

# PROJECT REPORT

EVOLUTIONAL COMPUTATION

Mert Can DENLİ  
mertcandenli@posta.mu.edu.tr

Friday 11<sup>th</sup> June, 2021

## Abstract

This project is about portfolio creation and analysis. By using Genetic Algorithm I am trying to predict stock prices for better income. Steady State Genetic Algorithm used in this project. For testing I chose stock values with high fitness after that income can be calculated with historical data.

## 1 Introduction

The number of people who wants to participate stock and other markets like Crypto Money grows rapidly. Therefore need for tools that analyses these portfolios always be in demand. Predicting stock prices and creating a good portfolio that returns positive amount of money is not an easy job for humans. Main goal is to create portfolios that has positive return. In order to create successful portfolios Steady state genetic algorithms being used.

## 2 Steady State Genetic Algorithms

### 2.1 Chromosome encoding

Genetic algorithms always need genome representation of the problem. So genetic operators can be applied. Our portfolios consists of 5 stocks and each stock have their parameters with it. These are "Golden Cross Value", "Stochastic Oscillator" and "Momentum."

```
0.32699999999999996  
[['cmtl.txt', -0.5145040322580563, 64.54646017699115, 3.135],  
['nvr.txt', 42.398749999999836, 40.55664782501843, 169.76999999999975],  
['hsic.txt', -0.7898991935483792, 72.61663286004072, 2.4350000000000023],  
['hio.txt', 0.11351048387096618, 79.65386238919389, -0.056700000000000195],  
['athm.txt', -1.7248387096774245, 91.05882352941171, -0.6099999999999994]]
```

## 2.2 Fitness Evaluation

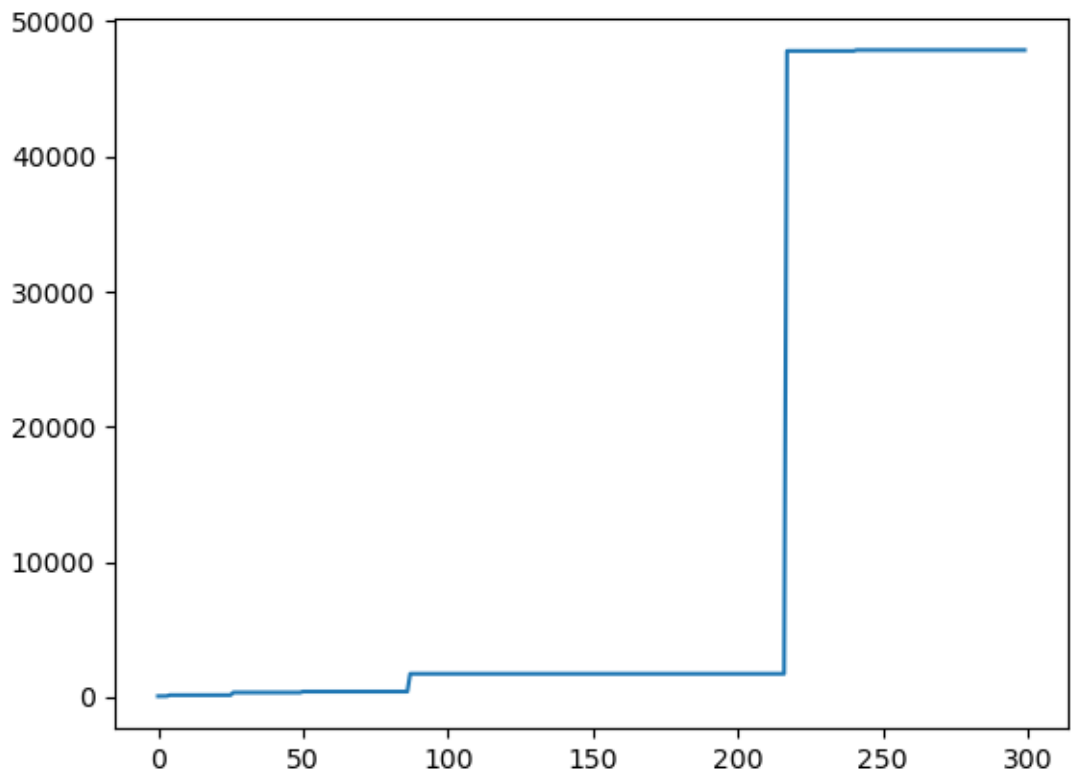
After defining the encoding method of the chromosomes, it is necessary to define the evaluation strategy of the chromosomes in the population according to the fitness function. In my approach of fitness evaluation I used the values that I encoded into each chromosome. I didn't calculate values in the fitness evaluation part because that would require extra amount of time . I avoided unnecessary array scans by doing that.

