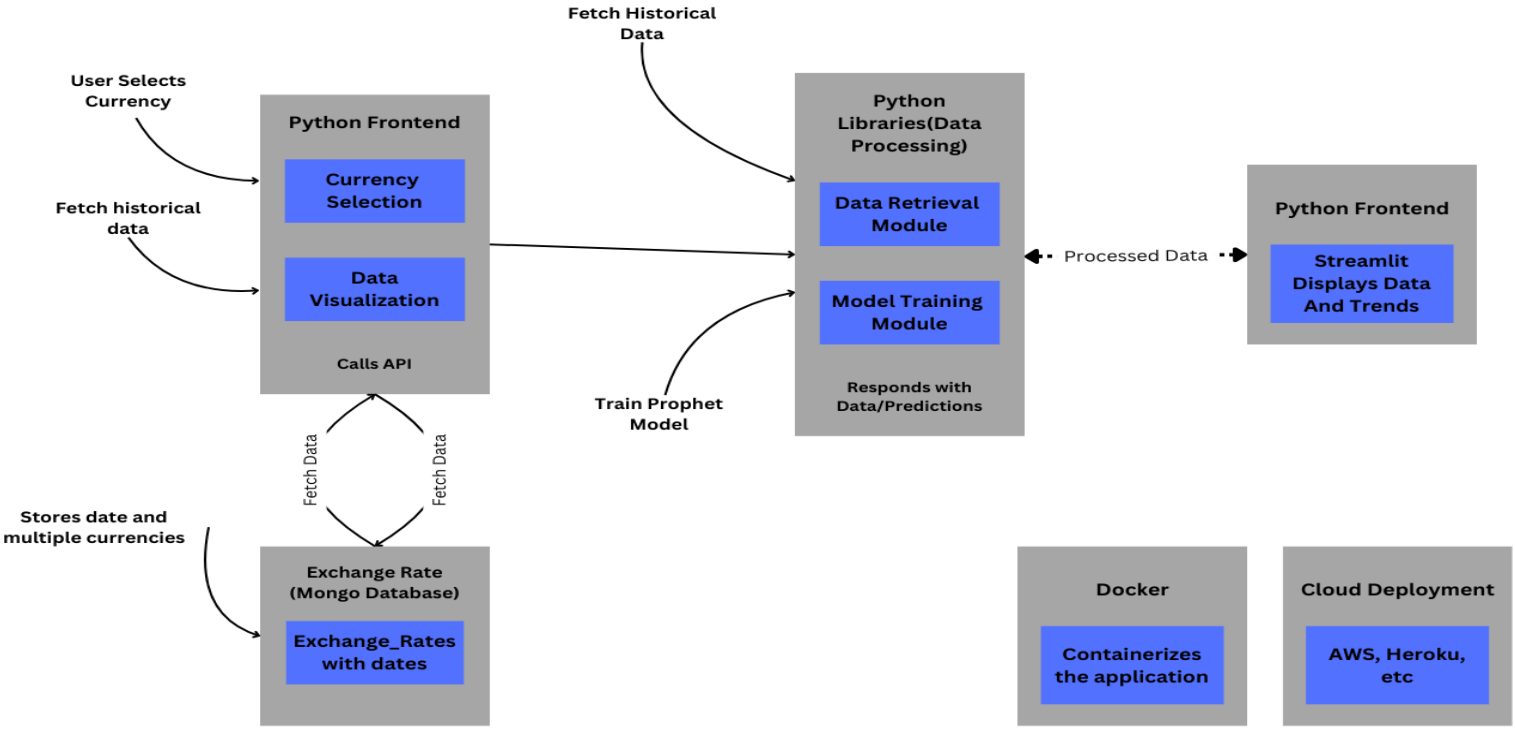

Fig 1 : Application Structure

Functional Requirements

1. Real-Time Exchange Rates:
    - The system shall display live exchange rates for user-selected currency pairs.
    - Exchange rates shall be updated at regular intervals (e.g., every minute) by fetching data from external APIs.
    - Users shall have the option to view the rates in various formats (e.g., decimal, fraction).
2. Custom Basket:
    - The system shall provide a currency conversion feature where users can input an amount and select the source and target currencies.
    - The system shall display the converted amount immediately upon user input.
    - The conversion shall reflect real-time exchange rates.
3. Historical Data Analysis:
    - The system shall allow users to access historical exchange rates for specific currency pairs.

