

# Optimizing Trading Algorithms Using Evolution

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## 1 Introduction

Algorithmic trading, otherwise known as algo trading, has been an area of interest within the academic community since the early days of the stock market. As the market evolved, hedge funds and individual investors alike developed countless techniques in an effort to beat the market and squeeze out a profit. As expected, markets have become increasingly efficient over time, resulting in alpha-decay on many trading strategies. The goal of this project is to explore the use of evolutionary techniques, mainly traditional genetic algorithms, neuroevolution, and genetic programming, to build consistent and dynamic trading strategies.

## 2 Areas of Exploration

I have three approaches in mind, each has its own advantages in terms of compute-time, generalizability, and sophistication.

1. Genetic algorithm technical indicator weighting
2. Neuro-Evolution of Augmenting Topologies (NEAT)
3. Genetic programming for human-readable trading logic

Similarly, I have multiple data types and sources in mind.

1. Open, high, low, close, volume (OHLCV) data
2. Common technical analysis indicators
3. Alternative data (sentiment, financial data, etc)

It will be important to maximize resource usage to decrease fitness evaluation time. The best way to do this is to vectorize all of the trading operations, ideally using the Numpy Python package. It will also be necessary to multiprocessing the backtests using a pool.

