Design and Backtesting of an Algorithmic Trading System

Using Technical Indicators and Machine Learning

. Abstract

This paper presents the design and implementation of an algorithmic trading system using technical indicators such as SMA, EMA, and RSI, combined with machine learning-based price prediction. The system performs backtesting, risk analysis, and trading simulation using historical stock market data. Results demonstrate improved risk-adjusted returns compared to a buy-and-hold strategy.

Keywords: Algorithmic Trading, Technical Analysis, RSI, SMA, EMA, Machine Learning, Stock Market, Backtesting

1. Introduction

- Problem of emotional trading
- Need for automated systems
- Objective of this project

2. Literature Review

- Rule-based strategies
- Indicator-based trading
- ML in financial forecasting

3. Methodology

- Data collection (Yahoo Finance API)
- Indicator calculation
- Buy/Sell signal generation
- Strategy backtesting
- Risk metrics (Sharpe, Drawdown)

4. System Architecture

- Data Layer
- Strategy Layer
- Execution Layer (Mock Broker)
- Visualization Layer (Streamlit)

5. Results & Analysis

- Market vs Strategy returns

- Drawdown comparison
- Trading journal analysis

6. Conclusion

- System performance
- Limitations
- Future scope (Live API, LSTM)

7. Future Work

- Zerodha Kite API
- Reinforcement Learning
- Portfolio optimization