Project Matthew: Algorithmic Trading System

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Introduction / Project Overview

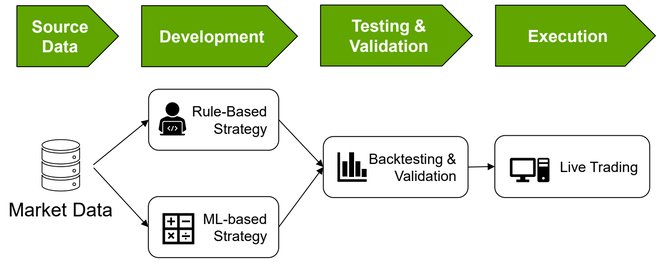
In modern financial markets, traditional discretionary trading and manual asset management are inherently exposed to human bias, emotional decision-making, and scalability limitations. While algorithmic trading mitigates these issues, many systems fail due to poor data quality, weak risk controls, overfitting, or fragile execution in live market conditions.

This project was conducted to design and deploy a robust Forex Algorithmic Trading System that integrates quantitative analysis, machine learning, and low-latency execution. The system aims to support systematic capital allocation across currency instruments while maintaining strong risk-adjusted performance and execution reliability in real-world trading environments.

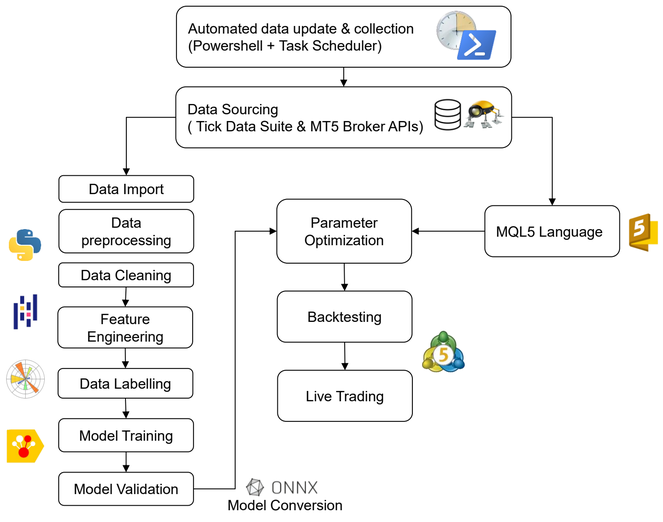
Objectives

- Design a modular end-to-end trading pipeline integrating data ingestion, robust strategy, risk management, and low-latency execution.
- Implement and validate both rule-based quantitative strategies and machine learning–driven models through rigorous backtesting within a maintainable and extensible code architecture.
- Apply a unified risk management framework to control drawdowns, position sizing, and trade exposure.
- Evaluate system performance using profitability and risk-adjusted return metrics.

Design



Implementation Workflow

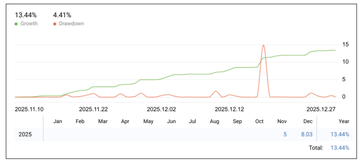


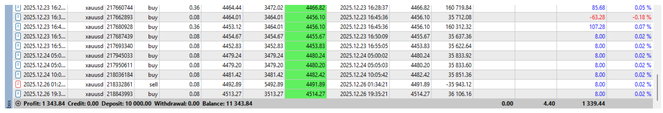
Result

The developed trading system was evaluated through live market deployment using MetaTrader 5, with a primary focus on the rule-based strategy due to its superior empirical performance.

The most statistically meaningful results were obtained from a USD 10,000 live trading account, operated over a period of approximately 47 days (10 November 2025 to 27 December 2025). According to the MT5 performance report , the strategy achieved:

Net profit: USD +1,343.84
Total return: +13.44%
Maximum drawdown: ~4.41%
Number of trades: 113
Win rate: ~90.27%
Profit factor: ~2.35
Recovery factor: ~2.79





2025.12.23 16:2...	xauusd	217660744	buy	0.36	4464.44	3472.02	4466.82	2025.12.23 16:28:37	4466.82	160 719.84		85.68	0.05 %
2025.12.23 16:3...	xauusd	217662893	buy	0.08	4464.01	3464.01	4456.10	2025.12.23 16:45:36	4456.10	35 712.08		-63.20	-0.18 %
2025.12.23 16:4...	xauusd	217680928	buy	0.36	4453.12	3464.01	4456.10	2025.12.23 16:45:36	4456.10	160 312.32		107.28	0.07 %
2025.12.23 16:5...	xauusd	217687439	buy	0.08	4454.67	3454.67	4455.67	2025.12.23 16:50:09	4455.67	35 637.36		8.00	0.02 %
2025.12.23 16:5...	xauusd	217693140	buy	0.08	4452.83	3452.83	4453.83	2025.12.23 16:55:05	4453.83	35 622.64		8.00	0.02 %
2025.12.24 05:0...	xauusd	217945033	buy	0.08	4479.24	3479.24	4480.24	2025.12.24 05:00:02	4480.24	35 833.92		8.00	0.02 %
2025.12.24 05:0...	xauusd	217950611	buy	0.08	4479.20	3479.20	4480.20	2025.12.24 05:05:03	4480.20	35 833.60		8.00	0.02 %
2025.12.24 10:0...	xauusd	218036184	buy	0.08	4481.42	3481.42	4482.42	2025.12.24 10:05:42	4482.42	35 851.36		8.00	0.02 %
2025.12.26 01:2...	xauusd	218332681	sell	0.08	4492.89	5492.89	4491.89	2025.12.26 01:34:21	4491.89	-35 943.12		8.00	0.02 %
2025.12.26 19:3...	xauusd	218843993	buy	0.08	4513.27	3513.27	4514.27	2025.12.26 19:35:21	4514.27	36 106.16		8.00	0.02 %
Profit: 1 343.84 Credit: 0.00 Deposit: 10 000.00 Withdrawal: 0.00 Balance: 11 343.84											0.00	4.40	1 339.44

All trades during this period were executed on XAUUSD, reflecting a focused deployment on a single, highly volatile instrument. The equity curve exhibited a generally upward trajectory with intermittent drawdowns, indicating profitable operation under live market conditions with controlled downside risk.

A secondary live account with a larger capital base showed lower returns over a shorter period and fewer trades . Due to its limited statistical significance, it was not used as the primary basis for evaluation.

The machine learning-based strategy was also implemented end-to-end and evaluated via historical backtesting. However, it did not demonstrate sufficient profitability or stability to justify live deployment within the project timeframe.

Conclusion

This project demonstrates that robust system design and execution discipline are more critical to practical trading performance than model complexity alone. The rule-based strategy, when deployed with deterministic logic and structured risk management, achieved measurable profitability under real market conditions while maintaining controlled drawdowns.

Although the machine learning-based approach did not yield profitable results, the project successfully delivered a complete ML trading pipeline, including data preprocessing, supervised model training, and ONNX-based deployment into MetaTrader 5. Its underperformance highlights the inherent difficulty of applying predictive models to non-stationary financial markets and reinforces the importance of realistic validation over theoretical capability.

Overall, the project provides empirical evidence that algorithmic trading is fundamentally a systems engineering problem, where execution realism, risk control, and validation methodology play a decisive role. The developed platform establishes a solid foundation for future work, including extended live testing, multi-instrument evaluation, and further refinement of learning-based strategies.