



Block chain-Based Sentiment Analysis of Agriculture News Headlines

¹Sonyabapu M. More, ²Gajendra R Wani

¹Women's College of Home Science and BCA, Loni, Ahilyanagar, Maharashtra, India

²BOSPONC College, Bhusawal, Maharashtra, India

Email: ¹moresirpvp@gmail.com, ²gajuwani03@gmail.com

Peer Review Information	Abstract
<p><i>Submission: 08 April 2026</i></p> <p><i>Revision: 29 April 2026</i></p> <p><i>Acceptance: 11 May 2026</i></p>	<p>Agriculture sector plays a very important role in ensuring food security of all human being and economic development across the world in each and every country around the world. With the fast and exponential growth of digital media, large volumes of agriculture related news headlines are published daily through online news portals, blogs and social media platforms. These headlines significantly influence and may impact farmers, policymakers, investors, and agricultural markets. Extracting insights and information from such huge textual data manually is a difficult and time-consuming task. Textual data can be automatically categorized into neutral, negative or positive sentiments using sentiment analysis, a feature of NLP (Natural language processing). This study presents a framework to perform a sentiment analysis on agricultural news headlines using a machine learning approach. Later on Block chain technology is integrated with it by which it ensures secure, transparent, and tamper-proof storage of analyzed data. The proposed model combines sentiment analysis with Block chain-based data management to improve transparency, reliability and accessibility of agricultural information. The proposed system serves as a valuable tool for stakeholders in the agricultural sector by enabling analysis of agricultural trends, market dynamics, policy impacts, crop planning, yield forecasting, risk mitigation strategies, price prediction, and supply chain management</p>
<p>Keywords</p> <p><i>Block chain Technology, Agriculture News Headlines, Sentiment Analysis, Machine Learning, NLP, Agricultural Data Analytics</i></p>	

Introduction

Agriculture sector of each country around the world provides consistent food supply for each human being on the earth. Farmers, researchers, policymakers, and agricultural organizations rely heavily on accurate and timely information to make strategic decisions regarding crop production, marketing, export-import and resource management such as fertilizers, pesticides and funds availability through the banks.

In the digital era, agricultural information is widely distributed through online news portals, Various Newspapers such as Times of India,

Indian Express, The Hindu, and social media platforms ,YouTube channels, mobile applications, News headlines related to crop production, weather updates, government policies, agricultural technological advancements, Export Import Strategies, Central & State government Budget and Share market prices performs a valuable role in influencing all the agricultural stakeholders.

However, manually analyzing vast volumes of news becomes impractical due to the time, effort, and potential for human error involved. Sentiment analysis provides automated methods to study textual data and understand

the emotional tone represented in the text with positive, negative and neutral sentiments.

Simultaneously, maintaining the authenticity and security of agricultural data is a critical concern. Block chain technology offers a decentralized approach that promotes transparency, immutability, and trust among stakeholders.

This study presents a framework that leverages sentiment analysis alongside block chain technology to analyse agricultural news headlines and securely store the results, ensuring reliable access for stakeholders.

Literature review

Sentiment analysis popularity and usefulness are continuously in increasing state due to the increasing availability of online textual data. Sentiment analysis is used in across various domains, including product reviews, financial market analysis, and political opinion mining. Machine learning Concepts like Naïve Bayes, Logistic Regression, and Support Vector Machine (SVM) are widely used for sentiment classification tasks.

In the last few years, block chain technology has gained recognition as a transformative and impactful solution tool for enabling secure and decentralized data management. Through cryptographic hashes and consensus across multiple nodes, block chain ensures secure and consistent data

X. Zhuo et al. (2024) conducted a systematic review on text analysis within Block chain research. The study highlights the growing uses of natural language processing(NLP) techniques for analyzing textual data in Block chain based systems and identifies key trends, methods, and research gaps, emphasizing the potential of integrating NLP with Block chain for efficient and secure data processing [1]. Sentiment analysis of news headlines uses natural language processing and deep learning. The study highlights the effectiveness LSTM deep learning models which extracting contextual information from textual data, recognizing complex patterns, and delivering high accuracy on large-scale datasets. By analysing multiple daily news headlines, the model was implemented to identify and project overall sentiment trends, demonstrating the importance of NLP-based approaches for real-world applications [4]. I.C. Somashekhar et al. (2025) proposed a Block chain-enabled framework for secure and transparent customer feedback analysis. Text data is effectively classified in this study using pre-processing methods like TF-IDF alongside machine learning algorithms such as Random Forest. The system utilizes block chain

technology to ensure data integrity, traceability, and tamper-resistant storage, resulting in improved reliability and transparency in managing user-generated content. [5].

