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A Secure Block chain-Based Crypto currency Trading and Prediction System Using Django and Machine Learning

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ABSTRACT

The rapid evolution of digital finance has significantly transformed traditional financial systems, with crypto currencies emerging as a dominant form of decentralized digital assets. This project presents a comprehensive **Block chain-Based Crypto currency Trading and Prediction System** developed using the Django web framework. The system is designed to facilitate secure transactions between users and agents while maintaining transparency through block chain ledger technology. Additionally, it integrates machine learning techniques to provide predictive insights for crypto currency trends. The proposed system introduces three major modules: **Admin**, **Agent**, and **User**. The admin module manages user registrations, monitors agents, updates crypto currency exchange rates, and oversees the block chain ledger. The agent module acts as an intermediary that buys crypto currencies and sells them to users. The user module allows customers to purchase crypto currencies, track transaction history, and analyze prediction results. A key feature of this system is the **Block chain Ledger**, which records every transaction in a tamper-proof structure. This ensures transparency, traceability, and security of financial operations. The ledger maintains transaction details such as buyer, seller, crypto currency type, quantity, and block chain charges, providing an auditable system.

The application also incorporates a **crypto currency price update mechanism**, where admins can dynamically adjust currency values based on percentage increments or decrements. These updates are logged for historical tracking and performance analysis. Furthermore, the system includes a **machine learning prediction module**, where datasets are processed to generate predictions using advanced algorithms like LSTM (Long Short-Term Memory), enabling users to make informed investment decisions. Security is maintained through authentication mechanisms for users and agents, session management, and controlled access levels. The use of Django ORM ensures efficient database handling, while modular design enhances scalability and maintainability. The integration of block chain concepts with machine learning provides a hybrid solution that

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not only supports secure trading but also enhances decision-making capabilities. This system can be extended to real-world applications such as crypto exchanges, financial analytics platforms, and investment advisory systems. Overall, the project demonstrates how modern technologies like block chain and artificial intelligence can be combined to build a secure, efficient, and intelligent crypto currency trading platform.

Keywords: Block chain, Crypto currency, Django Framework, Trading System, Machine Learning, LSTM, Digital Ledger, Crypto Exchange, Prediction System, Secure Transactions

I. INTRODUCTION

In recent years, crypto currencies have revolutionized the global financial ecosystem by introducing decentralized and peer-to-peer transaction systems. Unlike traditional banking systems, crypto currencies operate without central authority, leveraging block chain technology to ensure transparency, immutability, and security. With the increasing adoption of digital currencies such as Bit coin and Ethereum, there is a growing need for robust platforms that enable secure trading, efficient transaction management, and intelligent decision-making. This project presents a **Block chain-Based Crypto currency Trading and Prediction System** that integrates web technologies, block chain concepts, and machine learning algorithms. The system is built using the Django framework, which provides a scalable and secure environment for developing web applications. It aims to address the challenges associated with crypto currency trading, including lack of transparency, security vulnerabilities, and absence of predictive insights. The system architecture is divided into three primary roles: admin, agent, and user. The admin is responsible for managing the platform, including user approvals, crypto currency rate updates, and ledger monitoring. Agents act as intermediaries who purchase crypto currencies and make them available for users. Users can buy crypto currencies from agents and track their transactions. One of the core components of the system is the **Block chain Ledger**, which records all transactions in a structured and immutable format. This ensures that every transaction is transparent and verifiable, reducing the risk of fraud and manipulation. The ledger also calculates block chain charges, adding realism to the financial model.

Another significant feature is the **crypto currency rate management system**, which allows dynamic updates of currency values. These updates are stored along with timestamps, enabling historical analysis and tracking of market trends. The project also incorporates a **machine learning-based prediction system**. Using historical data, the system generates predictions for crypto currency price movements. This feature helps

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users make informed investment decisions and reduces financial risks. In addition to functional features, the system emphasizes security through authentication mechanisms, session management, and controlled access. Django's built-in features, such as ORM and middleware, enhance data handling and application security. This project bridges the gap between block chain technology and intelligent analytics by combining secure transaction systems with predictive capabilities. It serves as a prototype for modern financial platforms and demonstrates the potential of integrating emerging technologies in real-world applications.

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LITERATURE SURVEY (WITH EXISTING METHODS)

The emergence of crypto currency and block chain technology has attracted significant research attention in recent years. Various studies have explored secure transaction systems, decentralized architectures, and predictive analytics in the context of digital finance. Block chain technology, first introduced by Satoshi Nakamoto in 2008, revolutionized the concept of digital transactions by providing a decentralized and immutable ledger. Researchers have extensively studied block chain's applications in finance, supply chain management, and healthcare. The core advantage of block chain lies in its ability to ensure data integrity, transparency, and resistance to tampering. Several existing crypto currency trading platforms, such as Coinbase and Binance, provide user-friendly interfaces for buying and selling digital currencies. However, these platforms often rely on centralized systems, which can be vulnerable to hacking and data breaches. This has led to increased interest in decentralized finance (DeFi) systems. In terms of predictive analytics, machine learning algorithms have been widely used to forecast crypto currency prices. Studies have shown that models like **Long Short-Term Memory (LSTM)** networks outperform traditional statistical methods due to their ability to capture temporal dependencies in time-series data. Research by McNally et al. (2018) demonstrated the effectiveness of LSTM in predicting Bitcoin price movements. Other machine learning approaches, such as Support Vector Machines (SVM), Random Forests, and Neural Networks, have also been applied to crypto currency prediction. These models analyze historical price data, trading volume, and market indicators to generate predictions.

Security is another critical area of research. Traditional systems often face issues like unauthorized access, fraud, and data manipulation. Block chain-based systems address these issues by using cryptographic hashing and distributed consensus mechanisms. Despite advancements, existing systems have limitations, including lack of integration between trading platforms and predictive analytics, limited transparency, and scalability issues. Many platforms do not provide a complete ecosystem that combines trading, security, and intelligent decision-making. The proposed system aims to overcome these limitations by integrating block chain-based transaction recording with machine learning-based prediction in a unified platform. It leverages Django for backend development, ensuring scalability and efficient data management. This literature review highlights the importance of combining secure transaction systems with predictive analytics to build next-generation crypto currency platforms. The proposed system contributes to this domain by offering a hybrid solution that enhances both security and usability.

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EXISTING SYSTEM

Existing crypto currency trading systems primarily operate on centralized architectures where transactions are managed by a single authority or organization. Platforms such as Coinbase and Binance dominate the market by providing trading services, wallet management, and market analysis tools. While these platforms offer convenience and high performance, they suffer from several limitations. One of the major drawbacks of existing systems is **lack of transparency**. Users must trust the platform to manage their funds and transactions securely. Since these systems are centralized, there is a risk of data manipulation and fraud. Additionally, they are prone to cyber-attacks, leading to significant financial losses. Another limitation is the **absence of integrated predictive systems**. Although some platforms provide basic analytics, they do not offer advanced machine learning-based predictions that can assist users in making informed investment decisions. Users often rely on external tools for market analysis, which creates inefficiency.

Moreover, existing systems do not maintain a **true block chain-based ledger** for all transactions. While crypto currencies themselves use block chain, many trading platforms maintain internal databases that are not fully decentralized. This reduces the overall trustworthiness of the system. Scalability and high transaction fees are additional challenges. As the number of users increases, centralized systems may struggle to handle large volumes of transactions efficiently. The proposed system addresses these issues by introducing a decentralized ledger, integrating machine learning predictions, and ensuring transparency and security through block chain concepts. It provides a more reliable and intelligent trading environment compared to traditional systems.

