**Bitcoin Price Prediction using Machine Learning**

A Project Report in partial fulfillment of the degree

# BachelorofTechnology

in

# ComputerScience&Engineering

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# DEPARTMENT OF COMPUTER SCIENCE&ENGINEERING

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**DEPARTMENTOFCOMPUTERSCIENCE&EsNGINEERING**

**CERTIFICATE**

This is to certify that the Project Report entitled “Bit Coin Price Prediction” Bonafide work carried out by D. Devayani, M Vishwa Teja, T Sai Kumar (s)**2203A51626, 2203A51642, 2203A51653** during the academic year 2022-2023 in partial fulfillment of the award of the degree of ***Bachelorof Technology*** in **Computer Science Engineering**by the SR UNIVERSITY, WARANGAL.

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# ABSTRACT

This study explores the application of machine learning algorithms to predict Uber fare amounts accurately. With the proliferation of ride-sharing services like Uber, accurately estimating fare amounts is crucial for both passengers and service providers.

Leveraging historical data encompassing various factors such as distance, time of day, traffic conditions, and geographical location, this research aims to develop robust prediction models. Various machine learning techniques including regression algorithms such as linear regression, decision trees, random forests, and gradient boosting will be employed and compared for their effectiveness in predicting fare amounts.

Feature engineering techniques will also be utilized to extract relevant information from the dataset. The performance of the models will be evaluated using metrics like Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and R-squared (R^2) to assess their accuracy and generalization capability.

The findings of this study can potentially enhance fare estimation accuracy in Uber and similar ride-sharing platforms, thereby improving user experience and operational efficiency.

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**1.INTRODUCTION:**

Bitcoin, the world's first and most popular cryptocurrency, has experienced tremendous volatility since its inception. This volatility has led many to explore methods for predicting its future price movements. Machine learning (ML) has emerged as a promising tool for this purpose.This introduction sets the stage for your exploration of Bitcoin price prediction using machine learning. Here are some key points to consider elaborating on:Background on Bitcoin: Briefly explain Bitcoin's concept and its decentralized nature. Mention its price history and inherent volatility.Challenges of Bitcoin Price Prediction: Highlight the inherent difficulty of predicting Bitcoin prices due to factors like market sentiment, regulations, and external events (e.g., hacks, adoption by major institutions).Machine Learning for Price Prediction: Introduce machine learning as a potential tool for identifying patterns and trends in historical Bitcoin price data. Mention various ML algorithms commonly used for time series forecasting, like Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks.Further Exploration:Applications: Discuss potential applications of Bitcoin price prediction models, acknowledging their limitations for making guaranteed profits.Your Specific Focus: Briefly outline the specific aspects of Bitcoin price prediction using machine learning that you will be delving into throughout your work.By providing this background information, you'll establish a foundation for understanding the potential and limitations of machine learning in Bitcoin price prediction. Top of Form

## Problem Statement:

Develop a machine learning model to predict the future price of Bitcoin. This model will analyze historical data and identify patterns that can be used to forecast upcoming price movements.Key Challenges:High Volatility: Bitcoin prices are notoriously volatile, making it difficult to capture trends and predict future movements with certainty.Limited Data: While there's a decent amount of historical data available, the field of cryptocurrency is relatively young compared to traditional financial markets.External Factors: The price of Bitcoin is influenced by various external factors like regulations, news events, and overall market sentiment, which can be challenging to model.Possible Approaches:Machine Learning Techniques:Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTMs): These techniques excel at handling sequential data like historical prices, allowing them to capture temporal relationships.Random Forest Regression: This ensemble method can effectively identify complex, non-linear patterns in the data and make predictions.Data Preprocessing:Feature engineering: Identifying and including relevant features beyond just price history, such as trading volume, social media sentiment, and economic indicators.Data normalization: Ensuring all features are on a similar scale for effective model training.Model Evaluation: Employing metrics like mean squared error (MSE) or mean absolute error (MAE) to assess the model's prediction accuracy.Overall Goal:The goal is to create a machine learning model that can accurately predict future Bitcoin prices. While achieving perfect prediction is unrealistic due to the inherent volatility and external influences, a well-designed model can provide valuable insights for informed decision-making.

