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Bitcoin Price Prediction Using Lstm Network

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Abstract: This study explores Bitcoin price prediction using a Long Short-Term Memory (LSTM) network, addressing the limitations of traditional methods in volatile financial markets. Hourly Bitcoin closing prices from a year's data are preprocessed and used to train the LSTM model, configured with two LSTM layers, dropout for regularization, and a Dense output layer. A 60-hour time step is used to predict the next hour's price. The model, trained with the Adam optimizer and mean squared error loss, demonstrates reasonable accuracy in predicting Bitcoin prices. Results highlight LSTM's potential for financial forecasting, suggesting future improvements by incorporating additional market features like trading volume. This work establishes a foundation for advanced deep learning models in cryptocurrency markets, adept at handling their inherent non-linearity and volatility.

Index Terms -BITCOIN, machinelearning, KNN (K Nearest Neighbor), SVM (Support Vector Machine), dataset, classification, regression, prediction, accuracy

1.INTRODUCTION

BITCOIN and other digital currencies are commonly used for speculative or advanced payment purposes. For instance, BITCOIN is decentralised because no one owns it. Because they are not limited to a single nation, BITCOIN exchanges are simple. Through a number of commercial venues referred to as " BITCOIN trades," speculation ought to be accessible. These allow users to trade BITCOIN for a wide range of foreign currencies. The most BITCOIN is traded on Mt. Gox. BITCOIN are stored in a smart wallet that works like a virtual bank account. Block chain is a database that keeps track of various transactions' dates and records. In a block chain, a square stands in for each record. Each informational square includes a link to the preceding tile. Data on the blockchain is encrypted. During exchanges, only the customer's wallet ID is made visible; their name is not. Similar to a stock, BITCOIN 's value fluctuates, but in a strange way. Digital currencies like BITCOIN are used all around the world for speculation and advance payments. For instance, BITCOIN is decentralized because no one owns it. Given that they are not bound to any certain nation, BITCOIN exchanges are simple. Through several business hubs known as " BITCOIN exchanges," speculation should be possible. These allow users to trade BITCOIN for a wide range of foreign currencies. The most BITCOIN is traded on Mt. Gox. A smart wallet, which functions like a virtual bank account, is where BITCOIN is kept. The block chain is the repository for the timestamp data and the records of a significant number of deals. In a block chain, each record is represented by a square. Every informational square contains a reference to a previous tile. On the blockchain, data is encrypted. Only the wallet ID of the customer is made visible during exchanges; their name is not. Like a stock, BITCOIN 's value changes, but in an unexpected way. Using information from financial trades and a range of calculations, value is forecasted. But BITCOIN is impacted by peculiar variables. Forecasting the value of BITCOIN is crucial for making the best business decisions. The price of BITCOIN is unaffected by governmental intermediaries or changes in the economy, in contrast to a stock market. Therefore, we consider it crucial to estimate the value of BITCOIN using cutting-edge AI technology.

2. LITERATURE SURVEY

New technologies and methods have emerged as a result of the Internet's exponential access development. One way that the Internet is replacing the conventional monetary system as a means of exchange is through the use of cryptocurrencies. Cryptocurrencies, also known as digital or virtual currencies, are used to trade or transfer assets over a network of computers. In a brief period of time, the market for cryptocurrencies has grown exponentially. In 2009, the moniker " BITCOIN " was given to the first cryptocurrency. Decision Tree and Regression Techniques for Predicting Cryptocurrency Prices Karunya Rathan; Somarouthu Venkat Sai Tubati Sai Manikanta Publisher: IEEE 2021. In the first part of the study, the price trend on daily variations in the price of BITCOIN is detected while providing information on price trends for BITCOIN [1]. Using machine learning, predict the price of BITCOIN Siddhi Velankar; Sakshi Valecha Shreya Maji Publisher: IEEE 2021. In this essay, we make an effort to forecast the price of BITCOIN with some degree of accuracy while taking into account many factors that influence its value [2]. Deep Learning and Neural Networks for Prediction of Cryptocurrency Prices Toby Biswas; Mohandas Pawar; IEEE 2021. Because digital currencies have such a broad price range, it is essential to have solid planning when attempting to estimate the price of a given currency [3]. Short -Term Cryptocurrency Price Movement Prediction Using Centrality Measures Kin-Hon Ho; Wai-Han Chiu; Chin Li Publisher: IEEE 2021. In this essay, we make an effort to forecast the price of BITCOIN with some degree of accuracy while taking into account many factors that influence its value [4]. Ether Price Prediction Using Advanced DeepLearning Models Agis Politis; Katerina Doka; Nectarios Koziris Publisher: IEEE 2021. Although several re-search initiatives have been made to create systems that can accurately fore-cast price fluctuations in the BITCOIN market, they show substantial efficiency gaps, which this study further analyses [5].

