**Cracking the Market Code with AI-Driven Stock Price Prediction Using Time Series Analysis**

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### **1. Problem Statement**

* *[Stock market prices are influenced by both historical trends and real-world events reflected in financial news. Traditional forecasting methods often ignore these external factors.*
* *This project addresses the problem of stock price prediction by combining time series analysis of stock prices with sentiment analysis of news headlines, aiming to better forecast the next-day stock price of Reliance Industries using AI techniques.*
* *Type of problem: Regression*
* *Relevance: Helps investors make more informed decisions by capturing both numerical and textual market indicators. area*

### **2. Project Objective**

* *Build a predictive model for stock closing prices using LSTM (Long Short-Term Memory).*
* *Integrate sentiment analysis from real-world financial news.*
* *Evaluate model performance using metrics like RMSE.*
* *Visualize predictions against actual values to assess trend accuracy.*

### **3. Flowchart of the Project Workflo****w**

### **4. Data Description**

*Stock Price Data: Yahoo Finance (yfinance) – structured, time series*

*News Data: NewsAPI – unstructured, text headlines*

*Sentiment Analysis: TextBlob*

*Records: 30 days of stock prices with ~100 news headlines*

*Target Variable: Close price*

*Type: Time-series + Sentiment-enhanced regression*

### **5. Data Preprocessing**

* *[Reset index and clean stock data*
* *Convert news publish date to match stock date format*
* *Apply TextBlob to compute sentiment polarity*
* *Merge data on Date*
* *Normalize features using MinMaxScaler*
* *Final dataset includes: Close, Sentiment*

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### **6. Exploratory Data Analysis (EDA)**

Line plot of Close prices over 30 days

Sentiment trend line plotted by date

Observed that positive sentiment often aligns with upward price trends

Correlation between Sentiment and Close ~ moderate positive

### **7. Feature Engineering**

* *Created 10-day rolling sequences of Close + Sentiment as input*
* *Target: next-day Close*
* *Sentiment polarity used as a numeric feature*
* *Handled small sample size with short window and dropout layers*

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### **8. Model Building**

* + *Model Type: LSTM*
  + *Features: Close (scaled), Sentiment*
  + *Architecture: 2 LSTM layers + Dropout + Dense*
  + *Evaluated using RMSE*
  + *Achieved Test RMSE ≈ ₹18.08*
  + *Predicted prices followed actual trends closely*

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### **9. Visualization of Results & Model Insights**

* *[Actual vs Predicted line plot*
* *RMSE printed on chart title*
* *Example Output:*
* *Day 1: Actual = ₹1275.10, Predicted = ₹1259.30*
* *Day 2: Actual = ₹1252.60, Predicted = ₹1270.90*
* *Model captured short-term fluctuations despite small dataset*

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### **10. Tools and Technologies Used**

### **Language: Python**

### **IDE: Google Colab**

### **Libraries: yfinance, pandas, numpy, TextBlob, sklearn, matplotlib, tensorflow**

### **Visualization: matplotlib**

### **Deployment (Planned): Streamlit**

### **11. Team Members and Contributions**

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| Name | Roles | Responsibilities |
| KaviyM | Team Lead & Model Developer | Model selection, implementation (LSTM, ML), evaluation |
| Dhivya.R | Data Analyst & EDA Specialist | Data collection, cleaning, exploratory analysis |
| Kanitha.S | NLP / Sentiment Analyst | News data processing, sentiment scoring |
| Amutha.V | Frontend & Deployment Specialist | Build Streamlit/Gradio interface, visualization dashboard |
| Brindhashree.R | Research and Documentation Specialist | Literature survey, report writing, project documentation |