IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 1, December 2025
Impact Factor: 7.67

Machine Learning for Stock Valuation and Portfolio Optimization

Shreyas S, Gagandeep C, Dr Mahesh Kumar N
Department of Information Science
Global Academy of Technology , Bangalore, Karnataka, India
shreyas1ga22is148@gmail.com and gagandeep1ga22is055@gmail.com

Abstract: *Stock valuation and portfolio optimization are critical challenges in modern financial markets due to inherent volatility and complex market dynamics. "Classical valuation frameworks like DCF depend on analyst-driven assumptions about future cash flows and discount rates; these subjective judgments introduce systematic errors that undermine prediction consistency . Modern portfolio construction algorithms face two distinct bottlenecks: computational complexity scaling nonlinearly with asset universe size, and latency constraints in dynamic rebalancing when market conditions shift rapidly. This paper presents an integrated machine learning framework that combines advanced deep learning architectures with traditional financial valuation methods. We implement Transformer models with Time2Vec encoding for stock price prediction, automate DCF valuation using imitation learning and guided policy search, and develop a high-performance computing platform for dynamic portfolio optimization. Experimental results demonstrate superior performance compared to baseline methods, achieving R^2 of 0.92 for price prediction and 136% speedup in portfolio optimization computations. The proposed system effectively handles minute-level and tick-level data, enabling real-time portfolio rebalancing with improved risk-adjusted returns.*

Keywords: Stock Valuation, Portfolio Optimization, Transformer Models, Discounted Cash Flow, Deep Learning