CHALLENGES

1. Data Acquisition & Preprocessing Challenges

- High-frequency vs. low-frequency data: Predicting with minute-by-minute or second-by-second data introduces volume and noise issues.
- Handling missing data: Many crypto exchanges have outages or inconsistent data formats.

2. Prediction Challenges

- Volatility: Bitcoin is notoriously volatile. Standard models often underperform because of extreme price swings.
- Short-term vs. long-term prediction: Different models excel at different horizons (e.g., LSTMs may work better for short-term).

3. Modeling Challenges

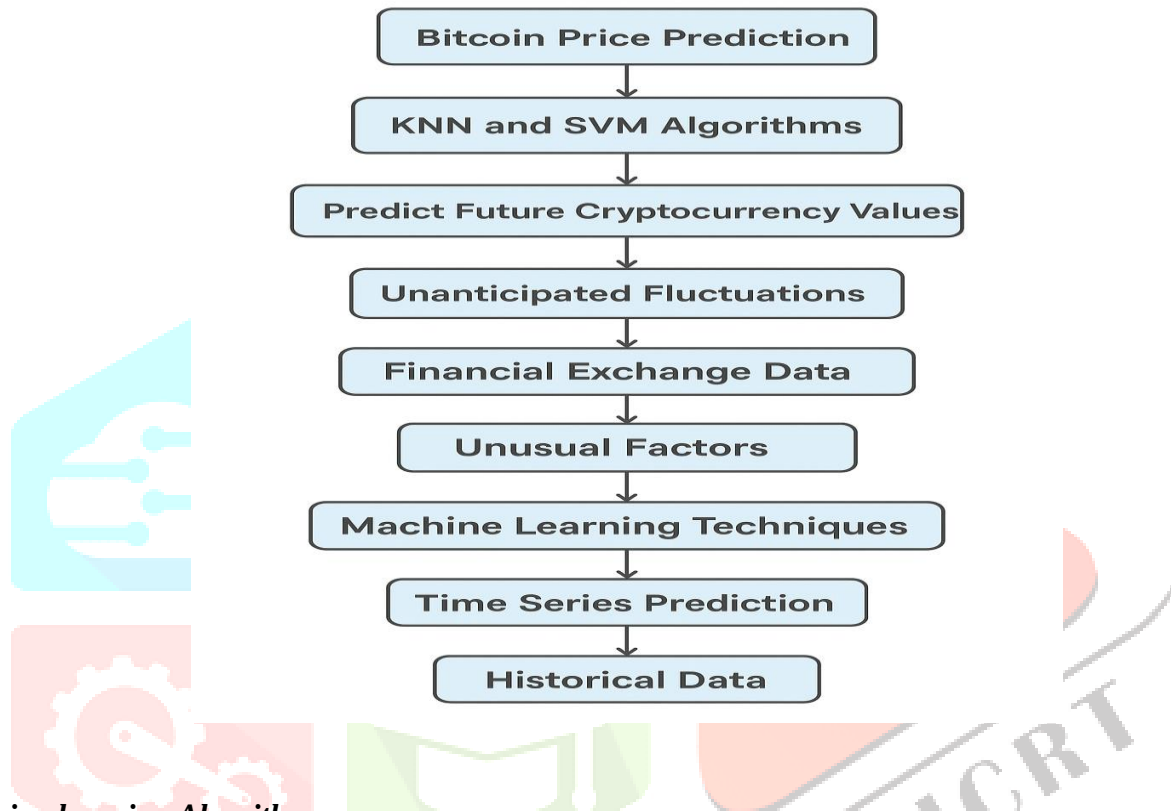
- Choosing appropriate models:
 - Compare LSTM, GRU, Transformer, ARIMA, XGBoost, Prophet.
 - Try hybrid models (e.g., LSTM + attention).
- Hyperparameter optimization: Tuning models with cross-validation is difficult with time series data.
- Overfitting: Many models memorize price patterns that don't generalize. Cross-validation for time series is more complex (use walk-forward validation).