II. PROPOSED METHOD

The proposed system introduces a **Block chain-Based Cryptocurrency Trading and Prediction Platform** that integrates secure transaction handling with intelligent price forecasting. The system is designed using the Django framework and consists of three main modules: **Admin, Agent, and User**, each performing specific roles to ensure smooth system operation. The admin module is responsible for monitoring and controlling the entire system. It manages user and agent registrations, activates accounts, updates cryptocurrency rates dynamically, and maintains a block chain ledger. The currency update mechanism allows percentage-based increase or decrease in cryptocurrency values, ensuring flexibility and real-time adaptability. The agent module acts as a mediator between the system and users. Agents can purchase cryptocurrencies, maintain holdings, and sell them to users. Each transaction is securely recorded, ensuring transparency. Agents also have access to prediction tools that help them analyze market

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trends. The user module enables customers to buy crypto currencies from agents. The system calculates transaction costs, including block chain charges, and records them in a secure ledger. Users can also view transaction history and use prediction tools to analyze future price movements.

A key feature of the proposed system is the **Block chain Ledger**, which records all transactions in a tamper-proof format. This ensures data integrity, transparency, and traceability. Additionally, the system integrates a **Machine Learning-based Prediction Module** using LSTM algorithms to forecast cryptocurrency prices based on historical data. The combination of block chain and machine learning enhances both security and decision-making capabilities. The system is scalable, secure, and suitable for real-world cryptocurrency trading applications.

III. IMPLEMENTATION

The implementation of the proposed system is carried out using the Django web framework, which provides a robust and scalable architecture for web applications. The system is developed using Python, HTML, CSS, and JavaScript, with a relational database for storing transactional and user data. The application follows the **Model-View-Template (MVT)** architecture of Django. Models define the database structure, views handle business logic, and templates manage the user interface. The admin module is implemented with authentication functionality that validates login credentials. Once authenticated, the admin can manage users and agents. Activation of accounts is handled by updating the status field and generating unique authentication keys. Cryptocurrency rates are stored in the database and updated dynamically through percentage-based calculations. The agent module allows agents to register, log in, and perform cryptocurrency transactions. When an agent buys cryptocurrency, the system calculates the payable amount based on current market rates. The purchased coins are stored in the agent's account, and transaction details are recorded in the database.

The user module enables customers to purchase cryptocurrency from agents. The system calculates block chain charges and adds them to the total payable amount. Once a transaction is completed, the system updates both the user's and agent's cryptocurrency balances. All transactions are recorded in the block chain ledger, ensuring transparency. The block chain ledger is implemented as a database table that stores transaction details such as user email, agent email, currency type, quantity, and transaction amount. The system also calculates the total ledger balance using aggregation functions. The machine learning module is implemented using LSTM (Long Short-Term Memory) networks. Historical cryptocurrency data is processed and fed into the model to generate predictions. The system also includes functionality to upload datasets and generate

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predictions dynamically. Recent research shows that LSTM-based models provide high accuracy in cryptocurrency prediction due to their ability to capture time-series dependencies . Advanced hybrid models combining LSTM with other techniques further improve prediction performance . Overall, the implementation ensures modularity, scalability, and efficient data processing while integrating secure transaction mechanisms with predictive analytics.

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IV. ALGORITHMS

The system utilizes multiple algorithms for handling transactions, updating cryptocurrency rates, and predicting future prices.

1. Cryptocurrency Rate Update Algorithm

This algorithm updates the currency value based on a percentage increment or decrement:

- Input: Current price, percentage change
- If percentage > 0 → Increase price
- If percentage < 0 → Decrease price
- Calculate new price using:
  - Increase: New Price = Current Price + (Percentage × Current Price / 100)
  - Decrease: New Price = Current Price - (|Percentage| × Current Price / 100)
- Update database and log changes

2. Transaction Processing Algorithm

- Input: Currency type, quantity, user/agent details
- Fetch current price from database
- Calculate payable amount
- Update user and agent balances
- Store transaction in block chain ledger

3. Block chain Ledger Algorithm

- Record each transaction as a block
- Store transaction details (user, agent, amount, timestamp)
- Aggregate total block chain value using sum function
- Ensure immutability by restricting updates

4. LSTM Prediction Algorithm

- Input: Historical cryptocurrency data
- Preprocess data (normalization, sequence generation)
- Train LSTM model
- Predict future values based on past sequences
- Output predicted price

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Studies confirm that LSTM and deep learning models outperform traditional methods due to their ability to model sequential dependencies in financial time-series data .

V. SYSTEM DESIGN

The system design follows a modular and layered architecture to ensure scalability, maintainability, and security. It is divided into three main layers: **Presentation Layer, Application Layer, and Data Layer**.

1. Presentation Layer

This layer consists of user interfaces developed using HTML, CSS, and JavaScript. It provides separate dashboards for admin, agent, and user. Each interface is designed to ensure ease of use and smooth navigation.

2. Application Layer

The application layer is implemented using Django views and handles all business logic. It processes user requests, manages authentication, performs calculations, and communicates with the database.

The system is divided into the following modules:

- **Admin Module**: Manages users, agents, currency rates, and ledger
- **Agent Module**: Handles cryptocurrency buying and selling
- **User Module**: Enables users to purchase and track crypto currencies
- **Prediction Module**: Provides price forecasts using machine learning

3. Data Layer

The data layer consists of database models:

- User and Agent Models
- Cryptocurrency Rate Model

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- Transaction Models
- Block chain Ledger Model

Each transaction is stored in the ledger, ensuring transparency and traceability.

4. Data Flow

- User/Agent sends request
- Django view processes request
- Model interacts with database
- Response is returned to UI

5. Security Design

- Authentication for all users
- Session management
- Role-based access control
- Secure transaction handling

6. Machine Learning Integration

The prediction module processes datasets and generates predictions. Advanced architectures combining LSTM with hybrid models improve forecasting accuracy .

7. Scalability

The modular design allows easy expansion, such as adding new crypto currencies or integrating APIs.

The system design ensures efficient handling of transactions, secure data storage, and intelligent prediction capabilities, making it suitable for real-world deployment.

SYSTEM DESIGN IMAGES

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Main Home Page

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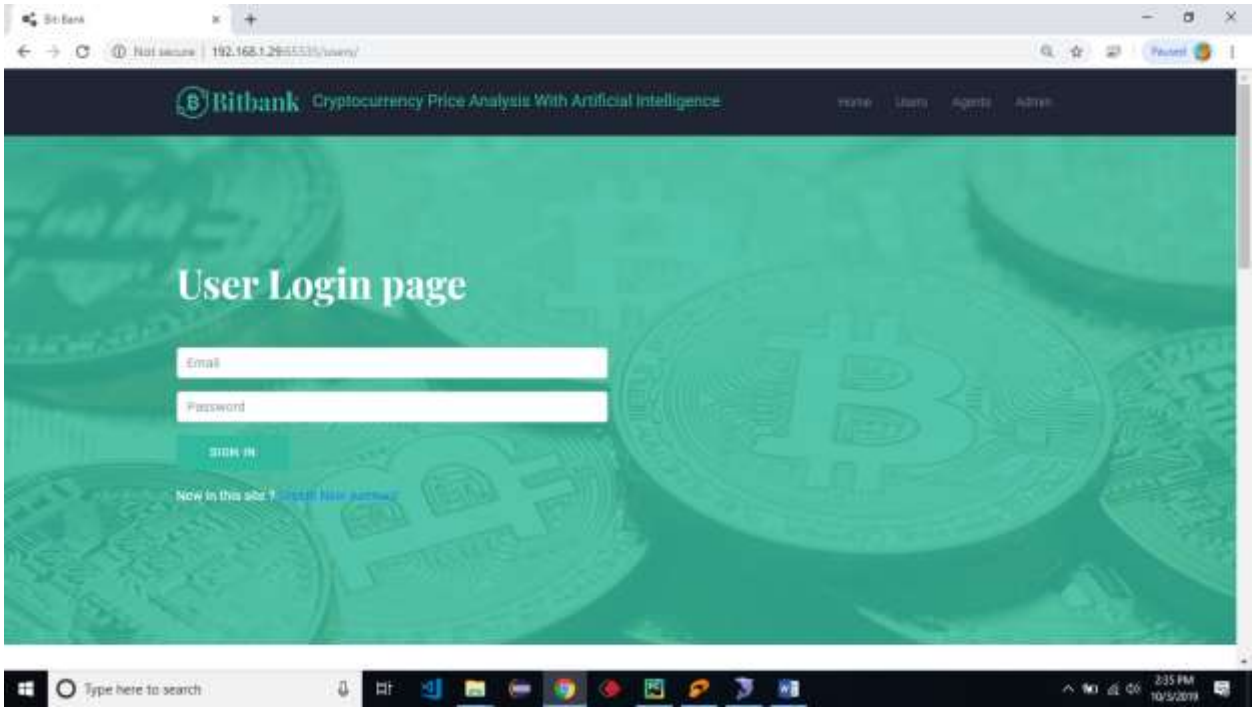

