



**POLITÉCNICA**

# Programming for Data Science: Web Scraping, Data Generation & Data Analysis

Leveraging on Data in order to improve Smallville Asset Management's Financial Performance

Ereš Ana Marija (114240329)  
email: [anamarija.eres@alumnos.upm.es](mailto:anamarija.eres@alumnos.upm.es)

Ilic Ema (200837)                      Kos Dominik (200842)  
email: [e.ilic@alumnos.upm.es](mailto:e.ilic@alumnos.upm.es)      email: [dominik.kos@alumnos.upm.es](mailto:dominik.kos@alumnos.upm.es)

Akos Levente Tanczos (BH5914998)  
email: [akos.tanczos@alumnos.upm.es](mailto:akos.tanczos@alumnos.upm.es)

Programming For Data Processing (103000905), Master's Degree EIT  
Digital in Data Science

Academic Year 2020/2021

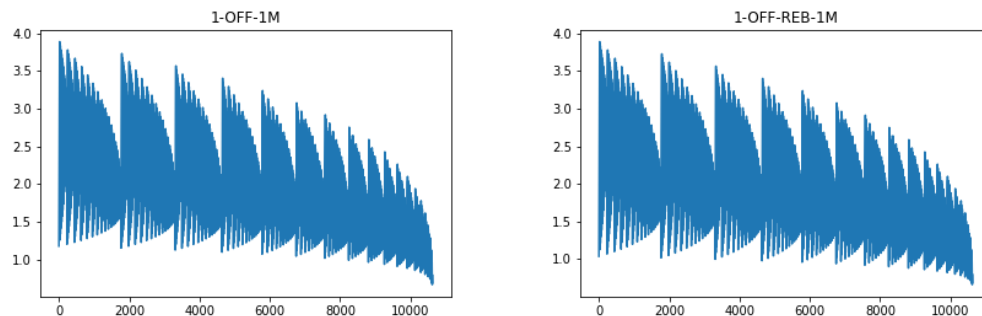
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# 1 Context

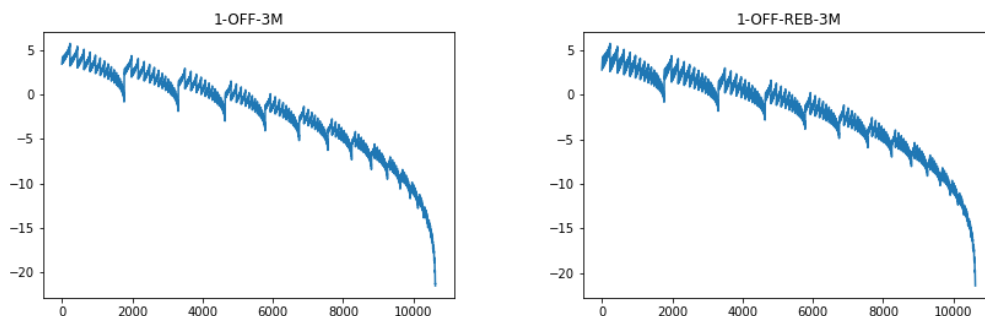
The assignment was divided into three tasks: Web Scrapping, Data Generation, and Data Analysis. This report is a summary of the part of the assignment on the investment strategies analysis.