4. Evaluation Challenges

- Back testing:
 - Build a realistic back testing engine.
 - Incorporate transaction costs and slippage.
- Robustness testing: Does your model still work during a black swan event (e.g., COVID crash, 2021 bull run)?

3. PROPOSED METHODOLOGY

The proposed system includes the algorithms such as KNN and SVM that are used to predict the prices of BITCOIN and giving best accurate results for the future value of crypto currencies. Even so, there are some unanticipated fluctuations in the value of the BITCOIN. On financial exchange data, different calculations are used to predict value. However, BITCOIN is affected by some unusual factors. This research aims to determine the precision with which machine learning techniques can forecast the direction of BITCOIN price. Fundamentally, this is a time series prediction issue. Although a tonne of study has been done on the application of different machine learning techniques to predict time series, that hasn't been much done in this area specifically on BITCOIN. Furthermore, because it is still in its infancy compared to other currencies like the USD, BITCOIN is much more unpredictable. In order to predict the price of BITCOIN based on the taken into account and further described historical data, we used the SVM and KNN machine learning algorithms.



Machine learning Algorithms:

A branch of computer science and artificial intelligence (AI), the study of machine learning seeks to pretend human learning processes through the use of data and algorithms, gradually improving the results' accuracy [12]. Machine learning is a vital part of the developing field of data science. Data mining projects use algorithms that have been statistically taught to make classifications or predictions [7]. The decisions made as a result of these insights affect key growth metrics and are then used to fuel applications and companies. Big data's continued growth and expansion will drive up demand for data scientists, who will be required to assist in identifying the most crucial company issues, as well as the data required to address them. Machine learning relies on input [5], such as training data or knowledge graphs, in a similar way to how the human brain learns information and develops understanding in order to grasp entities, domains, and the connections among them. Deep learning cannot begin until entities are defined. The first step in machine learning is observation or data, such as samples, first-hand knowledge, or instructions.

3.1 K-Nearest Neighbor

The key details in remote sensing images can only be recovered once they have been accurately classified. It is essential to use classification to take the fine information out of an image for further processing sensing. A synthetic immunological B-cell network and KNN are used to demonstrate how processing can be done with less data. As an illustration, imagine that we have a picture of a creature that resembles both a cat and a canine, but we are unsure of its identity. It is therefore possible to identify these objects using the KNN technique, which is depending on a similarity metric. Our KNN model will search for similarities between the traits of the new data set and those are the images of cats and canines and, in accordance with those similarities, it will categorise the new data set as cat- or dog-related.. This study shows that active learning methods were utilised to determine the best classifier in hyper spectral images and that KNN techniques were evaluated in those images. The best classification method has recently been a hot topic in academia. The K-nearest

neighbourhood technique is frequently used to classify photographs. In order to combine the location using the greatest margin classification, a better KNN is used for high resolution remote

3.2 Feature Selection

By employing only pertinent data and obtaining a noise-free grid of input data. It is a technique for decreasing the input variable in our model. It is the process of automatically selecting pertinent characteristics for our machine learning model and solving every issue according to the kind of machine learning algorithms you utilised in your model.

3.3 Support Vector Machine (SVM)

The SVM's main objective is to search the appropriate hyperplane in a high-dimensional space under various conditions. Numerous hyperplanes can realise this paradigm. In this approach, the support vector is applied to the data that is closest to the closed surface and the optimum choice surface. In order to accomplish classification, a hyperplane is created to partition the data, and the input vectors are then planned into a high dimensional space. Most non-convex, unconstrained minimization issues as well as quadratic programming issues can be solved using this method. The most efficient method for developing classifiers is the SVM.

