

CURRENCY CONVERTER USING LSTM

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ABSTRACT

Nowadays, amidst the proliferation of global integration, foreign exchange has become a lifeline of international trade travel and even finance. However, since the rates of exchanging currencies always followed with sporadic changes, individuals and organizations badly needed dependable resources or tools to convert currencies and foresee any trends in the future. That's why this project Currency Master was designed to develop a highly functional web-based application in a manner that real-time currency converting holds and currency value prediction using machine learning was integrated for the application development. Powered by Python Flask for the backend systems and HTML/CSS/JavaScript for the frontend, the application incorporates the ExchangeRate-API to obtain live exchange rates, and uses a simple regression model to forecast any future values of currency. LSTMs are suitable models for predicting future currencies based on learning from historical exchange rate patterns. The features for use for personalized conversion, along with an interactive visualization of several trends by Plotly.js, will indeed complement with real-time conversion of currencies. An integrated authentication system for accessing user-defined features would also be a benefit. The admin features will enable you to manage and monitor the currency databases in an easy to use dashboard. In short, currency masters will utilize machine learning and web development to offer a one-stop solution for all currency-related operations, which would allow the currencies to be

accurate, reliable, and bear user-friendly functionality. This project shines the fusion of technology and finance, providing users with a pragmatic tool to reduce the operational complexities involved in dealing with global currencies.

1. INTRODUCTION

The Currency Master project aims to develop a web-based currency conversion and prediction system based on real-time change of currency and machine-learning algorithms to aid users in making an informed financial decision. This is intended for use by individuals, companies, and financial analysts as a very reliable currency conversion and trend forecasting tool. The project combines ExchangeRate-API with a linear regression model for real-time currency conversion and predictive analysis, ensuring an allcomprehensive solution for users navigating the complex world of global currencies[1-22].

The way this project is directed towards a very easy and simple user-friendly web UI is HTML, CSS, and JavaScript. You have the most high-tech frontend, which gives you all the immersion or may provide the visualization experience over the interactive Plotly.js graphs. These graphs study the historical and future currency trends and make it easier for users to analyze them and assist them in key phrase data-driven decision-making. The whole backend framework in which the application has been built is Python Flask, and this takes care of all server-side operations, API integration, and secure data handling while processing requests efficiently. A linear regression value can now project the currency values on the basis of historical data fed into it, which shows the clear practical implementation of data science techniques to the real world. This extent enables users to look into the patterns of currency fluctuation and plan how and when to carry out transactions with cash.

Thus the Currency Master project combines all the real-time financial data, machine learning applications, and user-centered designs - which is useful for any person dealing with international transactions. It is the answer to the problem of web technology and artificial intelligence dealing with

real-world financial problems efficiently. It offers accurate currency conversion and forecasting, showing real-time intelligent applications in finance.

2.LITERATURE SURVEY

A literature survey across the years 2020 to 2024 provides a record of various activities initiated by academic projects in the development of applications that would make currency translation significantly easier. Here is the chronological detail of some sampled projects, their students, and deduced constraints:

2020:

Project Title: Currency Converter.

Contributors: Akhil Saini, Abhishek Jha, Ravi Kumar Singh Kumaar Anurag, Harshit Gupta.

Affiliation: Chandigarh University.

Summary: The objective of this proposal is to develop a currency converter application to enable users to convert amounts into different currencies.

Limitations:

Delay in updating exchange rates creates room for error.

Very limited support for lesser-known currencies.

A more user-friendly interface would have been appreciated.

2021:

Project Title: Currency Converter Using Java Swing

Contributors: Paras Thakur, Arshad Jamadar, Manthan Karekar, Devansh Patil, Shravani Sharma.
Affiliation: S. S. O. S. College of Diploma Engineering, Nagothane.

Overview: This project involved development of a currency converter application using Java Swing to give a graphical user interface to convert currencies.

Limitations:

It would require manual updates for the exchange rates and thus would not remain accurate all the time.

Basic currency conversion with limited features.

Does not have connection with any online API for automatic rates updating.

2022:

Project Title: Currency Converter

Contributors: Omkar Mahajan, Aniket Shikhare.

Affiliation: Gramin Technical & Management Campus, Vishnupuri, Nanded.

Overview: The project aims to develop a currency value converting tool for end-users to get conversions accurately.

Limitations:

Problems of up to date exchange rates could be faced.

Limited error handling infrastructure for invalid data inputs.