Stochastic oscillator value represents that if given stock is overbought or oversold. This value is between 0 - 100 and stock is overbought if its higher than 80 or its oversold if its lower than 20.

Golden cross value is positive if there is a Golden cross. This value represents that short time moving average is over long time moving average. Calculated by subtracting short time moving average from long time moving average. They say that value is likely to increase.

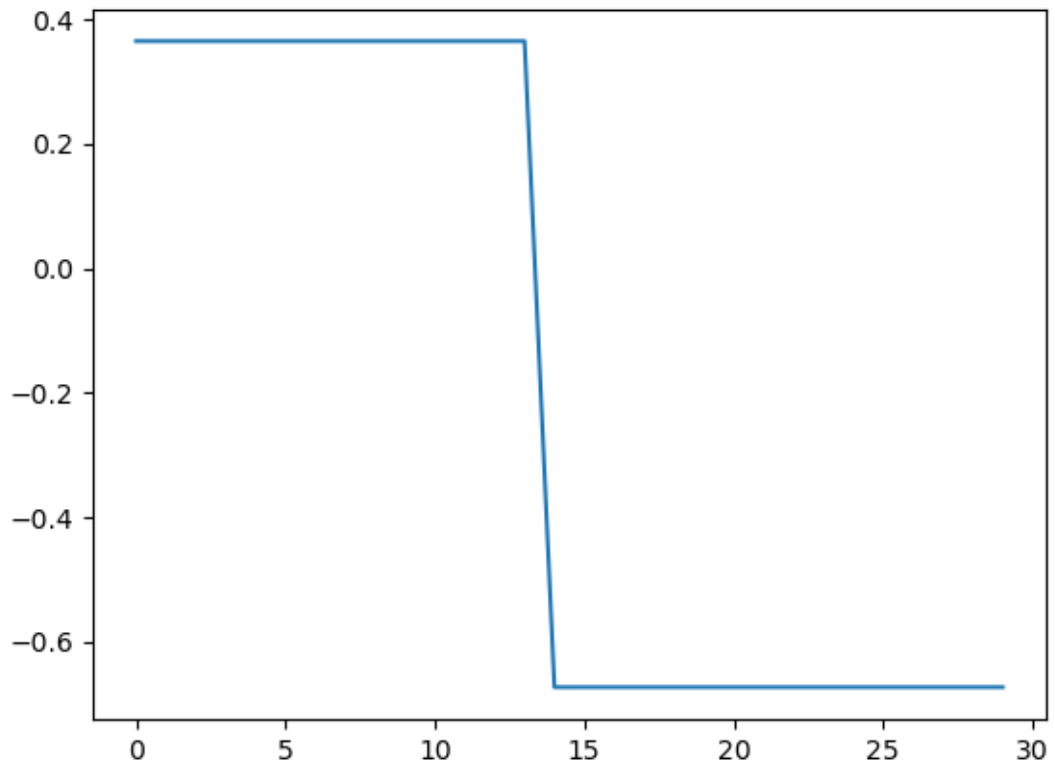
Momentum is for deciding if given stock become lower or higher in given time interval. If a stock always tends to decrease at value we need decrease its fitness value.

$$fitness = \sum stc/200 + \sum goldenCross/10 + \sum momentum \quad (1)$$



### 3 Results

Below graph shows how profits changes over iterations profits gained does not changes proportional to fitness because parameters that calculate fitness are not enough to calculate. And also someone who is expert an confident at finance needed just for fitness values. Those parameters means nothing when not being used properly.



### 4 Conclusion

Genetic algorithms can be used in portfolio creation if there is sufficient resources to calculate fitness. Genetic algorithms are particularly good at finding best combination of items. But performance of the Genetic algorithms is not consistent worst case scenarios and good ones decided by luck

### References

- [1] David Porush. *A Short Guide to Writing about Science*. Longman Publishing Group, 1997.