ALGORITHM OF PROPOSED WORK

TensorFlow: Tensorflow is an open-source made by Google for calculating computations using libraries. It is a prominent selection for developing applications that have extreme computations and use to handle graphics handling for the computation projects [5]. These are the fundamental considerations to work on machine learning applications, especially Deep Learning. It also has APIs for evaluating the high level of representation for generating Machine Learning applications [6]. The linear regression model using Tensor flow managing of all the computations 22 and then functions all the computations. Libraries like NumPy and Matplotlib are implemented in this project.

Procedure for ML method using Tensorflow:

- Step1: Initially, import all the related libraries to function classifier.
- Step2: Convert tabular data to a data frame to obtain a format and check it for classifier analysis.
- Step3: After conversion, load the data into python and isolate our dependent variables from independent variables. Split the dataset into train set and test set.
- Step4: Build a classifier model.
- Step5: Now apply the model to train set.
- Step6: Execute predictions using the generated model and use the same model for testing.
- Step7: compare both predicted values and check for the efficiency of the model.
- Step8: Finally, calculate the accuracy and print output.

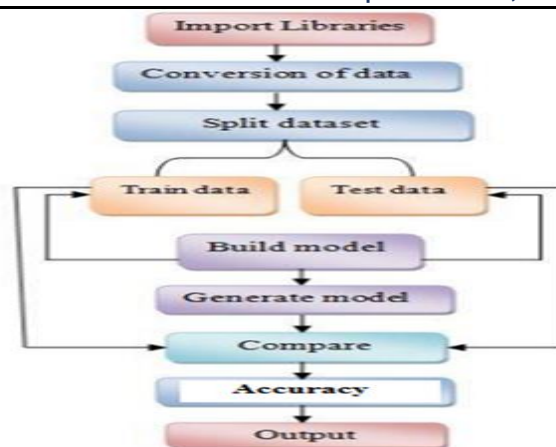


Fig. 1. Process of Proposed Model

A Comparison of the Proposed and Existing System:

In this work, the KNN and SVM algorithms are used to accurately predict the price of BITCOIN. The outcome demonstrated that the proposed[11] SVM performs better than the current KNN. The main flaw in the current system is its lack of accuracy, but with the suggested method, prediction accuracy is good.

Working Architecture of Proposed Methodology:

In our project bit coin price is predicted by algorithms namely K Nearest Neighbor (KNN) and Support Vector Machine Algorithm (SVM) in terms of accuracy [1]. From the result it's proved that proposed Support Vector Machine (SVM) works better than existing K Nearest Neighbor (KNN). In the existing system the major drawback is less accuracy but in proposed system we get good accuracy in prediction [2].

System Architecture

The developing utilization of web has advanced a simple and quick method for e correspondence. The outstanding case for this is e-mail. Presently days sending [9] and accepting email as a method for correspondence is prominently utilized. Be that as it may, at that point there stand up an issue in particular, Spam mails. Spam sends are the messages send by some obscure sender just to hamper the improvement of Internet e.g. Advertisement and many more. Spammers introduced [10] the new technique of embedding the spam mails in the attached image in the mail. In this paper, we proposed [13] a method based on combination of SVM and KNN.

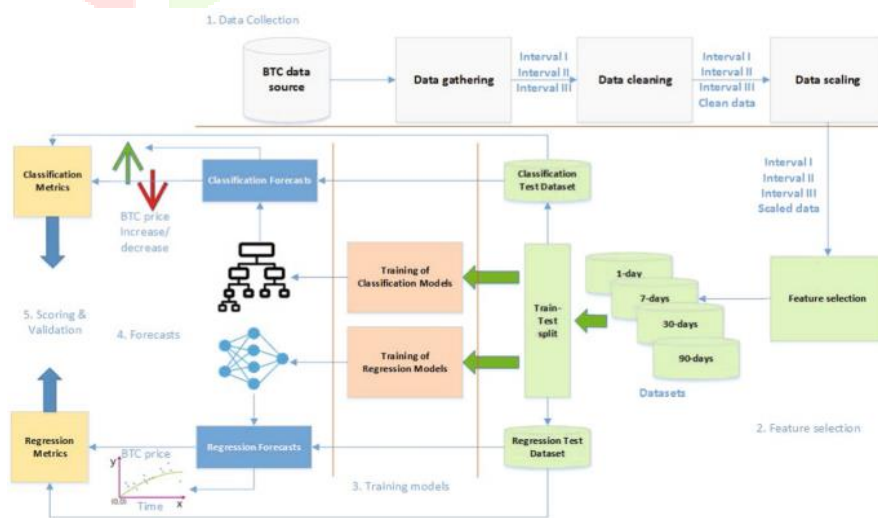


Fig. 2. System Architecture

3.1 Modules:

3.1.1 Upload Modules: Upload module all bitcoin market details from last 5-year dataset, there will be a open, close, low, high and volume. Open, close, low and high are different bid prices for at separate times with nearly direct names. The volume is the number of shares that passed from one owner to another during the time period.