- Users shall be able to select a date range (e.g., past week, month, year) for historical data.
- Historical data shall be presented in graphical format (e.g., line charts) and tabular format for detailed analysis.

4. Multi-Currency Support:
   - The system shall support a wide range of currencies (e.g., USD, EUR, GBP, JPY, INR).
   - Users shall be able to search for and select currencies from a dropdown menu or search bar.
5. Future Prediction of Currency:
   - The system displays future of currency based on previous data.
   - To display the output select number of days, the output will be in graphical format.
6. Min-Max & Risk Mitigation:
   - The website also shows minimum and maximum values of all of the selected currencies also, the risk factor is been displayed with it.
   - This feature is available in tabular format.

Non-Functional Requirements

1. Response Time:
   - The system shall return exchange rates and conversion results within 2 seconds for 95% of requests.
   - Historical data queries shall return results within 5 seconds for up to 1000 records.
2. Scalability:
   - The system shall support up to 1000 concurrent users without performance degradation.
   - The architecture should allow for horizontal scaling to accommodate increased user load.
3. User Interface:
   - The system shall have an intuitive and user-friendly interface, with clear navigation menus and tooltips.
   - Users shall be able to access all main functionalities within three clicks.
4. Documentation:
   - Comprehensive user manuals and FAQs shall be provided to assist users in navigating the system and utilising its features.
5. Regulatory Compliance:
   - The system shall comply with relevant financial regulations, including data protection and privacy laws.

Technologies Used

- **Streamlit**: A Python library that enables the rapid development of interactive web

applications for data science and machine learning. It is used for creating the user interface of your currency converter app.

- **Python**: The primary programming language used for developing the application, leveraging its simplicity and the extensive ecosystem of libraries for data analysis and visualisation.
- **Docker**: A platform for developing, shipping, and running applications in containers, ensuring consistent environments across different stages of development and deployment.
- **Data Analysis Libraries**: You may have libraries like Pandas for data manipulation, NumPy for numerical computations, and StatsModels for statistical modelling and forecasting.

Code Layout

Main Application File: `app.py`

- This is the entry point of your Streamlit application. It sets up the layout and navigation using tabs to switch between different functionalities such as Home, Currency Bucket, Future Prediction, and Exchange Rates.
- Each tab invokes a specific function from its respective module to display relevant content.

Module Files:

- `dashboard.py`: This module handles the main dashboard view, likely displaying general information and key metrics related to currency conversion.
- `currency_bucket.py`: This module manages the currency bucket functionality, possibly allowing users to store or view selected currencies.
- `future_prediction.py`: This module includes functionality for predicting future currency trends, utilising time series analysis or machine learning algorithms.
- `exchange_rate.py`: This module fetches and displays current exchange rates, providing users with real-time data for their conversions.

Requirements File: `requirements.txt`

- This file lists all the necessary Python packages and libraries required to run the application, ensuring that the environment is set up correctly. It includes packages like Streamlit for the web interface and other libraries for data manipulation and analysis.

Docker Configuration:

- `Dockerfile`: This file defines the environment for the application, specifying the base image, working directory, and commands to install

dependencies and run the Streamlit application.
- `docker-compose.yml`: This file orchestrates the application deployment using Docker Compose, allowing you to build, manage, and run multiple containers as a single service.

Deployment

- Local Development: You can run your app locally using Docker, the image is provided in repository.
- Cloud Deployment: You might consider hosting your app on platforms like AWS, Heroku, or DigitalOcean for wider access.

Summary

The Currency Converter Application is a web-based tool developed using Streamlit and Python, designed for real-time currency conversion and analysis. Key features include:

- Dashboard: Displays essential metrics.
- Currency Bucket: Allows management of selected currencies.
- Future Prediction: Predicts currency trends using statistical analysis.
- Exchange Rates: Provides real-time exchange rate information.

The application is containerized using Docker, ensuring consistent deployment and management. It features a modular code structure, making it easy to maintain and scale.

Future Enhancements

In future iterations of the Currency Converter Application, we aim to integrate artificial intelligence (AI) to enhance the model's accuracy and predictive capabilities. This integration will allow for more dynamic currency conversion based on real-time data and user preferences. Additionally, we will leverage Firebase to improve the application's functionality, enabling seamless data management and real-time updates. These enhancements will ensure that users receive the most accurate and timely information for their currency conversion needs.