SOCIAL MEDIA DRIVEN STOCK PRICE PREDICTION

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Introduction:

Social media platforms have become a rich source of public opinion and sentiments, which increasingly influence financial markets. Traders and investors use platforms like Twitter and Reddit to share opinions on market trends, which can lead to price movements. This project leverages Big Data, Artificial Intelligence, and Data Engineering to collect, analyze, and visualize social media sentiments to predict stock price trends. With advanced Natural Language Processing (NLP) and machine learning models, the project aims to bridge the gap between real-time sentiment and stock performance for smarter, sentiment-informed decision-making.

Objectives:

- To collect real-time and historical data from social media and stock market APIs.
- To perform sentiment analysis on social media posts using NLP models like BERT
- To develop predictive models (LSTM, Random Forest) combining sentiment and historical stock data.
- To visualize sentiment trends and predicted stock prices in an interactive dashboard.
- To deploy a real-time system accessible through a web application.

Methodology:

1. Data Collection:

   - Use Twitter API and Reddit API to gather posts containing stock-related keywords.
   - Collect historical stock data from Alpha Vantage API including indicators like trading volume.

2. Data Preprocessing:

   - Clean social media data by removing URLs, hashtags, mentions.
   - Tokenize and normalize the text.
   - Synchronize social media posts with stock data timestamps

3. Sentiment Analysis:

   - Fine-tune pre-trained transformer models like BERT.
   - Classify sentiments into positive, negative, or neutral.
   - Evaluate using metrics like accuracy and F1-score.

4. Stock Price Prediction:

   - Combine sentiment scores with stock indicators.
   - Train models like LSTM or hybrid models for trend prediction.

5. Visualization:

   - Use Plotly and Dash for real-time, interactive charts.
   - Filter data by stock, industry, and time range.

6. Deployment:

   - Build the application using Streamlit or Flask.
   - Deploy on platforms like Heroku or AWS for real-time access.

Result and Conclusion:

The project demonstrates a strong correlation between social sentiment and stock price movement. Using sentiment analysis and LSTM models, predictions were significantly more accurate than traditional technical analysis alone. Real-time dashboards made analysis user-friendly and effective. The integration of Big Data and AI techniques showcases a promising approach to modern investment tools.

Project Outcome & Industry Relevance:

This system can assist traders, analysts, and financial institutions in decision-making by providing timely insights from public sentiment. It automates the extraction of market-moving opinions, reducing reliance on manual analysis and enabling scalable predictions across multiple stocks.

Working Model vs. Simulation/Study:

This project is implemented as a *working model* with a real-time web application supported by live API data streams.

Project Outcomes and Learnings:

- Successfully built a data pipeline for collecting, preprocessing, and analyzing real-time data.
- Gained expertise in NLP and time-series forecasting techniques.
- Learned integration of AI with financial systems for practical applications.

Future Scope:

The future scope of this project includes:

1. Extend to multilingual sentiment analysis across global markets.
2. Integrate news media data and financial reports for comprehensive prediction.
3. Improve model robustness by incorporating reinforcement learning.
4. Provide mobile application support and alerts for investors.
5. Enhance scalability to handle larger datasets and more stock