3.1.2 Bitcoin: Bitcoin is a cryptographic money which is utilized worldwide for advanced installment or basically for speculation purposes [8]. Bitcoin is decentralized for example it isn't possessed by anybody. Exchanges made by Bitcoins are simple as they are not attached to any nation. Speculation should be possible through different commercial centers known as bitcoin trades. These enable individuals to sell/purchase Bitcoins utilizing various monetary forms [3]. The biggest Bitcoin trade is Mt Gox. Bitcoins are put away in an advanced wallet which is essentially similar to a virtual financial balance. The record of the considerable number of exchanges, the timestamp information is put away in a spot called Block chain. Each record in a block chain is known as a square. Each square contains a pointer to a past square of information. The information on block chain is scrambled. During exchanges the client's name isn't uncovered, however just their wallet ID is made open.

3.1.3 Bitcoin Price Prediction Module: Predicting bitcoin Price based on last five-year bitcoin history the accuracy of the bitcoin prediction system can be further improved by utilizing a much bigger dataset than the one being utilized currently.

3.1.4 Machine Learning: Data mining can be defined as the extraction of implicit, previously unknown and potentially useful information from data. Machine learning provides the technical basis for data mining. A dataset is comprised of observations which are known as instances which contain one or more 20 variables known as attributes. Broadly speaking, machine learning [4] can be split into two categories Supervised learning involves the modelling of datasets with labelled instances. Each instance can be represented as x and y , with x a set of independent predictor attributes and y the dependent target attribute [6]. The target attribute can be continuous or discrete however this has an effect on the model. If the target variable is continuous then a regression model is used and if the target variable is discrete then a classification model is used.

3.2 Modules Description:

1. Dataset Input
2. Dataset Analysis
3. Oversampling (using SMOTE)
4. Training and Testing Subset
5. Using the algorithm
6. Making Predictions about Outcomes

3.2.1 Dataset Input: You can get the dataset from an online data provider using online resources. In order to accurately estimate the accuracy, we must amass a sizable collection of data.

3.2.2 Dataset analysis: This section contains dataset analysis. For the data processing, the data size is taken into account.

3.2.3 Oversampling (Using SMOTE): We have compiled a thorough history of all day today's BITCOIN prices over a significant period of time. Synthetic Minority Oversampling Technique (SMOTE) is a statistical technique for uniformly increasing the number of cases in your dataset. The component takes existing minority scenarios that you describe as input and builds new instances from them.

3.2.4. Training and Testing Subset: Many classifiers exhibit bias for majority classes because the dataset is unbalanced. Minority-class characteristics are dismissed as noise and ignored. Therefore, choosing a sample dataset is suggested.

3.2.5. Using the algorithm: The classification algorithms that were tested on the dataset for the sub-sample are listed below. Knn and svm are two examples.

3.2.6. Making predictions about outcomes: The training model is used with the test subset. Accuracy is the metric that is utilised. The desired outcomes are obtained once the ROC Curve is displayed.

	Date	Open	High	Low	Close	Adj Close	Volume
0	2014-09-17	465.864014	468.174011	452.421997	457.334015	457.334015	2.105680e+07
1	2014-09-18	456.859985	456.859985	413.104004	424.440002	424.440002	3.448320e+07
2	2014-09-19	424.102997	427.834991	384.532013	394.795990	394.795990	3.791970e+07
3	2014-09-20	394.673004	423.295990	389.882996	408.903992	408.903992	3.686360e+07
4	2014-09-21	408.084991	412.425995	393.181000	398.821014	398.821014	2.658010e+07
...	...	...	...	...	...	...	...
1927	2019-12-27	7238.141113	7363.529297	7189.934082	7290.088379	7290.088379	2.277736e+10
1928	2019-12-28	7289.031250	7399.041016	7286.905273	7317.990234	7317.990234	2.136567e+10
1929	2019-12-29	7317.647461	7513.948242	7279.865234	7422.652832	7422.652832	2.244526e+10
1930	2019-12-30	7420.272949	7454.824219	7276.308105	7292.995117	7292.995117	2.287413e+10
1931	2019-12-31	7294.438965	7335.290039	7169.777832	7193.599121	7193.599121	2.116795e+10

