International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
ISSN: 3068-272X www.ijdim.com Original Research Paper

PROJECT TITLE: PREDICTING STOCK EXCHANGE TRENDS USING MACHINE LEARNING, DEEP LEARNING TECHNIQUES

[1]DevaRama Raju Matla,[2]Ch. China Subba Reddy
[1]M.Tech Student, [2] Professor
Department of Computer Science and Engineering
JBR Engineering College, University (Affiliated to JNTU Hyderabad)

ABSTRACT

Predicting stock market trends remains a challenging task due to the volatile and nonlinear nature of financial data. This study explores the application of machine learning and deep learning techniques to forecast stock price movements using historical data from the Tehran Stock Exchange. We evaluate nine machine learning models—Decision Tree, Random Forest, Adaboost, XGBoost, SVC, Naive Bayes, KNN, Logistic Regression, and ANN—and two deep learning models—RNN and LSTM. The models are trained on ten technical indicators derived from ten years of data, applied in both continuous and binary formats. Experimental results demonstrate that LSTM and RNN outperform traditional models, especially when using binary data. The study also presents a modular web-based system built using Python, Flask, and MySQL to facilitate real-time trend prediction.

Received: 05-10-2025 Accepted: 13-11-2025 Published: 21-11-2025

1. INTRODUCTION

The stock market is influenced by a multitude of factors,including economic indicators, political events, and investor psychology, making it inherently complex and nonlinear. Accurate prediction of stock trends can significantly benefit investors and financial analysts. Traditional methods like fundamental and technical analysis have been supplemented in recent years by data-driven approaches using machine learning (ML) and deep learning (DL). This research aims to enhance prediction accuracy by comparing a wide range of ML and DL models applied to both continuous and binary technical indicators. The study also introduces a scalable web application for real-time stock trend forecasting.

2. LITERATURE REVIEW

Several studies have applied ML and DL techniques to stock market prediction.Hassan et al. combined Genetic Algorithms (GA), ANNs, and Hidden Markov Models (HMM) for price forecasting. Huang et al. used SVM to predict trends in the NIKKEI 225 index, demonstrating its superiority over linear discriminant methods. Sun et al. proposed SVM ensembles for financial forecasting, while Ou et al. applied ten data mining techniques to the Hong Kong market. More recently, deep learning models like LSTMs and multi-filter neural networks (MFNN) have shown promise in capturing temporal dependencies and improving prediction accuracy. Our work builds on these approaches by systematically comparing multiple ML and DL models and introducing a novel binary preprocessing step for technical indicators.

3. METHODOLOGY/PROPOSED WORK

3.1 Data Collection and Preprocessing

We used ten years of historical data from four sectors of the Tehran Stock Exchange:petroleum, diversified financials, basic metals, and non-metallic minerals. Ten technical indicators were derived from open, close, high, and low prices. Two data formats were used:

· Continuous Data: Normalized values of technical indicators

· Binary Data: Transformed into +1 (upward trend) and -1 (downward trend)

3.2 Models

We evaluated the following models:

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
ISSN: 3068-272X www.ijdim.com Original Research Paper

· Machine Learning: Decision Tree, Random Forest, Adaboost, XGBoost, SVC, Naive Bayes, KNN, Logistic Regression, ANN
· Deep Learning: RNN, LSTM

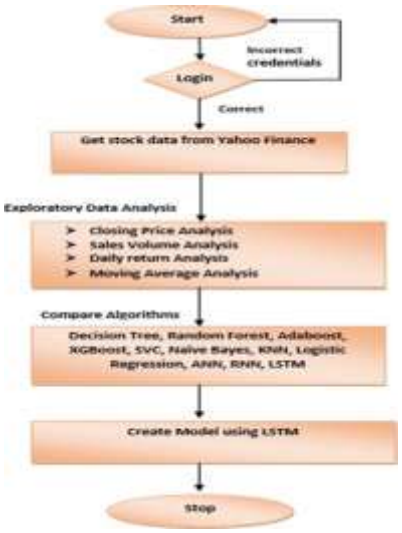
3.3 System Architecture

The system is divided into two modules:
· Admin Module: Data ingestion, exploratory analysis, model training, and evaluation
· User Module: Stock trend prediction using trained models
The architecture is implemented using Flask, MySQL, and Python, with modular blueprints for scalability.

3.4 System Flow

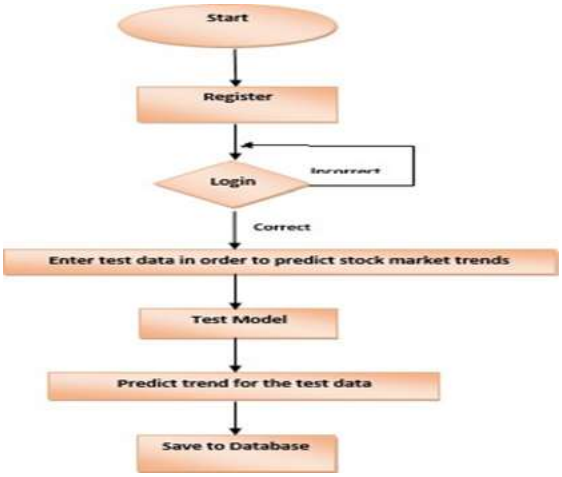
Data Flow Diagram - Admin:

