CENTRAL TOOL ROOM & TRAINING CENTER

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Department Of CSE(AI/ML)

CERTIFICATE

Certified that Major Project Work entitled "**STOCK PRICE PREDICTION**" is a bonafide work carried out by Ashis Kumar Bhuyan, Suman Sourav Dash, Sritam Mohapatra & Yashodev Rout in particular fulfillment of the requirements for the award of CERTIFICATION COURSE IN AI/ML from CENTRAL TOOL ROOM & TRAINING CENTER, Bhubaneswar, during the year 2025. It is certified that all the correction/suggestion indicated for internal assessment have been incorporated in the report. The major project report has been approved as is satisfied the academic requirements in the respect of project work prescribed for AI/ML, CTTC, Bhubaneswar.

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Course

Faculty

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Place: Bhubaneswar AI/ML

DECLARATION

We the batch of AI/ML studying as interns at CTTC (Central Tool Room & Training Center), Bhubaneswar, hereby declare that this major project work entitled "**STOCK PRICE PRDEICTION**" which is being submitted by us in the partial fulfillment for the award of the internship of AI/ML from CTTC, Bhubaneswar is an authentic record carried out during the Training year June 2025, under the supervision of Mrs. Ritu Maity at CTTC, Bhubaneswar.

ABSTRACT

Stock price prediction is the process of trying to guess how a stock's price will change in the future. This is important for investors who want to make profits or avoid losses. In the past, people used math-based models to predict prices, but now, with more data and better computers, new methods like machine learning and deep learning are being used. These models can find hidden patterns in past stock prices, trading volumes, and even news or social media. Some popular tools include decision trees, support vector machines, and neural networks like LSTM. While these methods show promise, it's still hard to predict prices accurately because markets change quickly and are affected by many factors. This study looks at different ways to predict stock prices and what can be done to improve them in the future.

Keywords:-

Stock Price Prediction, Investors , Profits, Losses, Mathematical Models, Machine Learning, Deep Learning, Historical Data, Trading Volume, News Analysis ,Social Media, Decision Trees, Support Vector Machines (SVM), Neural Networks, LSTM (Long Short-Term Memory), Market Volatility, Prediction Models

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INTRODUCTION

In today's world, many people invest in the stock market to earn money. However, predicting whether a stock's price will go up or down is not easy. Stock prices change quickly and are affected by many things like company news, market trends, and even public opinion. In the past, investors used simple math or manual methods to study stock data and make decisions. But now, with the help of technology and better computers, new smart systems are being used to predict stock prices more accurately.

One of the most powerful tools in this field is **Deep Learning**, a part of Artificial Intelligence. Deep learning allows a computer to learn from past data and make smart predictions without being told exactly what to do. By using deep learning, we can create systems that learn patterns in stock prices and help investors make better choices.

There are many ways to predict stock prices, such as:

- **Manual Analysis**
- **Statistical Methods**
- **Machine Learning Methods**
- **Deep Learning Models**
- **Sentiment Analysis from News and Social Media**

Manual Analysis
This is the old method where people look at stock charts and company reports by hand to guess future prices. It takes time and depends on personal knowledge.

Statistical Methods
These models use past price data to predict future prices. Tools like ARIMA use patterns in the data to make predictions.

Machine Learning Methods
These use computer programs that learn from past data. Algorithms like Decision Trees or SVM help make better predictions than manual methods.

Deep Learning Models
These models, like LSTM (Long Short-Term Memory), are good at understanding time-based data like stock prices. They can learn from large amounts of data and give better predictions over time.

Sentiment Analysis
This method checks how people feel about a stock by reading news, tweets, or other online content. If most people are positive about a company, the stock might go up, and vice versa.

SYSTEM ARCHITECTURE:

The architecture of the proposed stock price prediction system is a design diagram that shows how the system works as a whole. It explains each part (or module) of the system and how they are connected to one another. This diagram helps to clearly understand the flow of data and the steps involved in predicting stock prices. It aims to show the internal structure of the system and how different functions are carried out.

The architecture generally includes the following modules:

- **Data Collection :**
  Collects historical stock data from financial websites or APIs, including prices, volume, and other market-related information.
- **Data Preprocessing :**
  Cleans and prepares the collected data by removing missing values, normalizing values, and converting data into a usable format for the model.
- **Feature Extraction :**
  Identifies and selects important features (like opening price, closing price, moving average, etc.) that affect stock price changes.
- **Prediction Model :**
  Uses machine learning or deep learning models (such as LSTM) to learn from the historical data and make future predictions.
- **Result Visualization :**
  Displays the predicted stock prices using graphs or charts so users can easily understand the trends.

- **Evaluation :**
  Compares the predicted prices with actual prices to measure the accuracy of the model using metrics like RMSE (Root Mean Square Error) or MAE (Mean Absolute Error).