User interface design can be improved for general better usability.

2023:

Project Title: Currency Converter

Contributors: Dhiraj Anil Wagh

Affiliation: Sanjivani K.B.P. Polytechnic, Kopargaon

Overview: This project was dedicated to designing a currency converter application as part of the Advanced Java curriculum.

Limitations:

Reliance on static exchange rates without real-time updates.

Narrow user: primarily for learning purposes. Minimalistic user interface feature without advanced functionalities.

2024:

Project Title: Currency Converter Using Java Swing

Overview: The aim of the project was to develop a currency converter application using Java Swing technology which has the graphical interface for conversion of currencies.

Limitations:

This currency converter is dependent on manual update of exchange rates, thus affecting the real time accuracy.

It has limited function beyond the basic currency conversion feature.

It has no connection to any online API for automatic rate updates.

The above outlay is basically educational output in developing currency converter applications.

3.PROBLEM STATEMENT

The presently devised conversion and prediction currency systems have proven to be extremely hazy because they lead an individual or an enterprise toward making wrong financial decisions. Most of the older and traditional platforms depend mostly on some basic statistical models or even outdated algorithms; most of these, devoid of the effective reckoning of the dynamic and volatile nature of exchange rates. Events such as geopolitics, enforcement of military policy by countries, monetary inflation, etc., are crucial in determining the value of currencies. It is highly essential for a system to feature accurate, real-time, data-driven predictions.

4. METHODOLOGY

LSTM (Long Short-Term Memory) is a type of recurrent neural network (RNN) that is designed for sequential data. In currency prediction, historical exchange rates create a time-series dataset wherein past values significantly affect future trends. Unlike a typical RNN, an LSTM can remember important past information and changes to the state from time to time, weighing the importance of the information retained. Given this ability, LSTMs are suitable models for predicting future currencies based on learning from historical exchange rate patterns. Upon training, the LSTM model will take real-time exchange rate data as an input; it will then try to predict future values based on the patterns observed during training. The models' reliability in real-world applications is confirmed through various accuracy metrics, while performance comparison makes a case for LSTM against traditional methodologies such as linear regression. The LSTM way can understand long-term dependencies when it digs patterns into historic information, so it becomes a fair play in financial forecasting, giving insights on future trends of currency movement.

The Currency Master project will explore the possibility of employing Naïve Bayes as an analytical tool for currency exchange trends and future value prediction. Naïve Bayes is a method proposed for consideration due to its rationality, simplicity, efficient computation, and proper mode of probabilistic reasoning in financial datasets. It lays its foundation upon Bayes' theorem that computes the probability of an outcome based on some given features. Although Naïve Bayes is usually applied

to classification problems, it can also be used in a financial forecasting context by categorizing the movement of exchange rates, for instance, into either increase, decrease, or remain stable. Despite the assumption of feature independence, Naïve Bayes often provides very fast estimates that are easy to interpret, making it a possible candidate in investigating currency fluctuation trends.

In order for us to be able to apply Naïve Bayes to our project, we must first preprocess the historical currency exchange rate data by extracting some key features such as historical price trends, market indicators, and economic events. The data is then further binned categorically, which represents different trends, such as very high volatility, stable, or a declining rate. The Naïve Bayes model, therefore, learns from past events and assigns probabilities of change in future exchange rate according to the learned paradigm.

5.DESIGN

The architecture diagram of CurrencyMaster stands for the system structural flow, that is, how different components come together to provide infrastructure-dependent currency services. The system actually consists of three different major sections-web interface, backend, and data storage. In Web Interface, the entry point for users into the application and exchange requests like currency conversion, historical data, portfolio management, and market trends is done through API Gateway that delves into the middle of such an interface and backend services.

