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How Do AI Models Efficiently Use Various Algorithmic Processes to Predict Fluctuations in The Stock Market?

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Abstract

The rise of artificial intelligence has revolutionized countless industries, and its impact in the financial market is no exception. In 2023 alone, 60% of hedge funds reported using AI tools for stock market analysis and prediction, showing just how common machine learning intelligence has become. With AI's global market in finance projected to pass 42 billion by 2030, understanding how these models work and function is an extremely important question. Within this fast growing field, stock market prediction stands out as both a highly complex and high-stakes application of AI. The challenge lies in the unpredictable combination of numerical, emotional, and geopolitical variables that influence market behaviors. We have conducted this review to fill a gap in the literature by analyzing how specific AI models predict stock market fluctuations, focusing on both qualitative and quantitative findings within this scope. Our research explores three main areas. First, we examined how AI models gather and process both structured data and unstructured data using natural language processing (NLP) and sentiment analysis. Second, we analyzed algorithms like the Kalman Filter, Gaussian Process, and Neural Networks and how each type of model handles forecasting under different data and volatility conditions. Third, we evaluated the reliability of AI in this field, highlighting its advantages of speed, pattern recognition, and lack of emotional fallibility alongside its vulnerabilities of over-fitting, data manipulation, and its poor visibility for black swan events. This review suggests that future research should focus on hybrid systems combining human judgement and AI. As the financial industry evolves, understanding the strengths and limits of AI will be essential for ethical and accurate market forecasting.

Keywords: artificial intelligence; financial markets; hedge funds; natural language processing; stock market prediction