User Register Page

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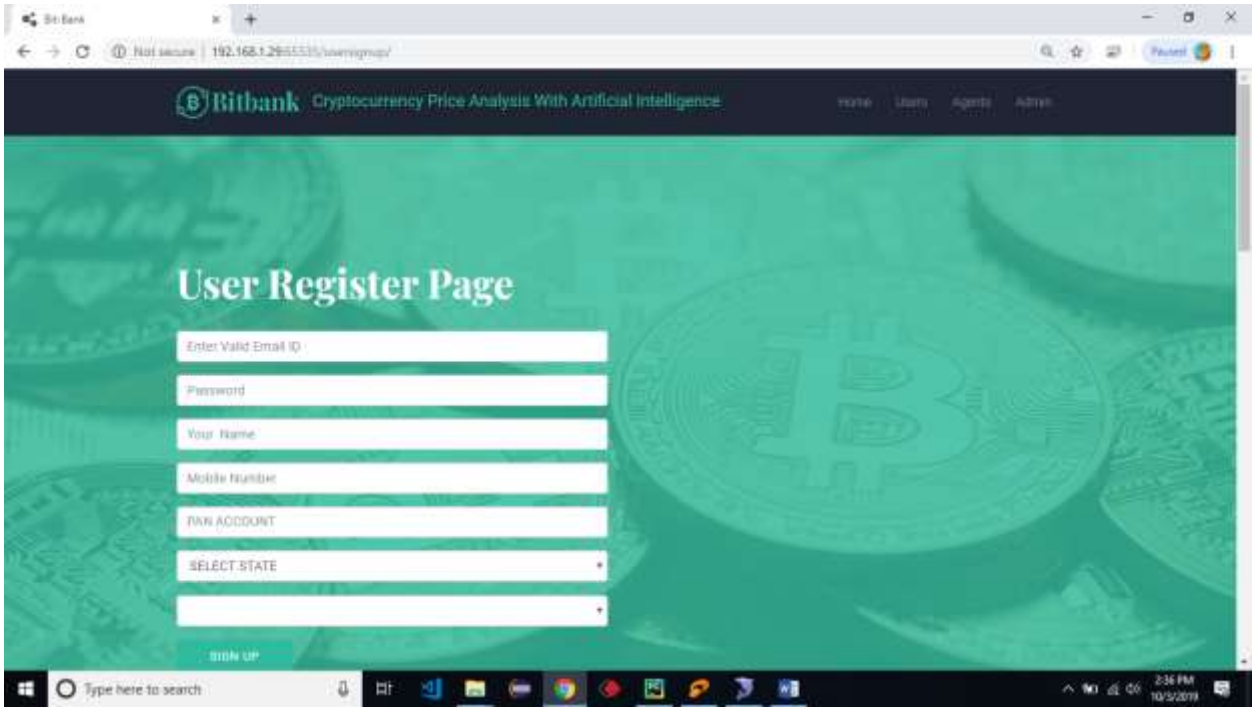

User Registration Form

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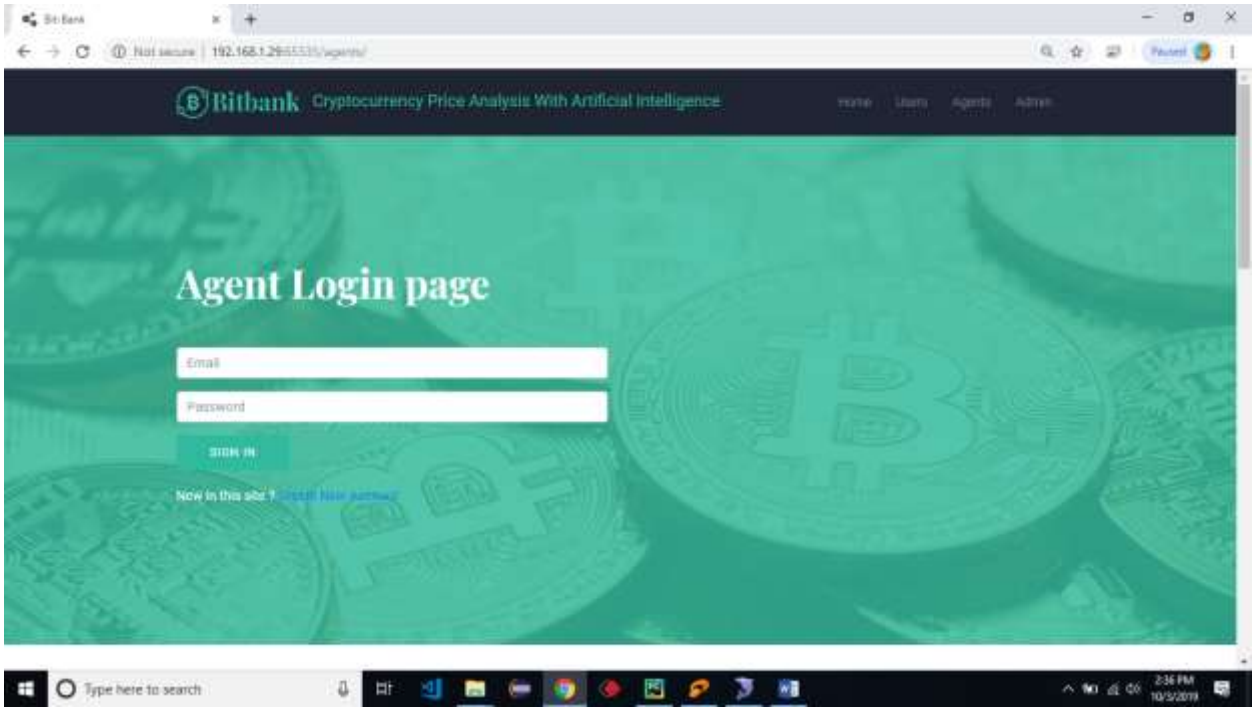

