Journal of Computer and Electrical Sciences (JCES)- Volume-1 Issue-4, April 2026
ISSN: 3049-2602

Predictive Analysis of Stock Market Trends Using Deep Learning

M. Deepika[1], Mrs. Y. Karuna Manjusha[2]

1 – Students, Department of Computer Science Engineering, Andhra Loyola Institute of Engineering and Technology, Vijayawada.

2 - Assistant Professor, Department of Computer Science Engineering, Andhra Loyola Institute of Engineering and Technology, Vijayawada.

Abstract: This paper presents the design and implementation of **StockAI India**, a web-based intelligent system for predicting stock market trends using deep learning techniques. The system integrates multiple models including Artificial Neural Networks (ANN), Recurrent Neural Networks (RNN), and Long Short-Term Memory (LSTM) networks to analyze historical stock data and forecast future prices. The backend is developed using Flask, while stock data is fetched using the yfinance library. A custom sentiment analysis module is incorporated to evaluate market sentiment without relying on external APIs. The frontend utilizes Chart.js for interactive data visualization. The system provides key functionalities such as stock price prediction, investment recommendations, risk analysis, sentiment evaluation, and 30-day future forecasting. The proposed system aims to assist investors in making informed decisions by combining data-driven insights with deep learning techniques.

Keywords: Stock Market Prediction, Deep Learning, LSTM, RNN, ANN, Flask, yfinance, Sentiment Analysis, Forecasting, Financial AI.

1. INTRODUCTION

The stock market is a highly dynamic and complex system influenced by multiple factors such as economic conditions, company performance, global events, and investor sentiment. Predicting stock prices accurately remains a challenging task due to the non-linear and volatile nature of financial data. Traditional statistical methods often fail to capture complex patterns in time-series data. With the advancement of deep learning, models such as ANN, RNN, and LSTM have shown significant improvements in handling sequential and temporal data. StockAI India is designed to leverage these deep learning techniques to provide accurate stock predictions and insights. The system not only predicts stock prices but also analyzes risk and sentiment, offering a comprehensive decision-support tool for investors.

2. LITERATURE SURVEY

Stock market prediction has been extensively studied using both traditional and modern approaches.

From existing research, the following observations are made:

https://doi.org/10.5281/zenodo.19606317

- Traditional models like Linear Regression and ARIMA struggle with non-linear patterns.
- Deep learning models such as LSTM perform better for time-series forecasting.
- RNN models capture sequential dependencies but suffer from vanishing gradient problems.
- LSTM overcomes RNN limitations and is widely used for financial forecasting.
- Sentiment analysis plays a crucial role in predicting market trends.
- Many existing systems rely heavily on external APIs, increasing dependency and cost.

Despite these advancements, most systems lack:

- Integrated multi-model prediction systems.
- Real-time visualization dashboards.
- Combined risk analysis and recommendation features.
- Custom sentiment analysis without third-party APIs.

