

# Cryptocurrency Price Prediction Using LSTM: A Comparative Analysis of BTC, ETH, BNB, and SOL

## 1. Introduction

### 1.1 Background

The market for cryptocurrency has been one of the most significant elements in the global economy. Since the first cryptocurrency, Bitcoin, was launched in 2009, cryptocurrencies have revolutionized our perception of money and enabled the world to take part in a decentralized and direct way of value exchange that differentiates them from traditional currencies. Popular cryptocurrencies, like Bitcoin, Binance Coin also known as (BNB), Ethereum also known as (ETH), Solana also known as (SOL), are the popular in this crypto world.

- **Bitcoin (BTC):** Bitcoin is the leading and the most famous cryptocurrency, It is a popular coin and it is the top most expensive coin in the blockchain technology.
- **Ethereum (ETH):** Ethereum is one of the most popular Coin in the market by introducing smart contracts.
- **Binance Coin (BNB):** Originally, BNB was created with the idea of saving users some costs incurred in the form of trading fees on the Binance exchange. It gradually became an all-rounder token to be used in payments, staking, and multiple uses.
- **Solana (SOL):** Solana is a fast and efficient blockchain for processing multiple transactions for very low fees, which, therefore, gets widespread adoption among developers.

Knowing how prices move in cryptocurrency is very important for investors and traders. They look at the prices to understand market trends, risks, and chances for good decision-making. Since cryptocurrency prices can change fast, guessing future prices is very useful. It helps people plan and change their strategies well.

### 1.2 Research Objectives and Contributions

Following are the objectives of this report:

1. **Historical Price Comparison:** To think about the changes in the prices of Ethereum, Bitcoin, Binance Coin, Solana for a given period to identify trends and measure the magnitude of their price rises and falls.

2. **Trend Analysis:** Research the changes in the prices of these cryptocurrencies to understand their past appreciation and analyze the interdependencies between their price movements.
3. **Predictive Modeling:** Train an LSTM, a type of neural network, to predict the prices for each of these cryptocurrencies over the next three days.
4. This report combines historical data analysis and price forecasting to research cryptocurrency trends. It demonstrates how machine learning can be applied for financial forecasting and therefore provides useful insights to investors and researchers.

## 2. Literature Review

### 2.1 Current Research on Cryptocurrency Price Analysis

So, people have been getting quite into crypto price prediction, whether it's for research or just fun. They have tried all manner of methods to make sense of how crypto prices are moving around: from simple stat tools to the high-tech world of machine learning.

- **Statistical Methods:** Early works were based on techniques like ARIMA, a model for the analysis of time series data. Those methods were good at catching easy-to-predict trends but failed to handle unexpected or sudden price changes, which are very common in cryptocurrencies.
- **Machine Learning Techniques:** The models of machine learning, including the support vector machines, random forests, and gradient boosting, are applied in the discovery of subtle patterns in price changes. These models work well in most cases with complex relationships among data, although the setting up of appropriate features takes much hand manipulation.
- **Deep Learning Models:** Deep learning techniques, especially neural networks also known as (RNNs) and long short-term memory networks also known as (LSTMs), which are a type of RNN, have widely changed this field. These models show a good ability to learn from ordered data, which really makes them good at predicting cryptocurrency prices over time.

It is well established that tool utilization, for example, using moving averages or the relative strength index (RSI), in addition to machine learning models, results in better forecasting. Yet, there still exist problems with how outside influences, for instance, government regulation and economic sentiment, affect price.

The more recent studies also considered combining various methods to predict better.

For instance, mixing the analysis of social media feelings with LSTM models has helped in understanding how public opinion impacts the price of cryptocurrency.