Fig. 3. Dataset

4. RESULT

The Fig.4 shows the BITCOIN price is predicted by algorithms namely KNN and SVM in terms of accuracy. From the result it's proved that proposed system SVM works better than existing KNN.

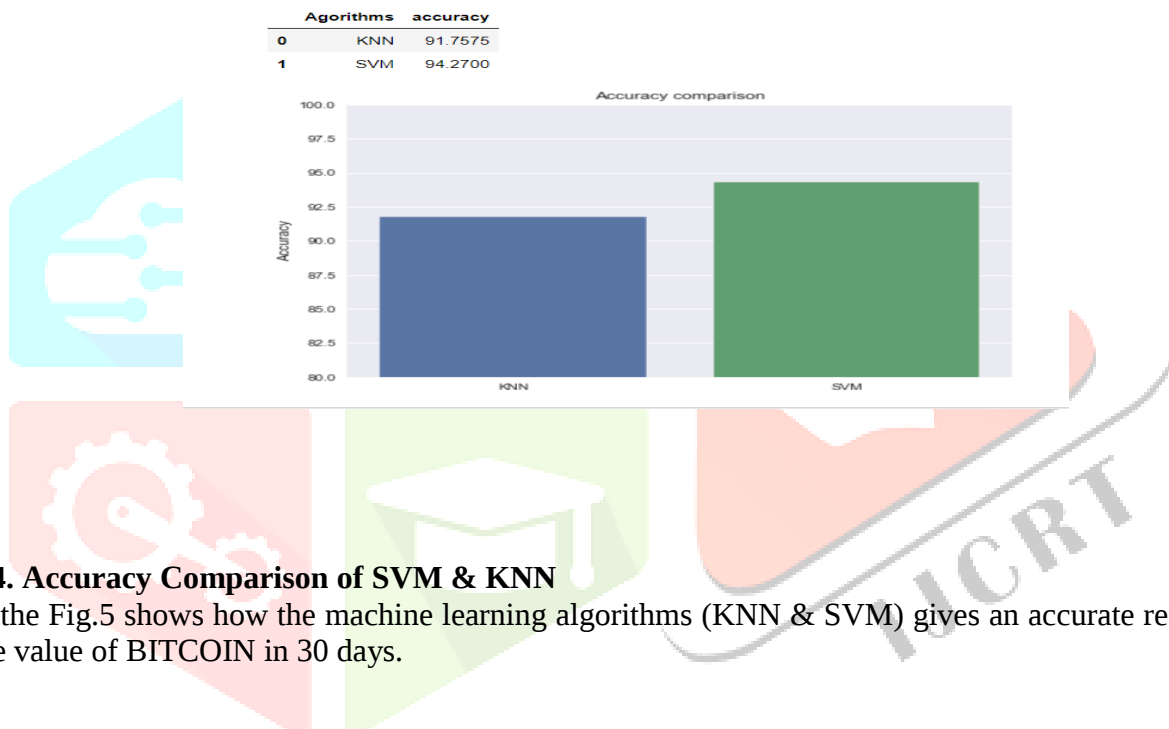


Fig. 4. Accuracy Comparison of SVM & KNN

Here the Fig.5 shows how the machine learning algorithms (KNN & SVM) gives an accurate results for the future value of BITCOIN in 30 days.