agent Login page

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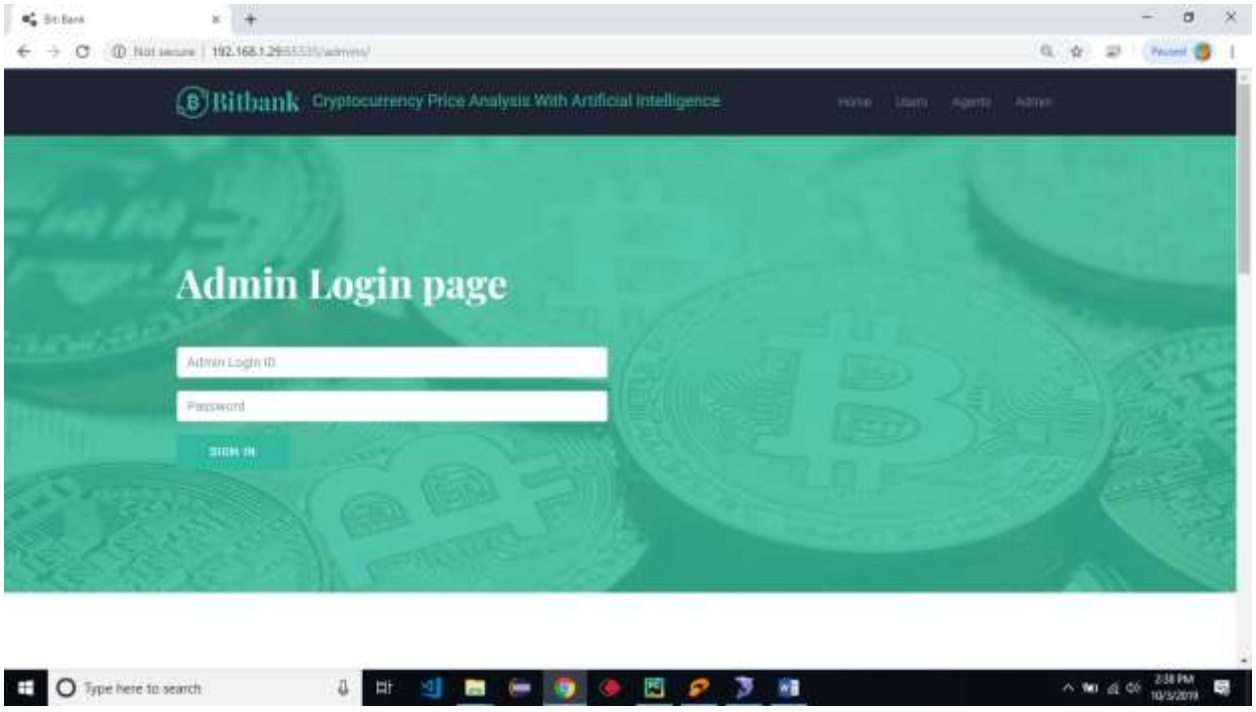
Agent Register page



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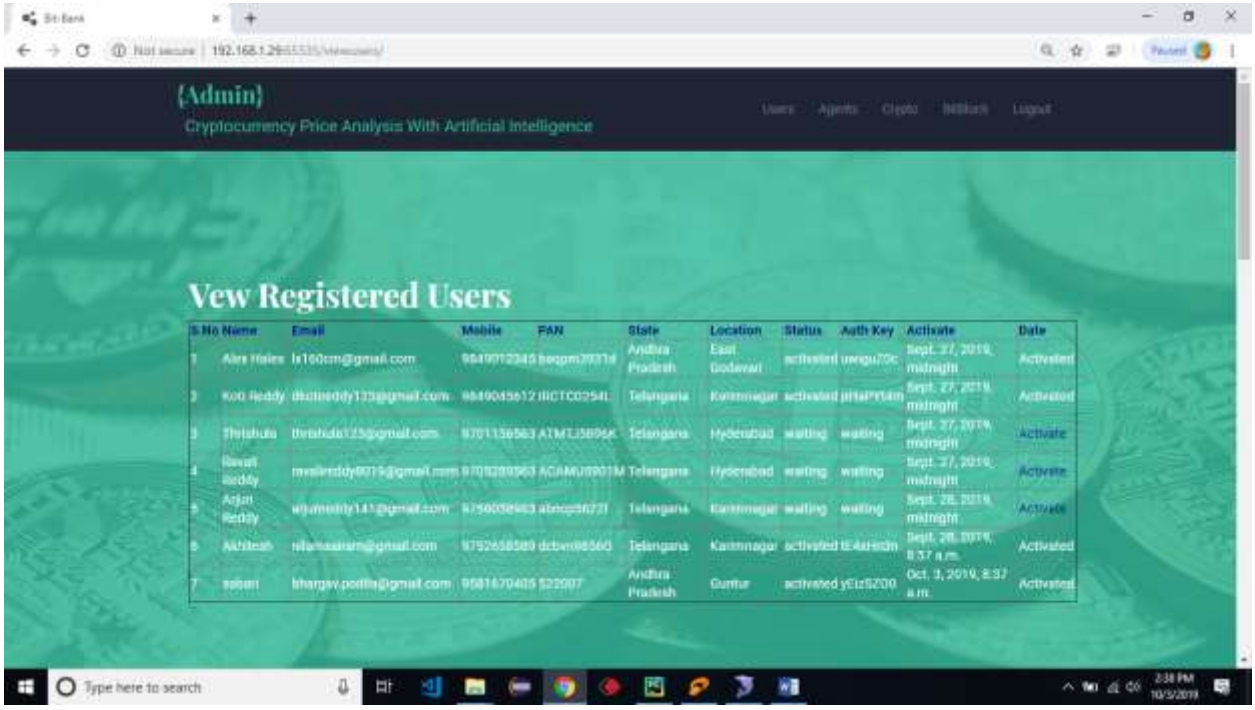
Admin Login Page



Admin Activate Users

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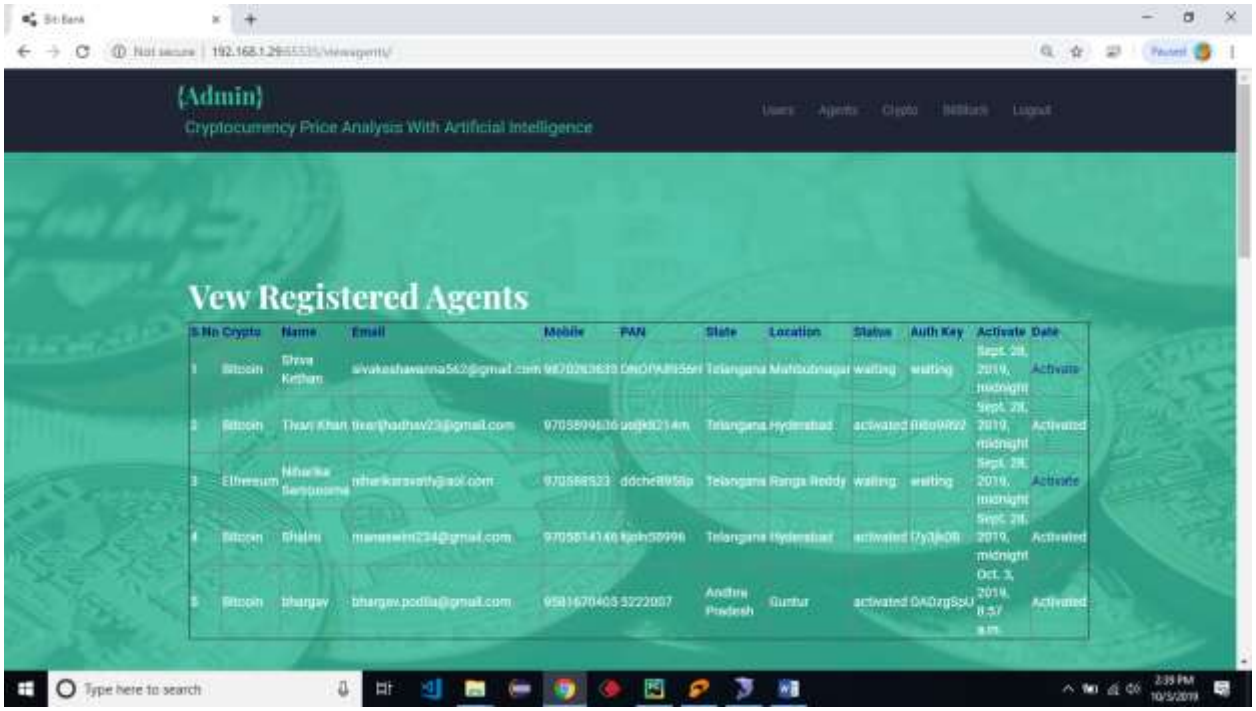