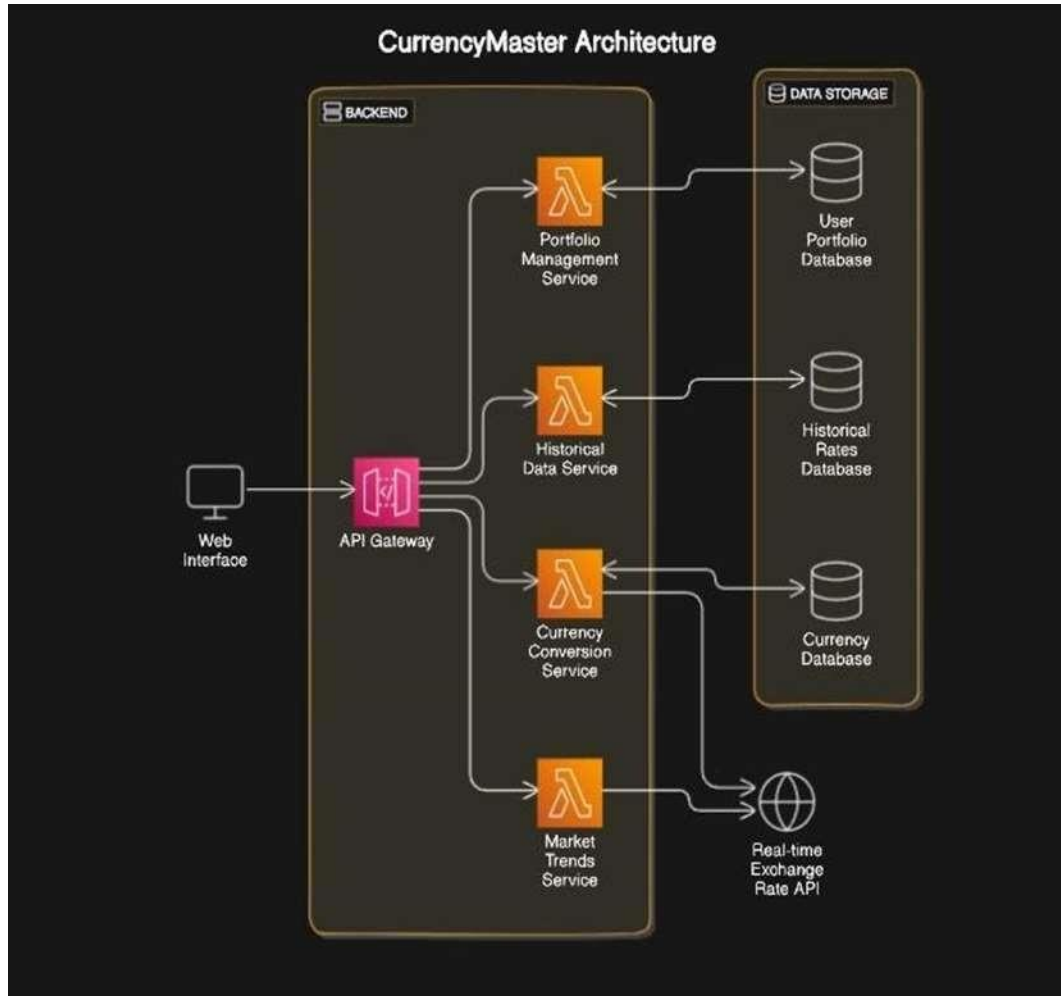
In the backend, multiple microservices encompass different functionalities of the system. The Portfolio Management Service is responsible for managing a user portfolio regarding saved data and trends in currency types. The Historical Data Service processes and fetches past information with respect to exchange rates for currency fluctuations and allows users to check data for previous years. The Currency conversion service performs real-time conversion to other currencies with fresh rates before doing it to ensure accuracy. The Market trends service would analyze trends in currency to have a guide for users as they make financial decisions.

The Data Storage section has different databases that serve the backend services. The User Portfolio Database is where the information of each user is kept, especially the currency they prefer and the currencies they have saved in their portfolio. The Historical Rates Database saves the data of exchange rates as they behaved in the past and are meant to be used by the historical data service for trend finding. The Currency Database keeps current values of exchange rates or what it has in relation to currencies, to speedily mobilise when needed quality real-time data. Thus, these databases coalesce to support the working of backend services efficiently.

An important external element is the Real-time Exchange Rate API, which serves fresh currency exchange rates. Both Market Trends and Currency Conversion Service are dependent on this API to provide real-time rates for their users, ensuring that what they process is as accurate and current as it archives. This aspect, too, bolsters the quality of currency conversion and forecasting.

In general, the CurrencyMaster Architecture holds modularity, scalability towards dynamic change and amazing efficiency it stands for, for interaction among users, backend services, databases and external APIs through the API Gateway secured by a streamlining of the communications, while microservices provide independent scalability and flexibility for the architecture overall. The combination of the realtime exchange rates with historical data analysis improves financial decision-making not only for

people interested in tracking their currency conversion but also analyzing them with ease.