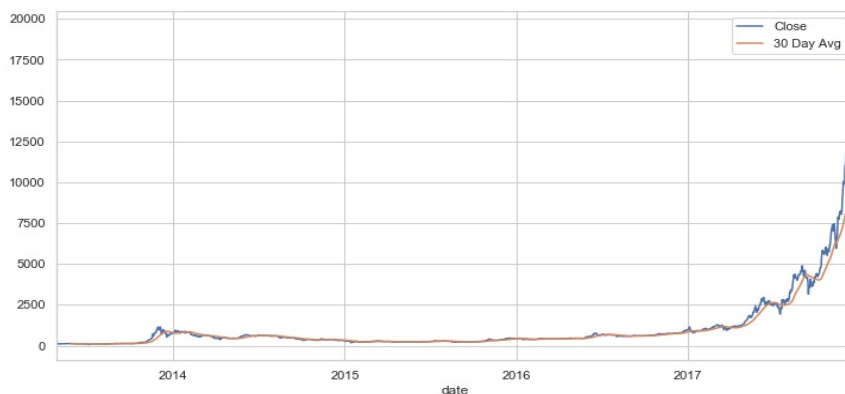


Fig.5. Bitcoins Price History

The minimal price of BITCOIN projections for the forthcoming days are provided Fig.6, and the actual value we anticipated for those specific days is also included [8] in the below figure. This is based on an analysis of the values of BITCOIN in previous years. The Fig.5 only applies to our dataset because it is based on data from prior years.

The prediction is: 607.1487500000002 But the real value is: 607.15

Fig. 6. Prediction Value

CONCLUSION

The finding of this investigation lead us to the following conclusion:

Recently, we integrated a different types of machine learning modules for the purpose of predicting BITCOIN price. Find out how accurate SVM and KNN are looking at the comparision table of ML algorithm model corretness. SVM and KNN are shows to be the most efficient algorithms in terms of reducing time complexity when using the ML algorithm to predict BITCOIN price. The techniques in machine learning will improve the idea of a cryptocurrency feature. As a result, investments in globules will appreciate in value. In this study, we developed a fresh method to judge the accuracy of the feature pricing. This boosts revenue and customer expansion. The implementation of these ML techniques not only enhances the accuracy of cryptocurrency price predictions but also contributes to the broader understanding of cryptocurrency market behavior. Improved prediction models have the potential to increase investor confidence, drive global investment, and contribute to the appreciation of digital asset value.

Furthermore, we introduced a novel evaluation framework for assessing the predictive accuracy of price-related features. This innovative approach is expected to boost revenue streams and support customer base expansion by enabling more reliable and timely decision-making in volatile markets.

FEATURE SCOPE

The use of deep learning and its usage to real time problem of crypto currency price prediction was performed. The implementations of the data preprocessing and filtering to give precise, sound and consistent data was executed successfully by creating a GUI File Picker for ease of users and greater scope. The usage of ML algorithm was done effectively. The accurate representation of the system design along with the precise threshold outputs at the display unit was done. The results were noted, and outputs were recorded by plotting a graph. The proposed model further would have advancements in terms of design and functionality. A sentimental analysis using twitter dataset is a prominent scope. Along with this, more complex and advanced algorithms supporting high level neural networks can be used.

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Kandhati Tulasi Krishna Kumar Nainar: Training & Placement Officer with 15 years' experience in training & placing the students into IT, ITES & Core profiles & trained more than 9,700 UG, PG candidates & trained more than 450 faculty through FDPs. Authored various books for the benefit of the diploma, pharmacy, engineering & pure science graduating students. He is a Certified Campus Recruitment Trainer from JNTUA, did his Master of Technology degree in CSE from VTA and in process of his Doctoral research. He is a professional in Pro-E, CNC certified by CITD He is recognized as an editorial member of IJIT (International Journal for Information Technology & member in IAAC, IEEE, MISTE, IAENG, ISOC, ISQEM, and SDIWC. He published 6 books, 55 articles in various international journals on Databases, Software Engineering, Human

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Narada Dharmaraju Reddy is pursuing his final semester MCA in Sanketika Vidya Parishad Engineering College, accredited with A grade by NAAC, affiliated by Andhra University and approved by AICTE. With interest in Artificial intelligence K.Bhargavi has taken up his PG project on VBITCOIN PRICE PREDICTION USING LSTM(Long Short Term Memory) NETWORK and published the paper in connection to the project under the guidance of Kandhati Tulasi Krishna Kumar Nainar, Assistant Professor, Training & Placement Officer, SVPEC.

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