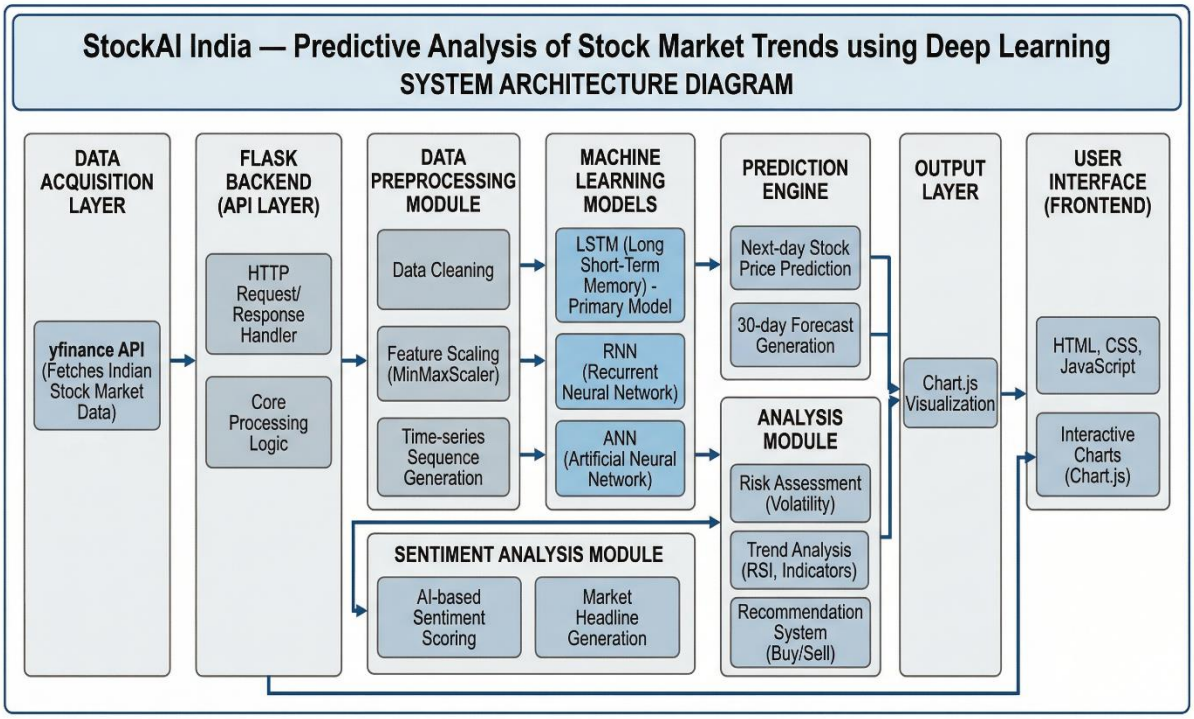
3. PROPOSED SYSTEM

The proposed system, **StockAI India**, is a web-based application that integrates deep-learning models with real-time stock data analysis.

The system architecture consists of:

- **Data Layer:** Fetches historical stock data using yfinance
- **Processing Layer:** Preprocesses data for model training
- **Model Layer:** Uses ANN, RNN, and LSTM for prediction
- **Backend Layer:** Flask handles API requests and model execution
- **Frontend Layer:** Chart.js visualizes predictions and trends

https://doi.org/10.5281/zenodo.19606317



Key Features:

- Stock price prediction
- 30-day future forecasting
- Investment recommendation (Buy/Sell/Hold)
- Risk analysis
- Sentiment analysis (custom-built)
- Interactive graphs and dashboards

The system provides an end-to-end solution for stock analysis with minimal external dependency.

4. METHODOLOGY

The methodology of the system is divided into the following steps:

1. Data Collection: Stock data is collected using the yfinance library, including:

- Open, High, Low, Close prices
- Volume

2. Data Preprocessing:

- Handling missing values

https://doi.org/10.5281/zenodo.19606317

- Normalization using MinMaxScaler
- Creating time-series sequences

3. Model Development: Three models are implemented:

- ANN: For baseline prediction
- RNN: For sequential learning
- LSTM: For long-term dependency learning

4. Model Training:

- Dataset split into training and testing
- Loss function: Mean Squared Error
- Optimizer: Adam

5. Prediction & Forecasting:

- Predict next-day stock price
- Generate 30-day forecast using recursive prediction

6. Sentiment Analysis:

- Custom rule-based or ML-based sentiment system
- Analyzes financial news/text data
- Outputs positive, negative, or neutral sentiment

7. Risk Analysis:

- Volatility calculation
- Trend strength evaluation
- Risk categorization (Low, Medium, High)

8. Visualization:

- Chart.js used for:
    - Historical trends
    - Predicted prices
    - Forecast graphs

https://doi.org/10.5281/zenodo.19606317

5. RESULTS

The proposed system was tested on multiple Indian stock datasets and demonstrated effective performance by the 3 models (LSTM, ANN and RNN).