Admin Activate Agents

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Current Price and Update

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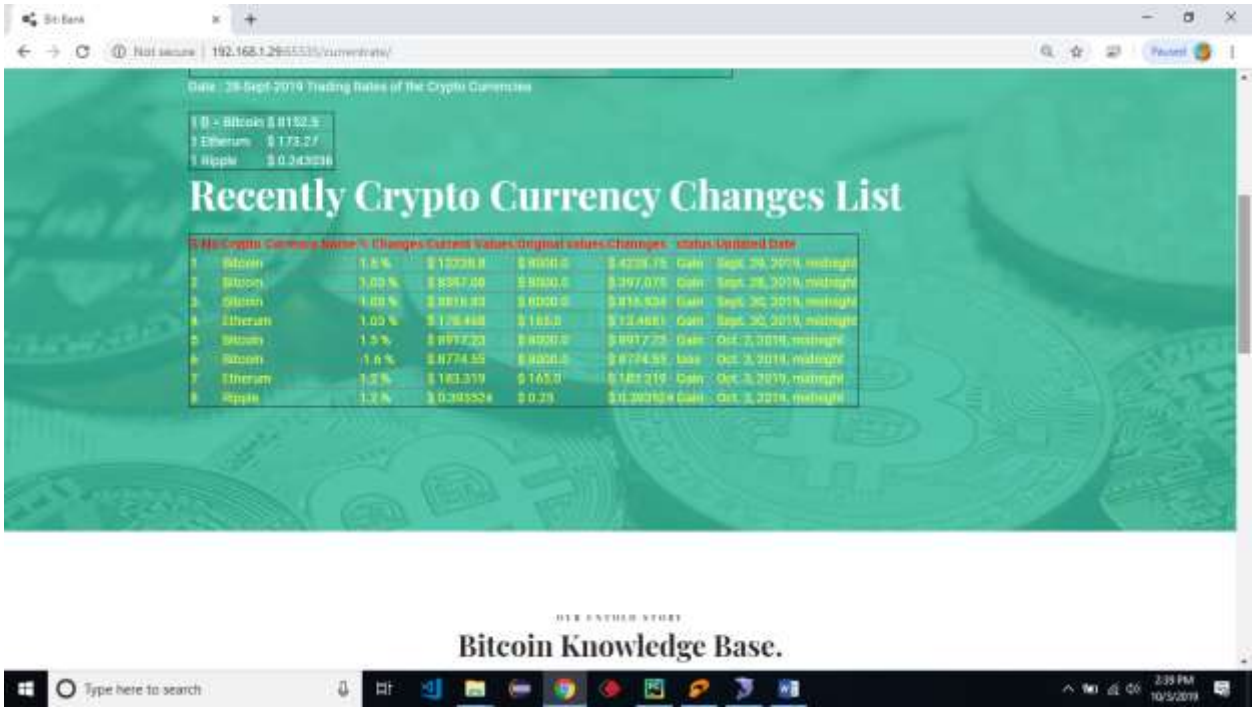

Crypto update history

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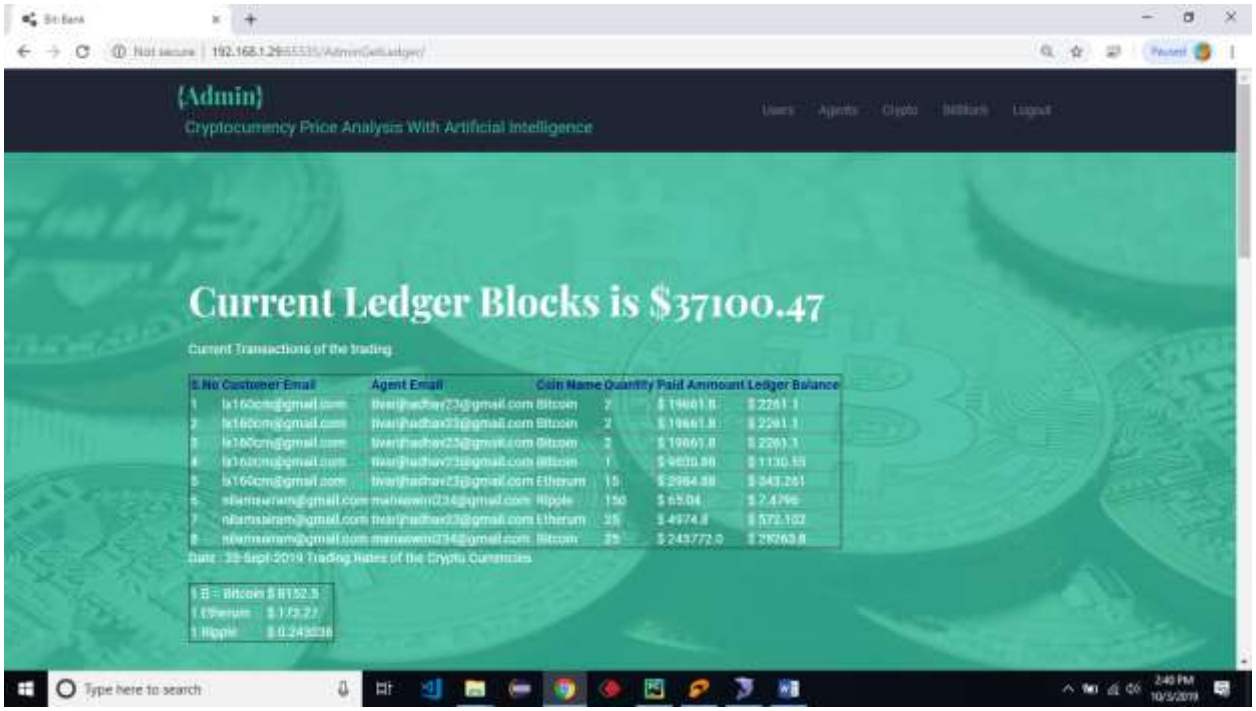

