

Cryptocurrency Price Prediction Using Machine Learning and Deep Learning

**Koppiseti Bhagya Lakshmi¹, ILLA Dhanaraju², Kadali Bhargavi³,
Katta Siva Shankar⁴, Kone Vaishnavi⁵, Mr. A.Krishna Kumar⁶**

^{1,2,3,4}Computer Science and Engineering VSM College of Engineering, Ramachandrapuram

⁵Assistant Professor, Computer Science and Engineering VSM College of Engineering,
Ramachandrapuram

Abstract: Most of the people wants to grow their money by investing in the stock market, but with the growing technology and the introduction of e-money, the better way to make the money to grow is by investing in cryptocurrency. Cryptocurrency is not under the influence of any country or government. For these reasons, it can be invested by anyone around the globe without the fear of being imposed of taxes from others countries. Compared to traditional exchanges, crypto exchanges are way faster as assets can be bought and sold in a minute where in traditional exchange method, we require a day or two for the process to take place. This project aims to leverage Machine Learning and Deep Learning techniques to predict cryptocurrency price trends. By analyzing historical data, market sentiment, and various other features, the project will build predictive models that forecast future price movements with improved accuracy.

I. INTRODUCTION

This project focus on close price factor in predicting the price. Using Machine learning and deep leaning algorithms, hidden patterns from data are discovered and will result in better efficient predictions. Cryptocurrency price depended on a lot of factors like technological progress, Internal competition, pressure on the markets to deliver, economic problems, security issues, political factor and more. Their high volatility leads to the great potential of high profit, if intelligent investing strategies are taken. The proposed hybrid models are evaluated using evaluation matrix RMSE of Bitcoin, Ethereum, and Litecoin.

II. IDENTIFY, RESEARCH AND COLLECT DATA

We used a Yahoo Finance Used for obtaining historical data for training. Binance API Used for fetching live cryptocurrency prices. Data Format OHLCV (Open, High, Low, Close, Volume) used for model inputs. Evaluation metrics are essential components in any machine learning or deep learning project, as they provide a quantifiable method to assess how well a model performs. In the context of cryptocurrency price prediction, these metrics help measure the accuracy and reliability of the predicted values compared to the actual market data.

III. PROPOSED SYSTEM

In this framework, a set of machine learning algorithms such as Linear Regression, Random Forest, and Support Vector Machines are employed to analyze historical price data. Simultaneously, deep learning models, particularly Long Short-Term Memory (LSTM) networks, are used to capture sequential patterns and long-term dependencies in the data. These models are trained and validated using real-world cryptocurrency datasets, with performance evaluated through metrics such as Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and prediction accuracy. The use of both types of models allows for a comparative analysis that strengthens the prediction process.

IV. TECHNOLOGIES USED IN PROPOSED SYSTEM

Python is used to implement the system, along with a number of auxiliary libraries. Scikit-learn offers tools for classification. PYTHON LIBRARIES: Pandas, NumPy, Matplotlib, Scikit-learn, TensorFlow, Keras, MinMaxScaler. Root Mean Squared Error (RMSE), R-squared (R^2) Score, Mean Absolute Error (MAE), and Mean Squared Error (MSE).

VI. SYSTEM ARCHITECTURE

The architecture of the cryptocurrency price prediction system consists of several interrelated working together for data handling, model training, and prediction delivery. Initially, the user logs into the system using valid credentials such as email and password. After authentication, the user uploads the cryptocurrency dataset which contains historical data such as opening price, closing price, high, low, volume, and date.



If a new user accesses the platform, they must Register with their name, email, password, and phone number. Once the admin approves the registration, the user can log in. Existing users can simply log in with their registered email and password. Once logged in, users can select a cryptocurrency, view historical trends, and request future price predictions. The system processes the request using the pre-trained model and displays predicted values in both tabular and graphical format.