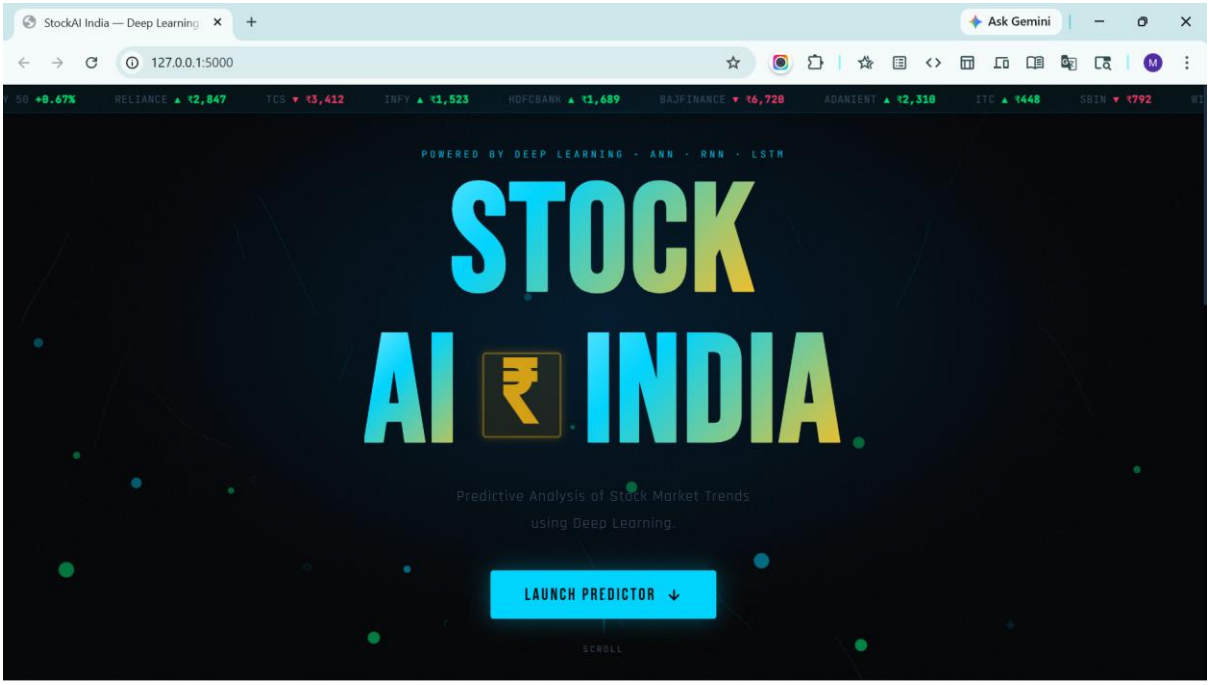


Fig 2. Home Page

When "**Launch Prediction**" is clicked, then it'll scroll down to "**Prediction Engine**".