Start → Login → Get Stock Data → Exploratory Data Analysis → Compare Algorithms → Create LSTM Model → Stop



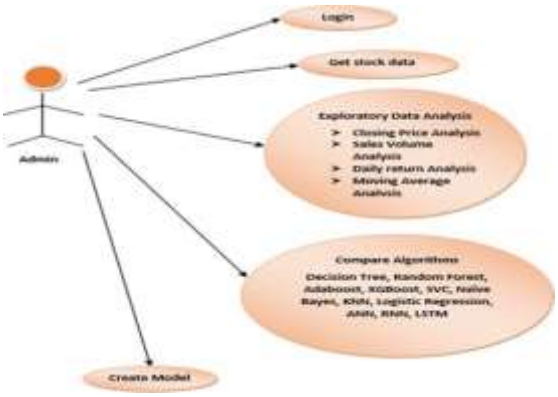
Data Flow Diagram - User:

Start → Register/Login → Enter Test Data → Test Model → Predict Trend → Save to Database



Use Case Diagram - Admin:

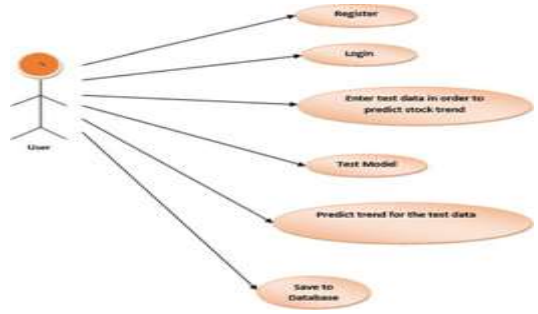
· Login
· Get stock data
· Exploratory Data Analysis (Closing Price, Sales Volume, Daily Return, Moving Average)
· Compare Algorithms (All ML/DL models)
· Create Model



Use Case Diagram - User

· Register
· Login
· Enter test data
· Test Model
· Predict trend
· Save to Database

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
ISSN: 3068-272X www.ijdim.com Original Research Paper



4. IMPLEMENTATION AND RUNTIME DETAILS

The system was developed using:

· Frontend: HTML, CSS, JavaScript
· Backend: Python, Flask
· Database: MySQL
· ML/DL Libraries: Scikit-learn, TensorFlow, Keras
· IDE: PyCharm 2019 Professional Edition

Hardware Configuration:

· HP Laptop with Intel Core i7 processor
· 8 GB RAM
· 1TB Hard Disk

Software Configuration:

· Windows 10 OS
· MySQL Workbench 8.0
· Python 3.8

Key implementation features:

· Modular Blueprints: For reusable components
· Pickling: To save and reload trained models
· Pipelines: For automated data preprocessing and training

5. RESULTS OUTPUT

The models were evaluated using accuracy metrics.Sample results for the Microsoft (MSFT) dataset:

· Logistic Regression: 58%
· Support Vector Machine: 60.78%
· Decision Tree: 45.10%
· Random Forest: 54.90%
· Adaboost: 50.98%
· LSTM: Highest accuracy among all models

The system interface includes:

· Exploratory Data Analysis (Price Analysis, Sales Volume Analysis, Daily Return Analysis, Moving Average Analysis)
· Algorithm Comparison Dashboard
· Model Creation Interface
· Prediction Results Display

6. FUTURE ENHANCEMENTS

To further improve prediction accuracy, we propose integrating Implicit Transformer with RNN, LSTM Capabilities, -based attention mechanisms to process:

· Financial news articles and TV news transcripts
· Company revenue projections and declared news
· Social media sentiments and investor forums
· Real-time financial news and market commentary

This NLP, LLM, or Pre trained – enhanced models would capture market sentiment and external events, providing a more holistic view of factors influencing stock prices and enabling more accurate physician future investment predictions.

7. CONCLUSION

This study demonstrates the effectiveness of deep learning models,particularly LSTM and RNN, in predicting stock market trends. The use of binary technical indicators further improves model performance. The proposed web-based system offers a practical tool for investors and analysts. Experimental results confirm that deep learning approaches outperform traditional machine learning models in stock trend prediction. Future work will focus on integrating multimodal data sources, including textual and sentiment analysis using Transformer architectures, to enhance predictive capabilities.

REFERENCES

[1]J. J. Murphy, Technical Analysis of the Financial Markets, 1999.
[2]T. Turner, A Beginner's Guide to Day Trading Online, 2007.

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
ISSN: 3068-272X www.ijdim.com Original Research Paper

[3]H. Magsood et al., "A Local and Global Event Sentiment Analysis," 2020.
[4]W. Long et al., "Deep Learning-Based Feature Engineering for Stock Price Prediction," 2019.
[5]J. B. Duarte et al., "Investor Psychology's Impact on Stock Markets," 2017.
[6]M. R. Hassan et al., "A Fusion Model of HMM and ANN," 2007.
[7]W. Huang et al., "SVM for Stock Market Prediction," 2005.
[8]J. Sun et al., "SVM Ensembles for Financial Prediction," 2012.
[9]P. Ou et al., "Data Mining for Stock Index Prediction," 2009.