## 2 Discussion

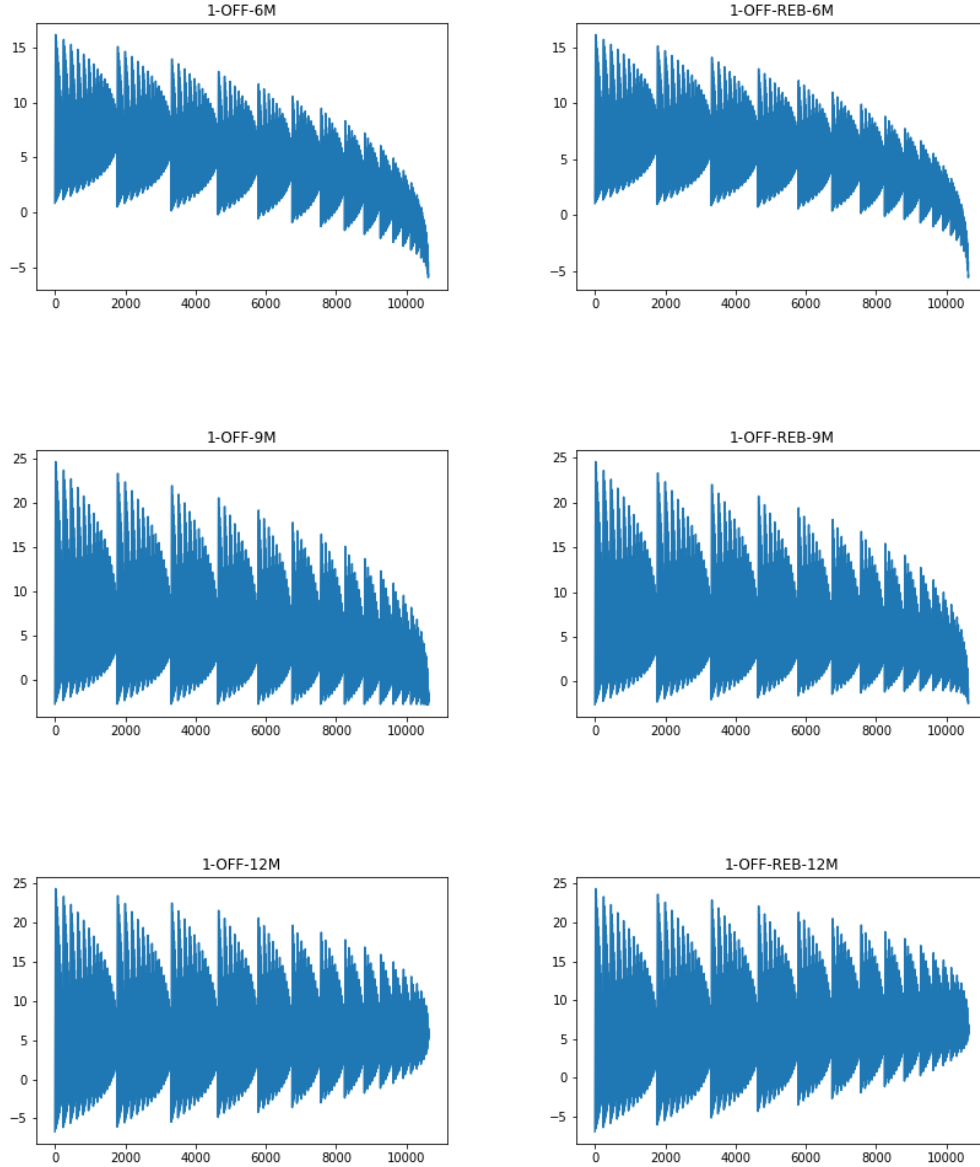


On the figure above one can observe the plots of the return metric for all of the 10626 portfolio combinations performed on the period of one month using the One Off method, and One Off Rebalanced trading methodology. In this methodology, all the funds are invested the first day. The money invested is split among the assets according to the percentage that the portfolio allocation file states for each portfolio, as it can be seen in the example for 10 different portfolio allocations in the figure right below.

|    | ST | CB | PB | GO | CA |     |
|----|----|----|----|----|----|-----|
| 0  | 0  | 0  | 0  | 0  | 0  | 100 |
| 1  | 0  | 0  | 0  | 0  | 5  | 95  |
| 2  | 0  | 0  | 0  | 0  | 10 | 90  |
| 3  | 0  | 0  | 0  | 0  | 15 | 85  |
| 4  | 0  | 0  | 0  | 0  | 20 | 80  |
| 5  | 0  | 0  | 0  | 0  | 25 | 75  |
| 6  | 0  | 0  | 0  | 0  | 30 | 70  |
| 7  | 0  | 0  | 0  | 0  | 35 | 65  |
| 8  | 0  | 0  | 0  | 0  | 40 | 60  |
| 9  | 0  | 0  | 0  | 0  | 45 | 55  |
| 10 | 0  | 0  | 0  | 0  | 50 | 50  |

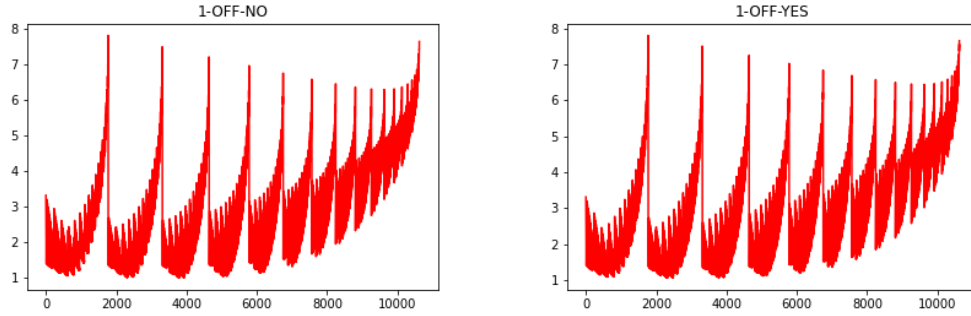


On the figures above and below, the comparison of the same methodologies can be observed for the three, six, nine and twelve month basis.