https://doi.org/10.5281/zenodo.19606317

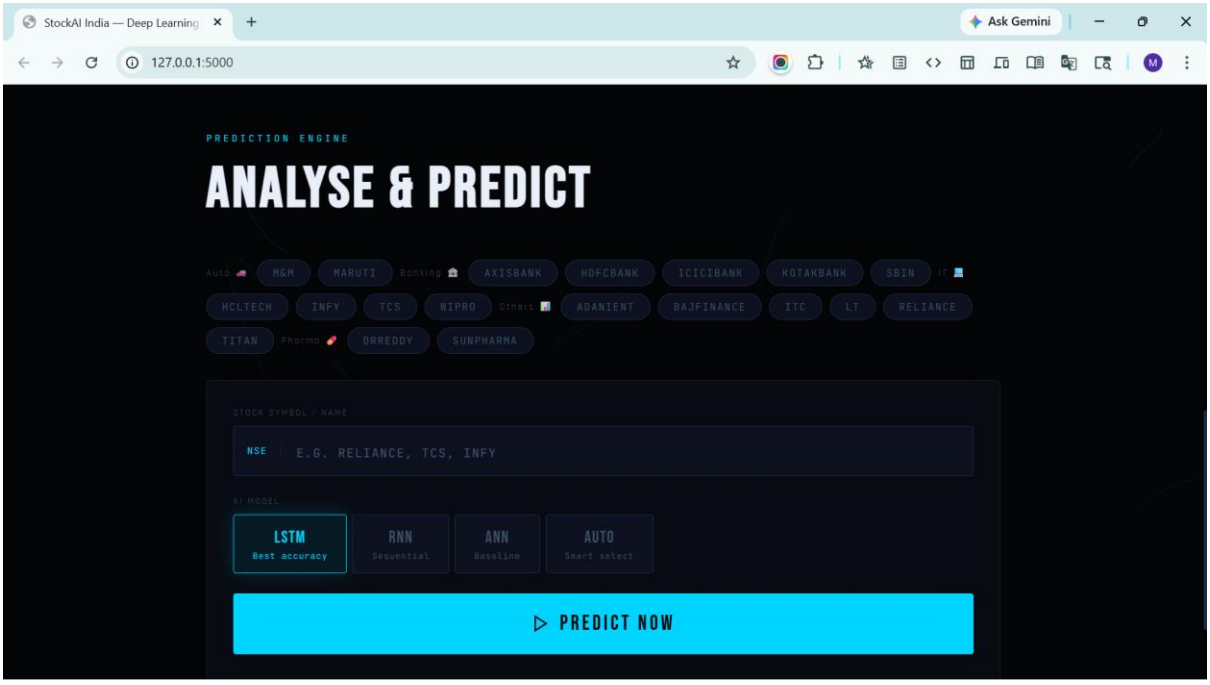
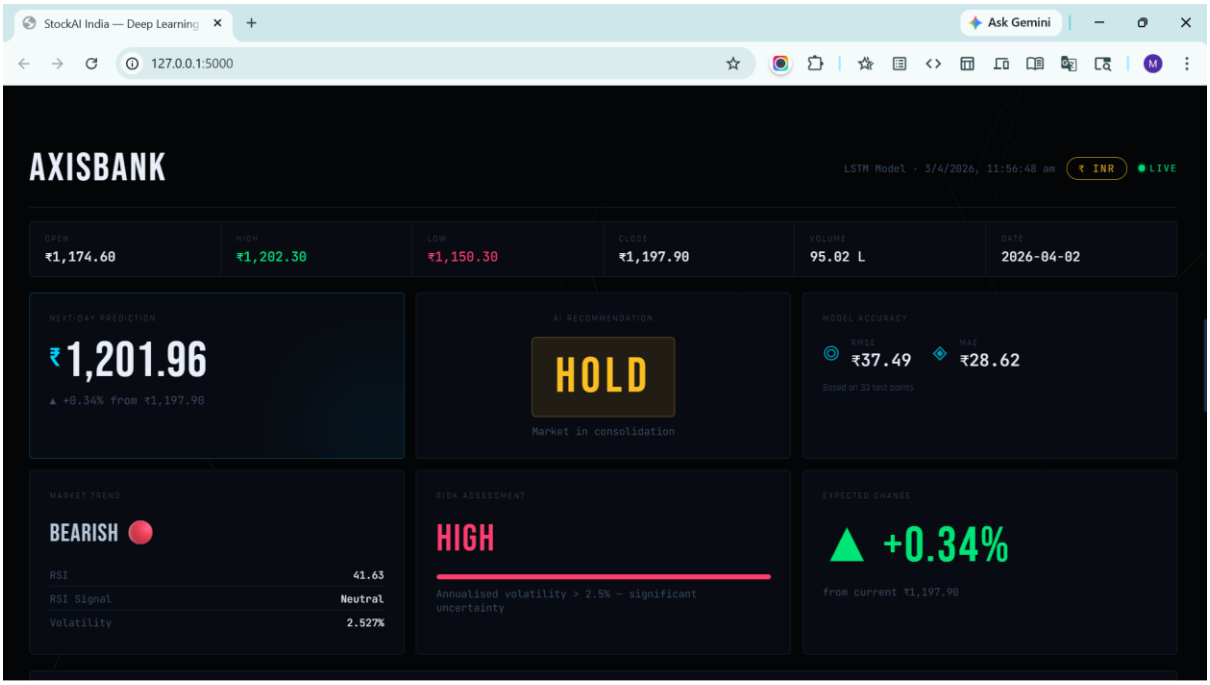


Fig 3. AI Prediction Engine

We are having different sectors here, like **Auto, Banking, IT, Pharma,** and **Others.**

From the Quick Select, if we click any of the stocks, it'll automatically predict the trend without even clicking the "Predict Now" button manually.