6.IMPLEMENTATION

The currency exchange project employs a mix of real-time and historical currency exchange data for enabling accurate currency conversion and prediction. The data comes from trusted financial APIs such as ExchangeRate-API, Open Exchange Rates API, Forex API, which report up-to-date exchange rates for several currencies around the globe. The historical data for exchange rates are collected from Yahoo Finance, Alpha Vantage, Kaggle, etc., ensuring ample data for training the machine learning model. The

data carries essential items such as currency pair values, date, and time stamps, indicators of market volatility, and macroeconomic considerations including inflation rate, interest rate, GDP, and trade balance, which affect the fluctuations in exchange rates.

The preprocessing stage involves data cleaning, normalization, and feature extraction of the dataset commonly for consistency and accuracy. Missing values are filled in using interpolation techniques, and the outlier removal assures no skewness in prediction. The pre-processed data is fed into a linear regression model trained to predict future currency values in terms of past trends. Other features such as market sentiment analysis, geopolitical events, and historical moving averages can be added to improve accuracy. With the recorded dataset not only can real-time currency conversion be accomplished with precision, but users can also read insights on possible future trends. Users can also check Yahoo Finance, Alpha Vantage, or Kaggle for publicly available datasets concerning exchange rate records and do their analysis.

7. MODULES

Currency Master is an upcoming project meant to eliminate the shortcomings of traditional systems by combining live currency exchange with machine learning-predicted models for more accuracy and reliability. This is a platform that retrieves live exchange rates from ExchangeRate-API. Hence, users can be assured of always getting the most updated value of the currency they are dealing with. The forecast of this model is based on Linear Regression training that is performed on past exchange rates and produces data-based, not trend-based, forecast-only analysis. Users also get to see the past trends on interactive graphical visualization, using Plotly.js, which helps decision-makers understand the implications of their decisions about money in a much clearer and profound sense. To enhance the user experience as well as security, user authentication is integrated into the platform. With user authentication, users can log into an authenticated account and use services such as saved conversions and previous predictions in a customized way. It is equipped with an admin dashboard for monitoring and controlling the currency data. This application has a prediction engine which brings in real-time data into its prediction function as well as real-time data to its interactive

interface; thus, it serves as one of the most secure, easy to use and trustworthily reliable tools which can help users in confident decision-making related to finance.

8. CONCLUSION

The Currency Converter and Predictor. This project adequately addresses the need for real-time currency conversion and estimating future exchange rates. By integrating APIs through which we can get live exchange rates and other predictive models, this system allows users to take informed decisions regarding their finance. More so, it has a user-friendly interface that allows a smooth experience in the conversion of currencies, providing accurate and instantaneous results. Currency prediction provides an added utility in that it assists users to plan in advance against currency fluctuations, which is very important for businesses, travelers, and investors.

9. FUTURE SCOPE:

There is considerable possibility for several advancements in the Currency Converter and Predictor project. The best part will be using advanced machine learning models to increase the accuracy of currency predictions. AI-based financial insights and personalized alerts help a person to better track investments and trades. They even can lead to blockchain technology bringing in secured and transparent transactions. Features in multi-language support and voice command can lift up user accessibility worldwide. Also, integrating the system with mobile applications and payment gateways can broaden its usability. Enhancing API reliability and data security would contribute to a better user experience.

REFERENCES

- [1] K. P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012. This book is a complete introduction to machine learning, emphasizing probabilistic models. The text examines supervised versus unsupervised learning, deep learning, and Bayesian networks. The

application of this knowledge for predictive modelling spans a wide variety of applications such as forecasting currency.