Blockchain ledger maintance

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Agent buting crypto coins

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Agent buy Transactions

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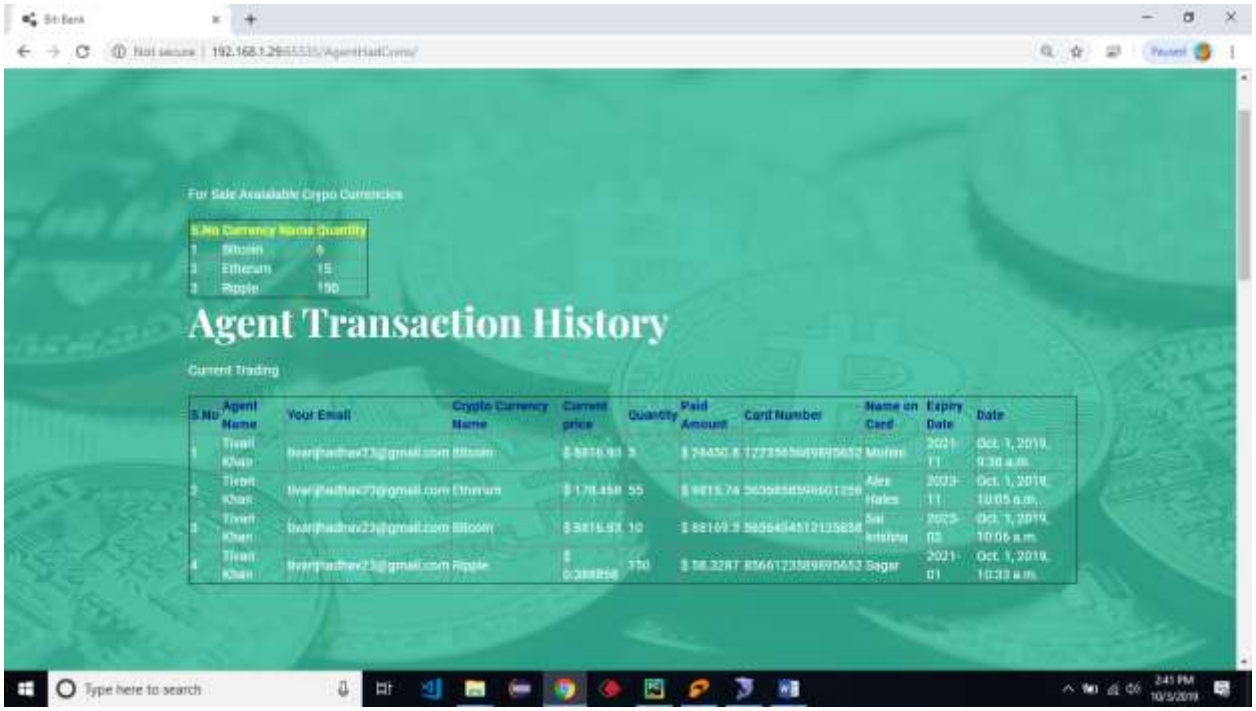

Agent transaction history

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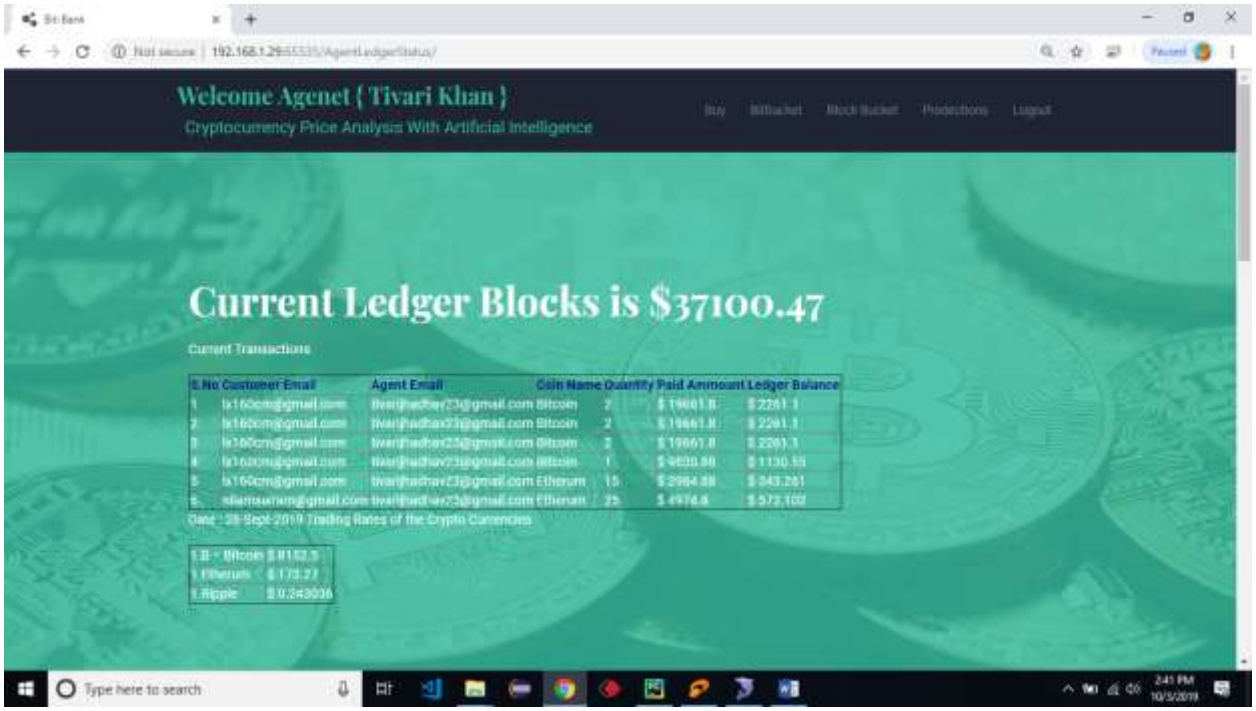

Agent view Ledger balance

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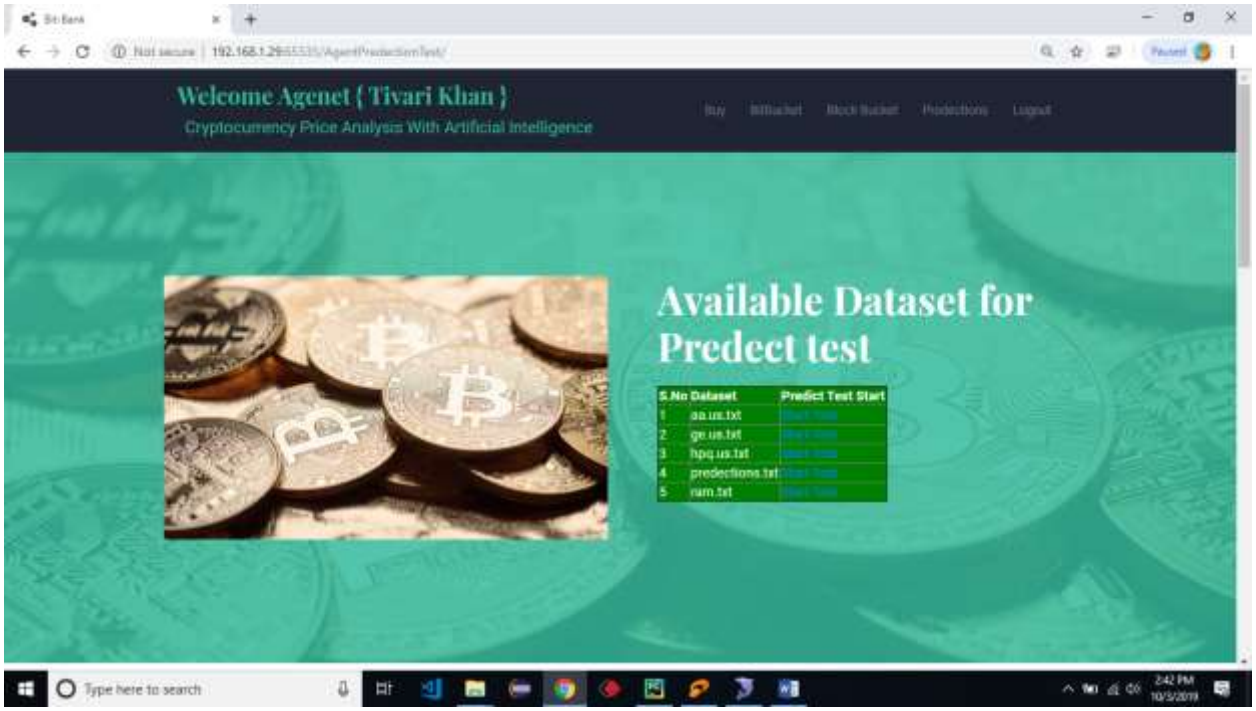

