Stock Price Prediction Using AI and Deep Learning

Abstract

Stock market prediction remains a significant challenge due to market volatility, external influences, and human emotions. Traditional statistical models struggle to process the vast amount of structured and unstructured financial data efficiently. This project introduces an **AI-powered deep learning framework** for predicting stock prices using **Recurrent Neural Networks (RNNs), LSTMs, and Transformer-based models** such as BERT for financial sentiment analysis.

The dataset comprises historical stock prices, trading volumes, macroeconomic indicators, and sentiment data extracted from financial news and social media platforms. The deep learning model incorporates **attention mechanisms** to weigh important financial signals and dynamically adjust predictions based on real-time events.

Additionally, a **reinforcement learning-based agent** is integrated to simulate market conditions and optimize trading strategies. The model is trained using **Generative Adversarial Networks (GANs)** to simulate realistic price distributions and improve predictive robustness. Performance is evaluated using RMSE, R-squared, and Sharpe ratio metrics. Future advancements may include **multi-modal AI** integrating voice-based investor sentiment and high-frequency trading analysis.