P. K. Agrawal et al. (2025) and I. C. Somashekhar et al. (2025) proposed Block chain-based frameworks for sentiment analysis of unstructured textual data. Their studies integrate text pre-processing techniques such as TF-IDF along with machine learning (ML) models for accurate classification. By incorporating Block chain technology, both approaches ensure data integrity, transparency, and tamper-proof storage, demonstrating how the combination of NLP and block chain ensures reliable and secure evaluation of user-generated content. Block chain technology now playing a key role in agriculture sector by supporting food traceability, enabling transparent information sharing, and optimizing supply chain processes. But, limited research has explored the integration of Block chain technology with sentiment analysis of agricultural news headlines.

Methodology

1. Data Collection

The news headlines about agricultural sector are gathered from online news portals, Indian Express, The times of India, The Hindu, agricultural blogs, government websites, and various digital media platforms.

2. Data Pre-processing

The pre-processing steps include:

- Removing punctuation and special characters
- Converting text to lowercase
- Removing stop words
- Tokenization
- Stemming or lemmatization

3. Feature Extraction

TF-IDF (Term Frequency–Inverse Document Frequency) is employed for feature extraction, which converts textual-data into numerical vector representations.

4. Sentiment Classification

Machine learning algorithms such as Naïve Bayes, Logistic Regression, and Support Vector Machine (SVM) are used to classify headlines into neutral, negative or positive sentiments categories.

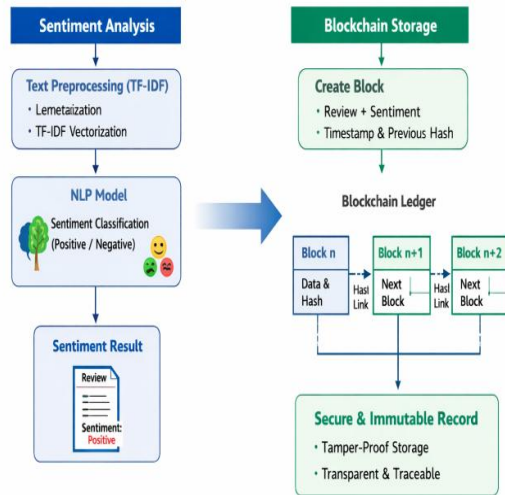
5. Block chain Integration

Once the sentiment analysis is completed, the output results are stored using Block chain technology. Each analysed headline and its

sentiment classification are recorded as a Block chain transaction to ensure data integrity, transparency, decentralization, and security.

System Architecture

The architecture of the proposed system includes the following components:



- **Data Source:** Agriculture news websites and digital media platforms.
- **Data Collection:** Collects agriculture news headlines.
- **Preprocessing:** Cleans and prepares textual data.
- **Sentiment Analysis:** Classifies headlines into sentiment categories and display results for user
- **Block chain Storage Module:** Stores analyzed data securely in Block chain.

A dataset of agriculture-related news headlines is processed using pandas. Textual data is transformed into numerical feature representations using TF-IDF vectorization. Subsequently, a Logistic Regression model is trained to categorize headlines into positive, negative, and neutral sentiment classes. Upon testing with a news headlines, the intended model predict the corresponding sentiment, demonstrating its effectiveness for automated analysis of agricultural news .

The Sample python Code as follows.

```
import pandas as pd
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import LogisticRegression
# Sample dataset (labeled with sentiment)
data = {
    "headline": [
```

```
"Government announces subsidy for farmers",
"Crop failure causes huge losses",
"New irrigation policy introduced",
"Farmers protest against low prices",
"Good monsoon boosts agriculture production"
],
"label": ["positive", "negative", "neutral", "negative", "positive"]
}
df = pd.DataFrame(data)
# Conversion of Text Data into Numerical Features
vectorizer = TfidfVectorizer()
X = vectorizer.fit_transform(df["headline"])
# Train model
model = LogisticRegression()
model.fit(X, df["label"])
# Prediction on new headline
new_headline = ["Farmers receive financial support from government"]
X_new = vectorizer.transform(new_headline)
prediction = model.predict(X_new)
print("Predicted Sentiment:", prediction[0])
```

Output:

Predicted Sentiment: positive

Blockchain Integration & Storage of data in Block

The predicted sentiment of agriculture news headlines is securely stored using a Block chain structure. Each block contains the headline, its predicted sentiment, timestamp, and cryptographic hash generated using SHA-256. The blocks are linked using previous hashes, ensuring immutability and tamper-proof storage of sentiment analysis results.