Agent view predections dataset for test

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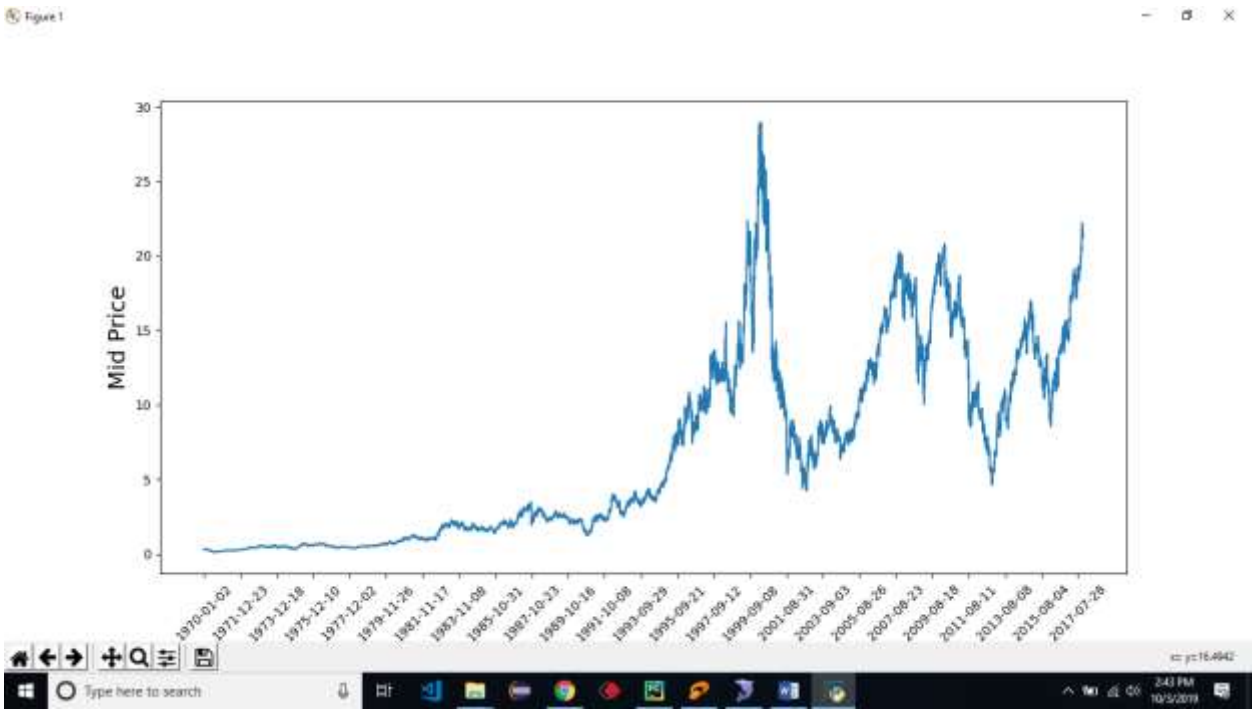

Dataset analysis

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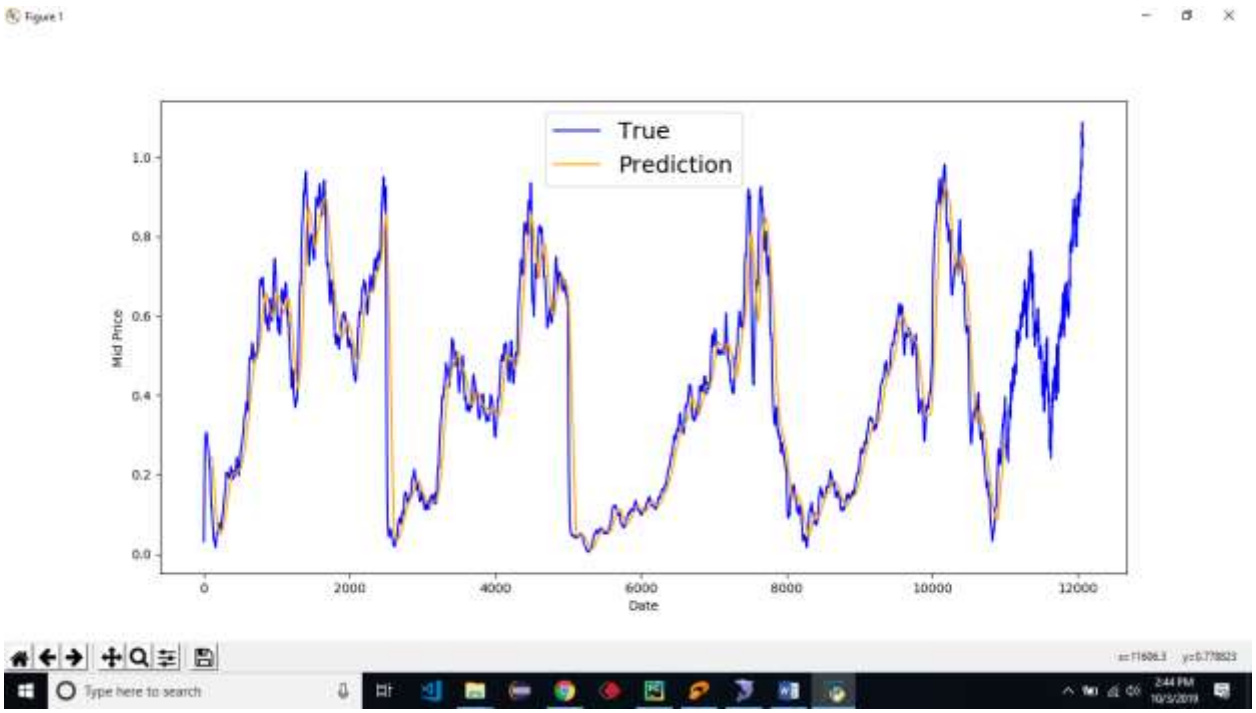

True Predections

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Predectins

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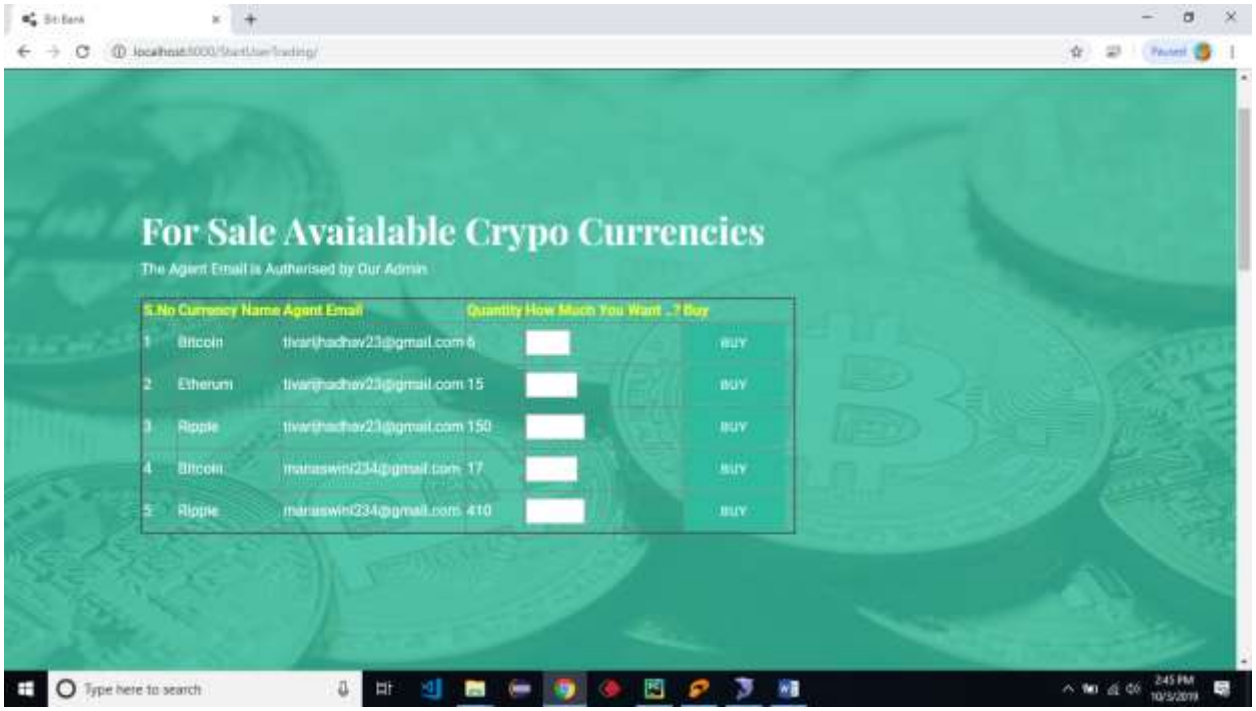