As we clicked "**Axisbank**", the results shows in the entire dashboard, AI Prediction Engine is recommending to "**HOLD**" the stock as market is inconsistent as we see in the Fig 4.



https://doi.org/10.5281/zenodo.19606317

Fig 4. Results of the stock

It also shows the 30-days Market Price Forecast / Trend as shown in Fig 5.

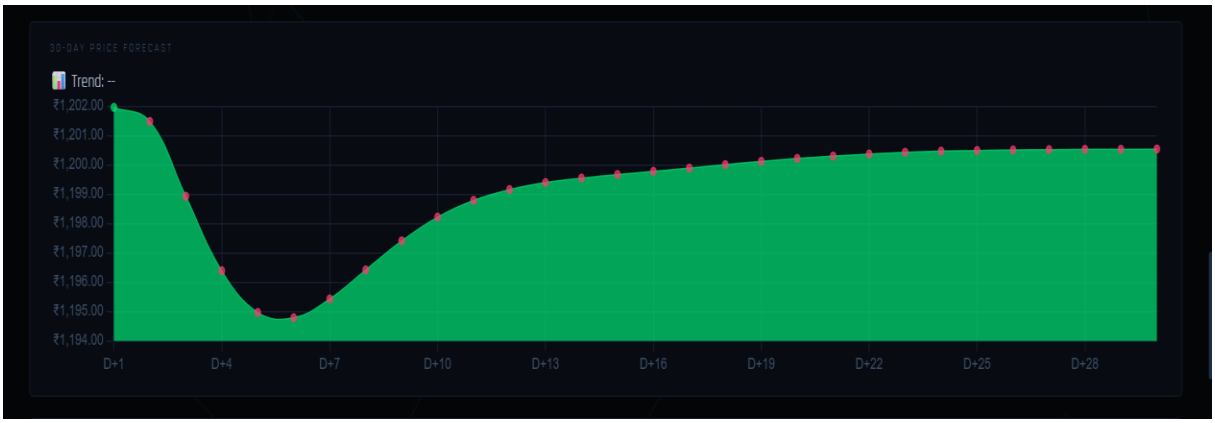


Fig 5. 30-days Price Forecast

And we can also see the graph plots of the stock in the current market, which shows the "**actual price**", "**LSTM predicted price**", "**ANN**", and "**RNN**" .