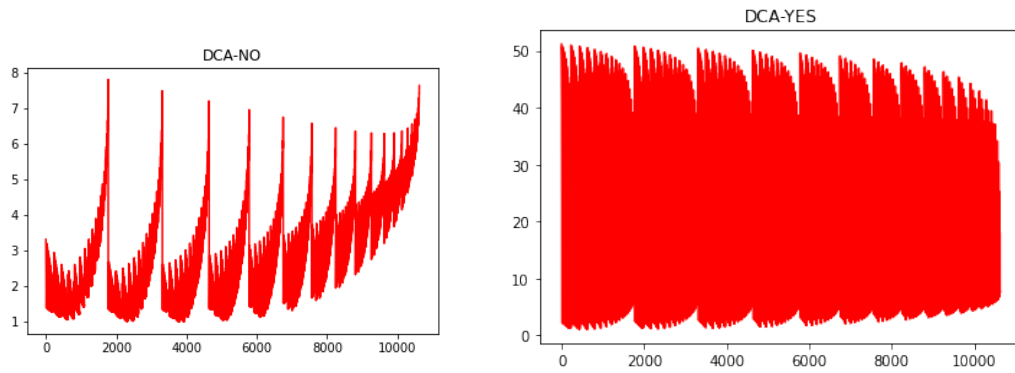


With regards to the one month period, it is more likely to obtain a positive return for both cases. The same goes for all the other cases, except for the 3 month case (both with and without rebalancing) which is more likely to yield a negative return.

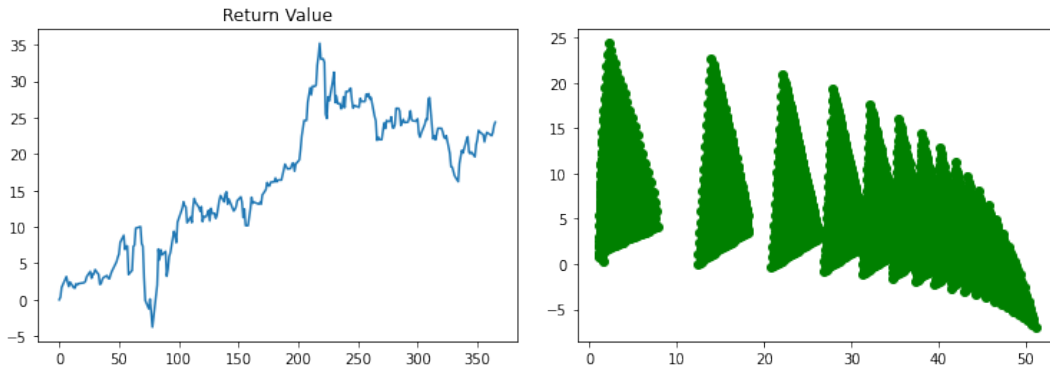
Moreover, the same comparison was done for the volatility (risk) analysis of the portfolio combinations. A trend can be observed here, with certain portfolios carrying a low risk (less than 1) and others a high one (almost 8%). On the left, the plots with no rebalancing can be observed, whereas on the right, the plots with the rebalancing can be observed.



Moreover, it can be observed that the DCA methodology with rebalancing is the riskiest one, with the risk reaching up to 50%.



Moreover, the best portfolio was plotted. Namely, the One Off method was decided to be studied a bit further by the means of plotting the best portfolio. Namely, with the careful analysis, it was discovered that the combination of stakes where a hundred percent of the investment money was invested in gold shares for the 1M, 6M, 9M, and 12M period, and where a hundred percent of the investment money was invested in public bonds for the 3M period gave the best results! On the figure on the left, observe the movement of the time series for a 1M period.



Finally, in order to quantify the return versus risk, the return was plotted on the y-axis and risk on the x-axis of the figure on the right. This yielded a scatter

plot which displays the quantification of risk using volatility. Therefore, it is indeed not always true that the higher the risk, the higher the return. We can observe on the scatter plot how, for the same risk, we have different levels of return.

### **3 Financial advising**

In this section, an example use-case will be shown: a customer wants to invest money, with some requirements on the portfolio. These conditions include that the share of cash should be 10%, and the customer only wants to invest in public bonds and corporate bonds. The question this chapter will answer is that whether is it possible to find a rational investment strategy with those premises or not. There are 19 portfolio allocations for every trading methodology that meet those criterias, these opportunities will be introduced respectively.

#### **3.1 1-OFF without rebalance**

In this kind of investment strategy, the public bonds asset doesn't perform well. If there would be only PB asset, the return would be slightly negative. However, corporate bonds performed well, and produced some positive return. If the client only invests in corporate bonds - which meets the criterias - besides the 10% cash, there would be 3.13% interest on the investment.

#### **3.2 1-OFF with rebalance**

The investment strategy in terms of return looks very similar to the previous one, the same applies here: a positive return of 3% can be achieved if all the investments are in corporate bonds.

#### **3.3 DCA without rebalance**

This trading methodology cannot be advised. Even the best-case scenario, where the client invests only CB would produce negative return. The explanation of this is that the value of corporate bonds increased between 2020/01/01 and 2020/12/31. Therefore, the later the investment happened, the less the acquired profit was (more precisely, the more the loss was).

#### **3.4 DCA with rebalance**

The performance of this trading methodology was really similar to the previous one, therefore, cannot be advised.

#### **3.5 Conclusion**

Provided the above reasoning, the answer is yes, it's possible with this investment strategy to show a return. The recommended trading methodology and asset allocation

combination would be the One off investment, with the share of 90% of corporate bonds and 10% of cash. Both with or without rebalance would provide the same return. The data that supports this decision can be found in the FinancialAdvisoring.csv.