

AUTOMATED TRADING: USING EXPERT ADVISORS AND ALGORITHMIC SYSTEMS



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1. Introduction to Automated Trading Systems

What is Automated Trading?

Automated trading, also known as algorithmic trading or robo-trading, uses computer programs to enter and exit trades based on pre-set criteria. These programs can operate without human intervention, executing trades at speeds and frequencies impossible for a human trader. Automated trading systems (ATS) rely on algorithms, which are a set of rules or calculations designed to perform specific tasks.

History and Evolution

Automated trading has its roots in the 1970s when the New York Stock Exchange (NYSE) introduced the Designated Order Turnaround (DOT) system. This system automated order routing and execution, paving the way for more sophisticated algorithmic trading. Over the decades, advancements in technology and increased computing power have enabled the development of complex trading algorithms capable of analyzing vast amounts of data and making split-second decisions.

Benefits of Automated Trading

- **Speed and Efficiency:** Algorithms can process and execute trades faster than humans.
- **Emotion-Free Trading:** Eliminates human emotions, leading to more disciplined and consistent trading.
- **Backtesting:** Ability to test strategies on historical data to gauge their effectiveness.
- **24/7 Trading:** Automated systems can trade around the clock without fatigue.

Risks and Challenges

- **Technical Failures:** System glitches or connectivity issues can lead to significant losses.
- **Over-Optimization:** Creating a strategy that works well in backtesting but fails in live trading.
- **Market Conditions:** Algorithms may not adapt well to changing market conditions or unexpected events.

2. Expert Advisors (EAs) for MT4/MT5

What are Expert Advisors?

Expert Advisors (EAs) are automated trading systems designed for the MetaTrader 4 (MT4) and MetaTrader 5 (MT5) platforms. EAs use the MQL4 and MQL5 programming languages to define

trading strategies, which the platform executes automatically. They can handle everything from market analysis to trade execution and management.

Creating and Installing EAs

1. **Developing an EA:** Traders can create their own EAs using the MetaEditor tool within the MetaTrader platform. This requires knowledge of MQL4 or MQL5.
2. **Buying or Downloading EAs:** EAs can be purchased or downloaded from the MetaTrader Market or other third-party websites.
3. **Installing an EA:** Once an EA is developed or downloaded, it needs to be installed on the MetaTrader platform. This involves placing the EA file in the 'Experts' directory and then activating it from the platform's Navigator window.

Configuring EAs

- **Settings and Parameters:** EAs come with configurable settings that allow traders to adjust parameters such as trade size, stop loss, take profit, and trading hours.
- **Risk Management:** Proper risk management settings are crucial to ensure the EA operates within acceptable risk levels.

Monitoring and Maintenance

Even though EAs automate trading, regular monitoring is essential to ensure they function correctly. Traders should check for software updates, market conditions, and performance metrics to ensure optimal operation.

3. Basics of Algorithmic Trading

What is Algorithmic Trading?

Algorithmic trading involves using computer algorithms to execute trades based on predefined criteria. These criteria can include timing, price, quantity, or any mathematical model. The goal is to make trading decisions and execute orders more efficiently and precisely than human traders.

Key Components

- **Algorithms:** The core of algorithmic trading, these are the rules or logic that determine trading actions.
- **Trading Platforms:** Software that allows traders to execute their algorithms. Popular platforms include MetaTrader, NinjaTrader, and TradeStation.

- **Data Feeds:** Real-time market data is essential for algorithmic trading. Data feeds provide the information needed to make trading decisions.

Types of Algorithmic Trading Strategies

1. **Trend Following:** Algorithms that follow market trends and execute trades based on the direction of the trend.
2. **Arbitrage:** Exploiting price differences between markets or instruments.
3. **Market Making:** Providing liquidity by placing buy and sell orders to profit from the bid-ask spread.
4. **Mean Reversion:** Strategies that bet on prices reverting to their historical mean or average.

Developing an Algorithmic Trading Strategy

1. **Define Objectives:** Determine the goals of the strategy, such as profit targets, risk tolerance, and trading frequency.
2. **Data Collection:** Gather historical data to analyze and test the strategy.
3. **Strategy Design:** Develop the algorithm based on the objectives and data analysis.
4. **Implementation:** Code the algorithm using a programming language or trading platform.
5. **Testing:** Perform rigorous backtesting and paper trading to validate the strategy.

4. Backtesting and Optimizing Automated Strategies

What is Backtesting?

Backtesting involves testing a trading strategy on historical data to evaluate its effectiveness. By simulating trades using past data, traders can see how their strategy would have performed and make necessary adjustments before applying it in live markets.

Steps to Backtest a Strategy

1. **Select Historical Data:** Choose a dataset that is representative of the market conditions you plan to trade.
2. **Implement the Strategy:** Code the strategy into a trading platform or backtesting software.
3. **Run Simulations:** Execute the strategy on the historical data to simulate trades.
4. **Analyse Results:** Evaluate the performance metrics such as profit, drawdown, win rate, and risk-adjusted returns.

Optimization Techniques

- **Parameter Tuning:** Adjusting the parameters of the strategy to find the optimal settings.
- **Walk-Forward Analysis:** Dividing the historical data into segments and testing the strategy on each segment to ensure robustness.
- **Monte Carlo Simulation:** Running multiple simulations with random variations to assess the strategy's performance under different conditions.

Avoiding Overfitting

Overfitting occurs when a strategy is too closely tailored to historical data, making it less effective in live trading. To avoid overfitting:

- **Use Out-of-Sample Data:** Test the strategy on data not used in the development phase.
- **Simplify the Model:** Avoid adding too many parameters or overly complex rules.
- **Regular Updates:** Continuously monitor and update the strategy to adapt to changing market conditions.

5. Conclusion

Automated and algorithmic trading represent the cutting edge of modern trading strategies, offering speed, efficiency, and the ability to handle complex data. Understanding the principles of Expert Advisors, the basics of algorithmic trading, and the importance of backtesting and optimization can help traders harness the power of automated systems to improve their trading performance. While these systems offer significant advantages, it is crucial to approach them with diligence, ongoing monitoring, and a commitment to continuous learning and adaptation.