Sample Python code Block chain Storage :

```
import hashlib
import datetime
class Block:
    def __init__(self, index, data, previous_hash):
        self.index = index
        self.timestamp = str(datetime.datetime.now())
        self.data = data
        self.previous_hash = previous_hash
        self.hash = self.calculate_hash()
    def calculate_hash(self):
        return hashlib.sha256(
            (str(self.index) + self.timestamp + self.data +
            self.previous_hash).encode()
        ).hexdigest()
class Blockchain:
    def __init__(self):
        self.chain = [self.create_genesis_block()]
    def create_genesis_block(self):
```

```

return Block(0, "Genesis Block", "0")

def add_block(self, data):
    prev_block = self.chain[-1]
    new_block = Block(len(self.chain), data,
prev_block.hash)
self.chain.append(new_block)
# Create Block chain
bc = Block chain()

# Store sentiment result in Block chain
bc.add_block(f"{new_headline} -> {prediction}")

# Display Block chain
for block in bc.chain:
print("Index:", block.index)
print("Data:", block.data)
print("Hash:", block.hash)
print("-" * 40)
Output :
Index: 0
Data: Genesis Block
Hash:
383f8c9cc10c4c0e4023fde9c5c21e6e43e30d46
971de96afa808774ee13c966

-----
Index: 1
Data: ['Farmers receive financial support from
government'] -> ['positive']
Hash:
4d58a8cb8421ab2399bce8402e5ea0cb5f3890d
4810eb16b19c3732c865ed872
-----

```

Result And Discussion

The proposed sentiment analysis model processes agriculture news headlines and categories them into sentiment categories like **positive, negative or neutral**. The model is trained using feature extraction through TfidfVectorizer and classification using Logistic Regression.

The output results show that the system effectively identifies the sentiment expressed in agricultural news headlines.

- **Positive sentiments** are about the News headlines related to government support, subsidies, technological advancements, and favorable weather conditions.
- **Negative sentiments** include news about crop failures, pest attacks, price drops, and farmer protests.
- **Neutral sentiments** represent informational updates such as policy announcements, statistical reports, and general agricultural news.

The integration of Block chain technology confirms that all the analysed output results are

stored securely with immutability and transparency, preventing unauthorized modifications. Each classified headline is recorded as a Block chain transaction, making the system reliable and trustworthy for stakeholders.

Overall, the proposed system demonstrates the capability to automate sentiment analysis while maintaining secure and tamper-proof storage, thereby supporting better decision-making in the agricultural domain.

Advantage Of Proposed System

- Automated analysis of large volumes of news.
- Improved understanding of agricultural trends.
- Secure and transparent data storage..
- Reliable information for farmers and policymakers..
- Prevention of data manipulation using Block chain

Conclusion

This research presents a framework for analyzing agriculture news headlines using sentiment analysis integrated with Block chain technology. The system enables automated classification of news sentiments while ensuring secure storage of analyzed information.

The proposed approach integrates machine learning (ML), natural language processing (NLP), and block chain technology to provide a reliable framework for agricultural information management. Future studies can focus on leveraging advanced deep learning techniques, such as LSTM and BERT, to enhance sentiment analysis accuracy, along with developing real-time systems for monitoring agricultural news.

References

- X. Zhuo, F. Irresberger, and D. Bostandzic, "How are texts analyzed in Blockchain research? A systematic literature review," *Financial Innovation*, vol. 10, 2024.
- P. K. Agrawal et al., "Blockchain Framework for Sentiment Analysis from Unstructured Text Reviews," *International Journal of Information Engineering and Electronic Business*, vol. 17, no. 6, pp. 34–47, 2025.
- Somashekhar, I. C., H. Patil, and H. K. Prasad, "A Blockchain-Enabled Framework for Transparent and Secure Customer Feedback Systems in Retail Banking," in *Proceedings of the 2025 2nd International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF)*, IEEE, pp. 1–6, 2025.

M. Vicari and M. Gaspari, "Analysis of News Sentiments Using Natural Language Processing and Deep Learning," *AI & Society*, vol. 36, pp. 931–937, 2021.

V. Pandey, V. Tiwari, R. Sonavane, G. Jha, K. Mishra, and G. Lohar, "To Implement Blockchain Based Social Media Platform with Sentiment

Analysis Using NLP," in *Proceedings of the 2024 International Conference on Advances in Computing Research on Science Engineering and Technology (ACROSET)*, Indore, India, pp. 1–7, 2024, doi: 10.1109/ACROSET62108.2024.10743538.