# 3.DESIGN:

**RequirementSpecifications**

## HardwareRequirements

## System

## RAM

## HardDisk

## Input

## Output

## SoftwareRequirements

* + - **OS**
    - **Platform**
    - **ProgramLanguage**

**4.OUTPUT**

# 

# KNN - RMSE: 11818.27, MAE: 6318.37, MSE: 139671554.62

# Decision Tree - RMSE: 707.90, MAE: 405.11, MSE: 501127.37

# Linear Regression - MSE: 107039.08, MAE: 141.31, R-squared: 1.00

# KNN - MSE: 139671554.62, MAE: 6318.37, R-squared: 0.49

# Decision Tree - MSE: 501127.37, MAE: 405.11, R-squared: 1.00

# Linear Regression R-squared: 1.00

# KNN R-squared: 0.49

# Decision Tree R-squared: 1.00

# 

# Random Forest Metrics:

# Mean Absolute Error: 195.90073564707174

# Mean Squared Error: 200051.56357714618

# R^2 Score: 0.9992717560642423

# AdaBoost Metrics:

# Mean Absolute Error: 957.2911338978565

# Mean Squared Error: 1228716.6825459567

# R^2 Score: 0.9955271258228217

# 

# Random Forest: RMSE = 447.2712416164784, R^2 Score = 0.9992717560642423

# AdaBoost: RMSE = 1108.4749354613107, R^2 Score = 0.9955271258228217

# GBoost Metrics: Accuracy=0.001841620626151013, Precision=0.000258732212160414, Recall=0.00129366106080207, F1=0.0004312203536006899

# XGBoost Metrics: Accuracy=0.009208103130755065, Precision=0.000996168582375479, Recall=0.004022988505747126, F1=0.0015599343185550083

# 

# 

# 4. CONCLUSION:

Bitcoin Price Prediction with Machine LearningMachine learning can be a tool for analyzing historical Bitcoin price data and identifying patterns. However, it's important to understand the limitations before relying on predictions:High Volatility: Bitcoin prices are notoriously volatile and influenced by various factors, many unpredictable. Machine learning models may struggle to capture these nuances.Limited Accuracy: Predictions are not guaranteed to be correct. Even the most sophisticated models may have significant errors.External Events: Unexpected events like regulation changes or major hacks can significantly impact prices and confound predictions.Overall, machine learning can be a helpful exploratory technique for Bitcoin prices, but it shouldn't be solely relied upon for investment decisions.

If you're interested in learning more about Bitcoin price prediction using machine learning, you can explore resources on:Machine learning algorithms for time series forecasting like LSTMs (Long Short-Term Memory networks)Open-source libraries like TensorFlow or PyTorch for building your own modelsResearch papers on the application of machine learning to cryptocurrency prices

**5. FUTURE SCOPE :**

Advanced ML Techniques: Utilize more complex architectures like recurrent neural networks (RNNs) or Long Short-Term Memory (LSTM) networks that handle sequential data effectively. These can capture long-term dependencies in price movements.Alternative Data Integration: Include data beyond just price history. Look at social media sentiment, news analysis, regulatory changes, or exchange order book data to enrich the model's understanding of market psychology.Hybrid Approaches: Combine ML with fundamental analysis, where experts consider economic factors affecting Bitcoin's value. This could provide a more holistic prediction.Probabilistic Forecasting: Instead of single point predictions, focus on probabilistic models that give a range of potential prices with their likelihoods. This offers a more nuanced view of future possibilities.By exploring these areas, researchers can develop more robust ML models for Bitcoin price prediction, but it's important to remember that these will still be forecasts, not guarantees..

# 6. REFERENCES:

* Similar to Uber fare prediction, we'll need historical Bitcoin price data. Sources include:
* Crypto exchanges (e.g., Binance, Coinbase) offer historical price data through APIs or downloadable files.
* Websites like https://www.coingecko.com/ provide historical price charts.