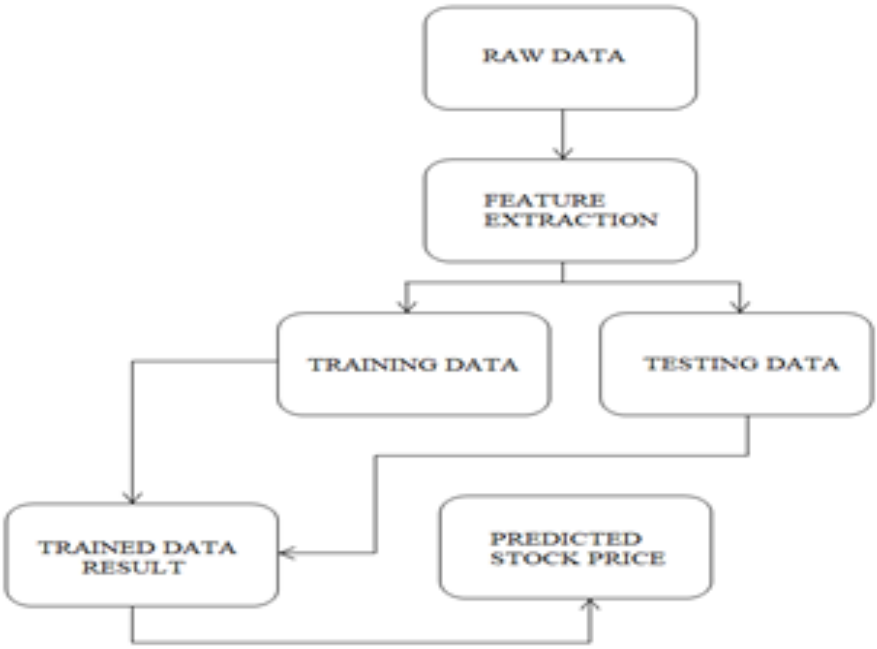

Fig. 3: Process Flow

Hardware and software Part

The project consists mainly of **software components**, as stock price prediction is a data-driven, software-based system. However, hardware may be used in terms of computing devices like a PC or server for model training and testing.

SOFTWARE

The software part is the backbone of this system. It includes:

- **Machine Learning & Deep Learning Libraries**:
  Used to build and train models like LSTM (Long Short-Term Memory) for accurate stock predictions.
- **Python Programming Language**:
  Python is used for scripting and model development due to its rich ecosystem for data science.

- **Libraries and Frameworks**:
  - **TensorFlow/Keras** – Used for deep learning model development.
  - **NumPy & Pandas** – For data manipulation and analysis.
  - **Matplotlib & Seaborn** – For visualizing data and model output.
  - **Scikit-learn** – For preprocessing and evaluation.
- **Transfer Learning**:
  Advanced technique where a pre-trained model (trained on financial or similar time-series data) is adapted for specific stock datasets, helping reduce training time and improve performance.

HARDWARE

Stock prediction is a software-based system, but the following hardware is required for processing and visualization:

- **Computer/Laptop**:
  Required for running scripts, training models, and testing the system.
- **GPU (Optional)**:
  For faster training of deep learning models like LSTM and CNN, a system with a dedicated GPU is helpful.
- **Internet Connection**:
  For accessing live stock data from online sources and APIs like Yahoo Finance or Alpha Vantage.

COMPONENTS & SUPPLIES

1. Personal Computer or Laptop
2. Python Installed (with required libraries)
3. Internet Connection
4. Jupyter Notebook / IDE (e.g., PyCharm, VS Code)
5. API Key for financial data provider (e.g., Alpha Vantage, Yahoo Finance

INTRODUCTION TO SOFTWARE TOOLS

LSTM (Long Short-Term Memory)

LSTM is a type of Recurrent Neural Network (RNN) specially designed for sequential data like time series. It is capable of learning patterns from past stock prices and predicting future values. It helps solve the problem of short-term memory in standard RNNs.

Transfer Learning in Financial Forecasting

Transfer learning involves using a model trained on one dataset and applying it to another related dataset. In stock prediction, transfer learning can reduce training time and improve prediction performance by using pre-trained models on financial trends.

Data Collection using APIs

Data is collected using APIs like Yahoo Finance, Alpha Vantage, or Quandl. The API returns historical stock data such as Open, Close, High, Low, and Volume in structured formats (CSV/JSON), which are processed for training and testing.

WORK FLOW OF GUI

1. **This project uses Python's Tkinter or PyQt5 for GUI design** and SQLite for managing the prediction records.
2. **User Interface (UI)** has separate sections for:
    - **Admin Login**
    - **Model Training**
    - **Stock Prediction**
    - **Result Visualization**
3. **Admin Login Page**:
   Allows the authorized user to access the model training and prediction modules.

4. **Model Training Page**:
   Here, the user selects the stock, sets the prediction window (e.g., 7 days), and trains the model using historical data.

5. **Prediction Page**:
   After training, the user can enter a date range or number of future days, and the system predicts future stock prices.

6. **Result Visualization Page**:
   Displays predicted vs actual stock prices using line graphs, candlestick charts, and tables.

WORK FLOW OF DATABASE

1. **In the stock price prediction system**, the database plays a critical role in storing historical data, model outputs, and user interaction logs.

2. **Database Tables**:

   - stock_data: Stores raw historical data (Date, Open, Close, Volume, etc.).

   - prediction_results: Saves predicted prices with timestamps for evaluation.

   - user_logs: Stores login and activity history of users interacting with the system.

3. **During training**, the historical data is pulled from the database or fetched via API, then preprocessed and used to train the model.

4. **After prediction**, the predicted stock prices are saved in prediction_results along with error metrics (e.g., RMSE, MAE) for future comparison and analysis.

5. **Visualization tools** retrieve data from the database and display it in an easy-to-understand graphical format for better decision-making.