- [2] Hull, Options, Futures, and Other Derivatives, Pearson Education, 2018. This book discusses financial derivatives, risk management, and trading strategies in the world markets. It studies futures, options, and swaps, among others, essential to understanding the fluctuations of currency. These concepts assist in designing predictive models for the forecasting of exchange rates.
- [3] G.E. Reinsel, Elements of Time Series Econometrics, Springer, 2003. This manuscript covers the econometric modeling techniques, analysis of time series, and forecasting methodologies. It discusses in detail autoregressive and moving average models, among others, for predicting currency exchange rates. The text includes theoretical and practical aspects of analyzing financial data. Ramdas Vankdothu, Dr. Mohd Abdul Hameed, Husnah Fatima "A Brain Tumor Identification and Classification Using Deep Learning based on CNN-LSTM Method" Computers and Electrical Engineering, 101 (2022) 107960
- [4] Ramdas Vankdothu, Mohd Abdul Hameed "Adaptive features selection and EDNN based brain image recognition on the internet of medical things", Computers and Electrical Engineering, 103 (2022) 108338.
- [5] Ramdas Vankdothu, Mohd Abdul Hameed, Ayesha Ameen, Raheem, Unnisa "Brain image identification and classification on Internet of Medical Things in healthcare system using support value based deep neural network" Computers and Electrical Engineering, 102 (2022) 108196.
- [6] Ramdas Vankdothu, Mohd Abdul Hameed "Brain tumor segmentation of MR images using SVM and fuzzy classifier in machine learning" Measurement: Sensors Journal, Volume 24, 2022, 100440.
- [7] Ramdas Vankdothu, Mohd Abdul Hameed "Brain tumor MRI images identification and classification based on the recurrent convolutional neural network" Measurement: Sensors Journal, Volume 24, 2022, 100412.
- [8] Bhukya Madhu, M. Venu Gopala Chari, Ramdas Vankdothu, Arun Kumar Siliveri, Veerender Aerranagula "Intrusion detection models for IOT networks via deep learning approaches" Measurement: Sensors Journal, Volume 25, 2022, 100641
- [9] Mohd Thousif Ahemad, Mohd Abdul Hameed, Ramdas Vankdothu "COVID-19 detection and

- classification for machine learning methods using human genomic data” Measurement: Sensors Journal, Volume 24, 2022, 100537
- [10] S. Rakesh ^a, Nagaratna P. Hegde ^b, M. VenuGopalachari ^c, D. Jayaram ^c, Bhukya Madhu ^d, Mohd Abdul Hameed ^a, Ramdas Vankdothu ^e, L.K. Suresh Kumar “Moving object detection using modified GMM based background subtraction” Measurement: Sensors ,Journal, Volume 30, 2023, 100898
- [11] Ramdas Vankdothu, Dr. Mohd Abdul Hameed, Husnah Fatima “Efficient Detection of Brain Tumor Using Unsupervised Modified Deep Belief Network in Big Data” Journal of Adv Research in Dynamical & Control Systems, Vol. 12, 2020.
- [12] Ramdas Vankdothu, Dr. Mohd Abdul Hameed, Husnah Fatima “Internet of Medical Things of Brain Image Recognition Algorithm and High Performance Computing by Convolutional Neural Network” International Journal of Advanced Science and Technology, Vol. 29, No. 6, (2020), pp. 2875 – 2881
- [13] Ramdas Vankdothu, Dr. Mohd Abdul Hameed, Husnah Fatima “Convolutional Neural Network-Based Brain Image Recognition Algorithm And High-Performance Computing”, Journal Of Critical Reviews, Vol 7, Issue 08, 2020 (Scopus Indexed)
- [14] Ramdas Vankdothu, Dr. Mohd Abdul Hameed “A Security Applicable with Deep Learning Algorithm for Big Data Analysis”, Test Engineering & Management Journal, January-February 2020
- [15] Ramdas Vankdothu, G. Shyama Chandra Prasad “A Study on Privacy Applicable Deep Learning Schemes for Big Data” Complexity International Journal, Volume 23, Issue 2, July-August 2019
- [16] Ramdas Vankdothu, Dr. Mohd Abdul Hameed, Husnah Fatima “Brain Image Recognition using Internet of Medical Things based Support Value based Adaptive Deep Neural Network” The International journal of analytical and experimental modal analysis, Volume XII, Issue IV, April/2020
- [17] Ramdas Vankdothu, Dr. Mohd Abdul Hameed, Husnah Fatima “Adaptive Features Selection and EDNN based Brain Image Recognition In Internet Of Medical Things “ Journal of Engineering Sciences, Vol 11, Issue 4, April/ 2020 (UGC Care Journal)
- [18] Ramdas Vankdothu, Dr. Mohd Abdul Hameed “Implementation of a Privacy based Deep Learning Algorithm for Big Data Analytics”, Complexity International Journal, Volume 24, Issue 01, Jan 2020
- [19] Ramdas Vankdothu, G. Shyama Chandra Prasad “A Survey On Big Data Analytics: Challenges, Open Research Issues and Tools” International Journal For Innovative Engineering and Management Research, Vol 08 Issue 08, Aug 2019

BIBLIOGRAPHY



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