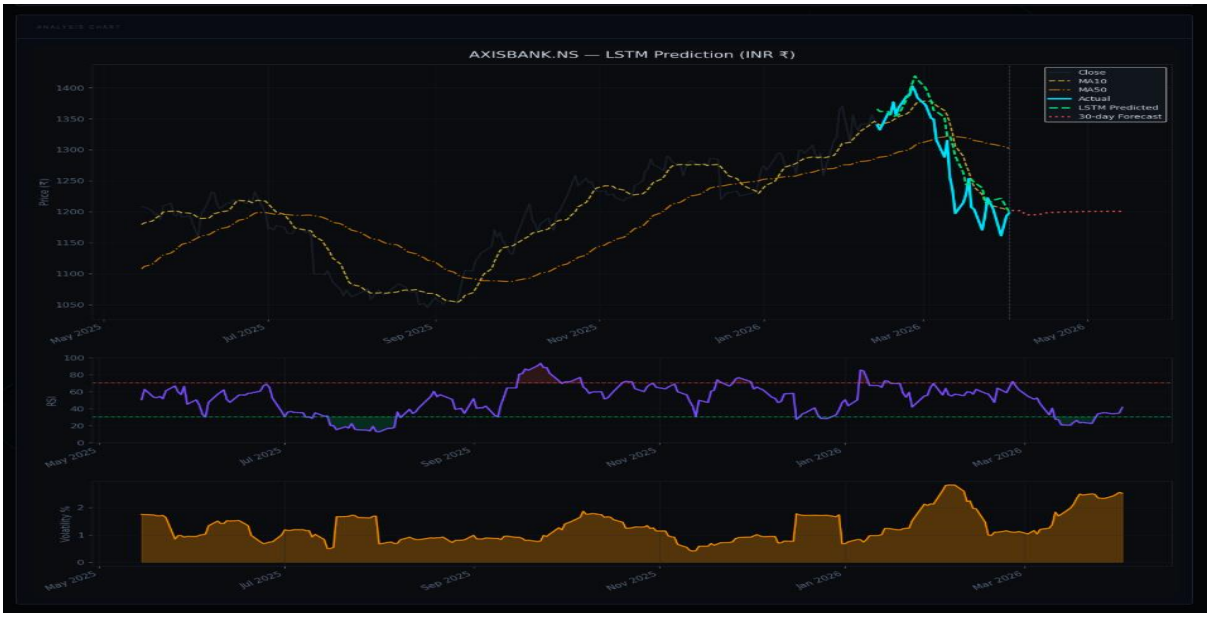


Fig 6. Analysis Chart

And when we come to the last part of the web-page, we see the "**Market Sentiment (AI)**" and also the "**Market Headlines (AI)**". By training the model on live stock prices, and based on past occurrences, it generates the headlines which is accurate according to the prediction.

https://doi.org/10.5281/zenodo.19606317

Fig 7. Market Sentiment (AI) & Market Headlines (AI)

Observations:

- LSTM model provided the highest accuracy among all models
- Predictions closely followed actual market trends
- 30-day forecasts showed consistent trend patterns
- Sentiment analysis improved decision-making insights
- Risk analysis helped classify stocks effectively

System Performance:

- Fast response time via Flask backend
- Smooth visualization using Chart.js
- Accurate predictions with minimal error

Overall, the system successfully integrates deep learning with real-time stock analysis.

6. CONCLUSION

This paper presents StockAI India, a deep learning-based stock prediction system that combines ANN, RNN, and LSTM models to provide accurate and reliable forecasts. The system enhances traditional prediction approaches by incorporating sentiment analysis, risk evaluation, and interactive visualization. The use of LSTM significantly improves prediction accuracy for time-series data.

StockAI India serves as a powerful tool for investors, enabling data-driven decision-making and reducing uncertainty in stock trading.

REFERENCES

1. Mojitaba Nabipour et al., Predicting Stock Market Trends Using Machine Learning and Deep Learning Algorithms via Continuous and Binary Data; a Comparative Analysis, 2020.

https://doi.org/10.5281/zenodo.19606317

2. Hiransha M et al., NSE Stock Market Prediction Using Deep-Learning Models, 2018.
3. Erfan Radfar, Stock market trend prediction using deep neural network via chart analysis, 2025.
4. Gaurang Sonkavde et al., Forecasting Stock Market Prices Using Machine Learning and Deep Learning Models: A Systematic Review, Performance Analysis and Discussion of Implications, 2023.
5. Ying-Lei-Lin et al., Using Deep Learning Techniques in Forecasting Stock Markets by Hybrid Data with Multilingual Sentiment Analysis, 2022.
6. Somenath Mukherjee et al., Stock market prediction using deep learning algorithms, 2021.
7. Jitendra Kumar Chouhan et al., A novel deep learning model for stock market prediction using a sentiment analysis system from authoritative financial website's data, 2025.
8. Wenjie Sun et al., Research on deep learning model for stock prediction by integrating frequency domain and time series features, 2025.
9. Zhenda Hu et al., Stock Market Trend Forecasting Based on Multiple Textual Features: A Deep Learning Method, 2021.
10. Timothy Julian et al., Stock Price Prediction Model Using Deep Learning Optimization Based on Technical Analysis Indicators, 2023.
11. Aryendra Singh et al., An Empirical Research and Comprehensive Analysis of Stock Market Prediction using Machine Learning and Deep Learning techniques, 2020.

https://doi.org/10.5281/zenodo.19606317