User buying coins

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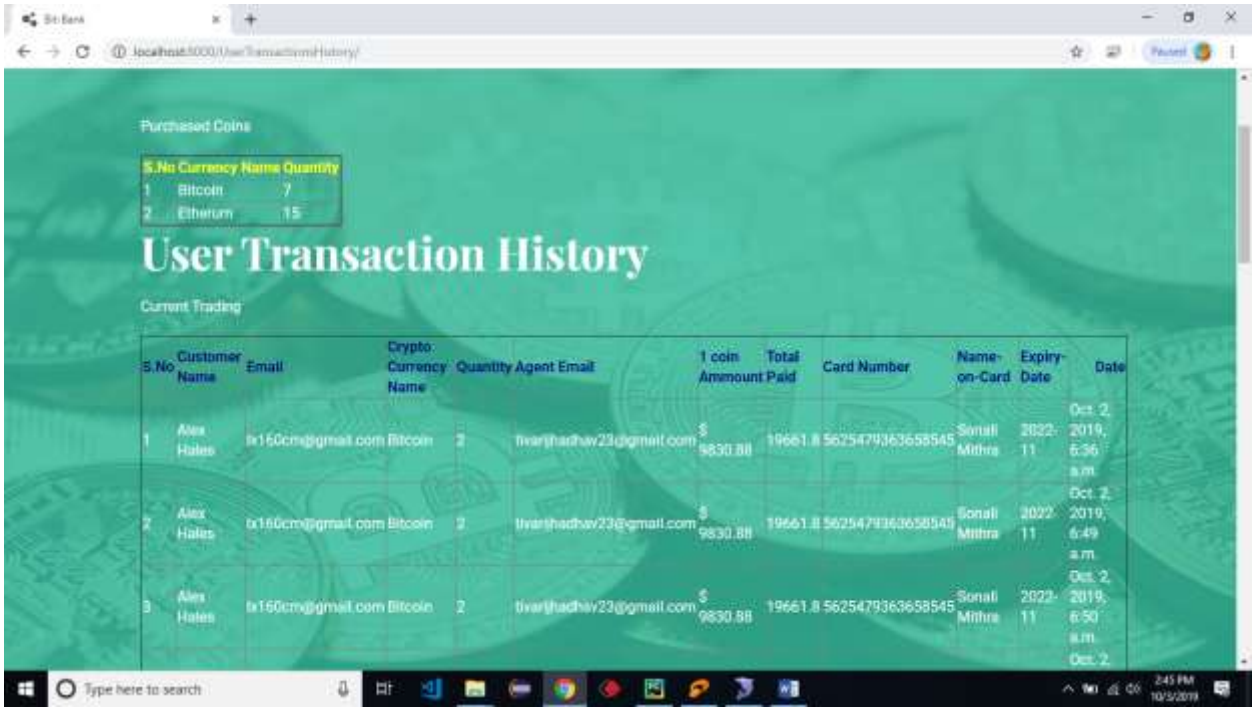

User purchased Coins

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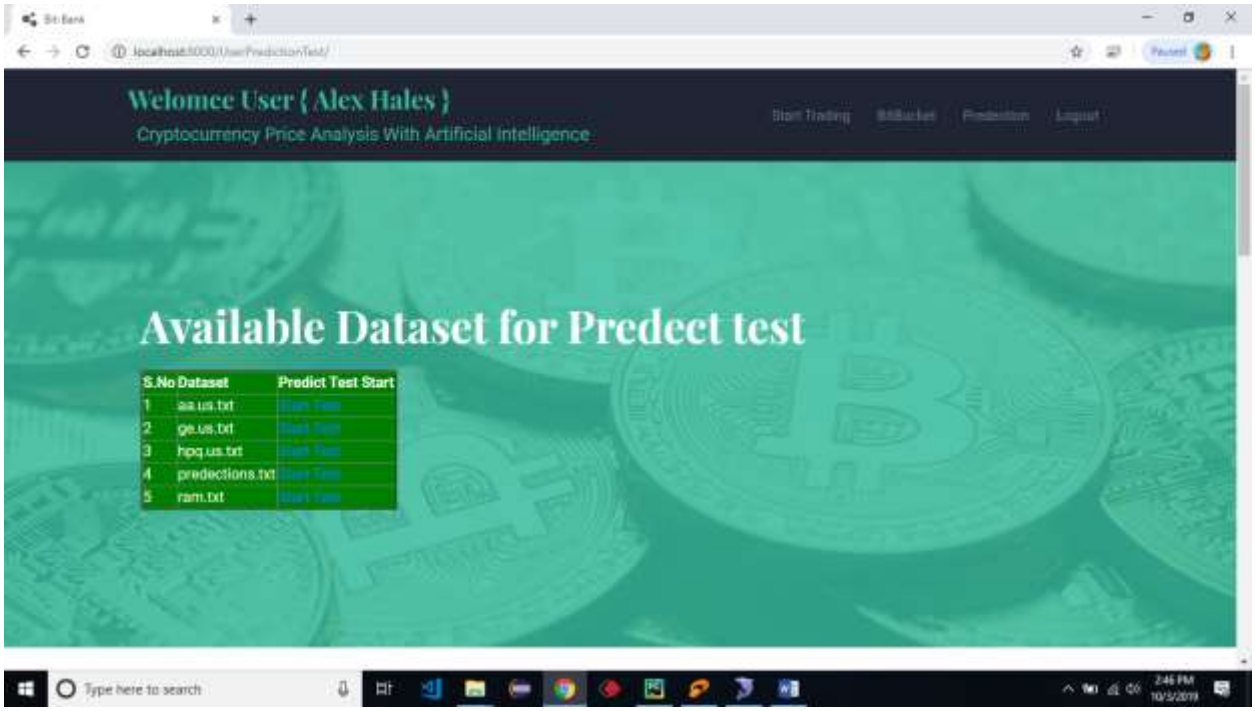

User can test the predections

VI. CONCLUSION

The proposed Block chain-Based Cryptocurrency Trading and Prediction System successfully integrates modern technologies such as block chain and machine learning to create a secure and intelligent trading platform. The system addresses key challenges in existing cryptocurrency platforms, including lack of transparency, security concerns, and absence of predictive insights. By implementing a block chain ledger, the system ensures that all transactions are recorded in a secure and tamper-proof manner. This enhances trust and reliability, making the system suitable for real-world applications. The use of Django framework enables efficient data handling, scalability, and modular design. The integration of machine learning, particularly LSTM algorithms, provides accurate predictions of cryptocurrency prices. This feature empowers users and agents to make informed investment decisions, reducing risks associated with market volatility. Research studies have shown that LSTM models are highly effective in capturing time-series patterns and improving prediction accuracy .

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The system also demonstrates effective role-based functionality, where admin, agent, and user modules work together seamlessly. Each module performs specific tasks while maintaining overall system efficiency. Future enhancements may include real-time API integration, advanced deep learning models, mobile application support, and decentralized finance (DeFi) features. In conclusion, the system provides a comprehensive solution that combines secure transactions with intelligent analytics, paving the way for next-generation crypto currency platforms.

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