VII. IMPLEMENTATION

Python is used in the implementation of the Cryptocurrency Price Prediction Using Machine Learning and Deep Learning. Using the Pandas library, the system loads a dataset of labeled comments first. The `train_test_split` method in scikit-learn is used to divide the dataset into training and testing sets. The proposed cryptocurrency price prediction system is structured into several distinct modules. Each module plays a crucial role in the overall functioning of the system, from data acquisition to final prediction visualization. The modules are as follows:

- Machine Learning Module
- Deep Learning Module
- User Interface Module

A. Machine Learning Module

This module implements several classical machine learning algorithms for cryptocurrency price prediction. The goal is to build models that can learn from past data and forecast future prices with reasonable accuracy. In this module we use Linear Regression, Decision Tree Regression, Random Forest Regression, Support Vector Machine (SVM) Regression algorithms.

B. Deep Learning Module

Given the complex and nonlinear nature of cryptocurrency price movements, deep learning models especially those capable of handling sequential data can offer improved performance over traditional models.

C. User Interface Module

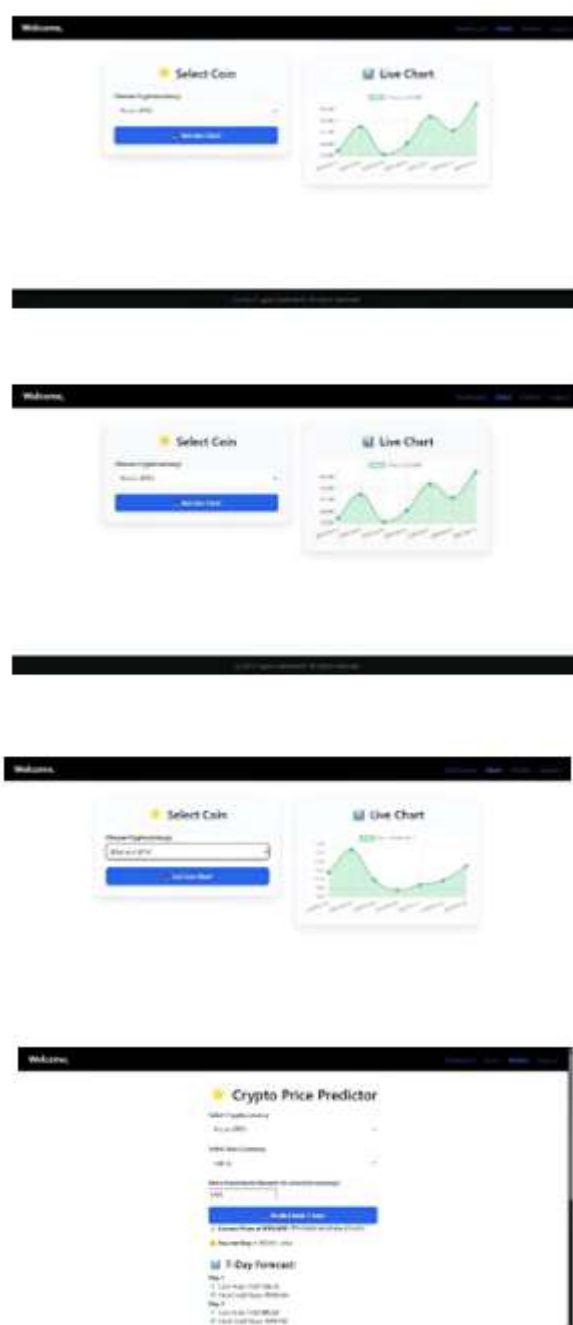
The project includes a web interface that allows users to interact with the system. This interface is built using HTML5, CSS3, JavaScript, and Bootstrap. HTML5 structures the content of the Web pages, including the layout for login, registration, and prediction results.

VII. CONCLUSION

Outcome of the study confirms that deep learning, particularly LSTM, is more effective for forecasting cryptocurrency prices compared to traditional machine learning models. However, it also highlights the limitation of using only historical price data. Cryptocurrency prices are highly volatile and are influenced by various external factors such as news, social media trends, government regulations, and market sentiment, which were not included in this analysis. As technology and data collection methods advance, integrating broader and more diverse data sources could significantly enhance prediction accuracy.

VII. RESULTS







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