

Documentation of Forex-Metrikanalyser 2023-2024

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V1.0

Update with some Robustnesstests



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0 Introduction

Motivation:

Why do we need the metrics analyser?

Why isn't it enough for us to simply generate strategies and then take the most robust ones to trade?

I have found that in order to generate strategies successfully, the following things must be fulfilled.

The settings in the workflow/generator must be optimally coordinated.

The generator has to generate *more good strategies than bad ones*, otherwise the whole thing won't work.

On the one hand, we can first ask ourselves what a generator actually is?

You can compare a generator like this to a robot that builds a house. The goal of this robot is to build houses that don't collapse.

Of course, houses don't last forever and will eventually collapse.

You can compare this with strategy development. We generate strategies and they run for a certain time.

A house that remains standing generates a certain profit every month. Of course, some houses deliver more or less profit. At some point the house collapses and we have to build a new one.

The generator uses building blocks to build houses. These building blocks are the building blocks that can be found in StrategyQuantX.

Houses have certain characteristics. And this is exactly where the metrics come into play.

We use the metrics to describe certain characteristics of houses.

e.g. is this a big house? Whether the house has 5 or 6 windows, or even just consists of windows?

How big the entrance doors are, how many doors and how many windows the house has. Whether an oven is installed etc.

These specific characteristics are specified by the civil engineer. Sometimes the rule is just that the whole thing should be as simple as possible. So the complexity of the rules should be as low as possible.

So the expert puts together a set of rules with metrics. Then the next step is to build a house with it and check how long it will last.

The whole thing is like strategy development.

We think of metrics with associated min and max values and let the SQX generator build strategies (houses) with them.

We do a backtest and see how profitable the whole thing is (we test how long the house lasts).

If the generator only produces scrap, then we won't be able to make anything useful out of this scrap as the optimization/robustness tests continue.

Therefore, again. The most important thing in strategy development is the generator.

A generator consists of.

- 1) Building blocks
- 2) TP/SL trading logic
- 3) Metrics with associated min-max values.

We can use the Metrics-Analyser to analyse and optimize part 3).

We hope this will be able to do this without over-optimization.

In order to test this precisely, we need to do a Walkflow-Analysis after creating the generator. Only with a Walkflow-Analysis can we prove that the generator works in different market phases and is not over-optimized.

In this guide I will describe the “Metrikanalyser” program. With this program you can determine the metrics for a generator.

The Metric-Analyser is freeware. So you can use the program however you want. But I would like to ask you if it helps you to generate profitable strategies that you maybe send me one or the other strategy.

Overview:

In Chapter 1. I will show how to install the Metrikanalyser.

In Chapter 2. I will describe the configuration of the Metrikanalyser.

In Chapter 3. I will show with an example how to calculate the Correlation of the Metrics

In Chapter 4.1 I show how to work with the Metrikanalyser with the full automatic Optimization.

In Chapter 4.2. I show how to use only some Metrics for the optimization process.

There is a great result in chapter 4.2 I will show the improvement of the following Portfolio.

This Portfolio with contains 1000 Strategies is bad, because the Result is negative. The Equitycurve of the portfolio looks bad too.



The Metrikanalyser found only one additional rule and after filtering with this additional rule the portfolio looks great.

Net profit (Port...	Mini equity cha...	# of trad...	Mini equity cha...	# of trad...
\$ 1 386		0		81

In this Portfolio are only 17 Strategies. The equitycurve look great.

I added only one rule to reach this result.

The solution is often very simple. However, it is often very difficult to find simple solutions. The metrics analyser helps us in this process.

I would still like to dampen my joy a bit. You have to be careful not to over-optimize with the metric analyser.

In Chapter 5. The installer installs in his new version a demo-workflow and some example data. With this demo data I explained the functionality of the Metrikanalyser. I Descripted in Chapter5 the Demonstration and the Demo-Walkflow Step by Step. You will understand the Metrikanalyser in every aspect. If you learned this all and you found a good generator, you can send it to me. I will make more detailed analysis with this generator.

In Chapter 6. I will show some examples how to work with Robustnesstests.

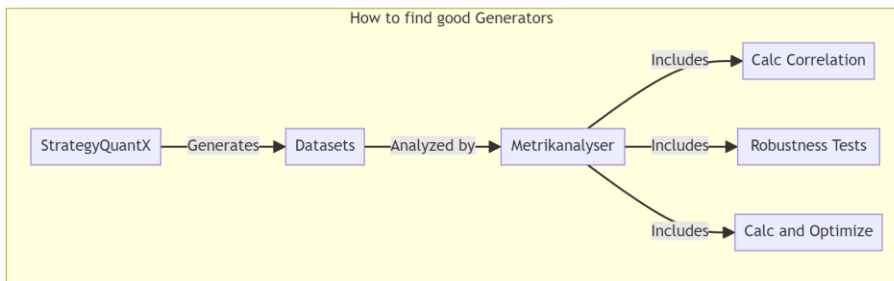
The Robustnesstests

We have a really big problem with the curve fitting, this should not be underestimated. Actually, it is the central problem in automatic strategy development.

For this purpose, I added a simple robustness test to the metrics analyzer. To do this, I divide the basic set of strategies found into 6 parts. A part where we look for rules and correlation values. And 5 other parts on which we additionally check what we found. The 5 other parts are strategies that the metric analyser had not yet seen. We can therefore estimate whether the rules found are curve fitted or not.

In Chapter 6 of this documentation I will show more examples how to work with this Robustnesstests.

How this all works together.



1 Installation of the Metric-Analyser

For installation of the MetricAnalyser is a full installer available. The best way to install this is to install the Analyser in C:\Forex\MetrikAnalyser. This is the default path for the installation.

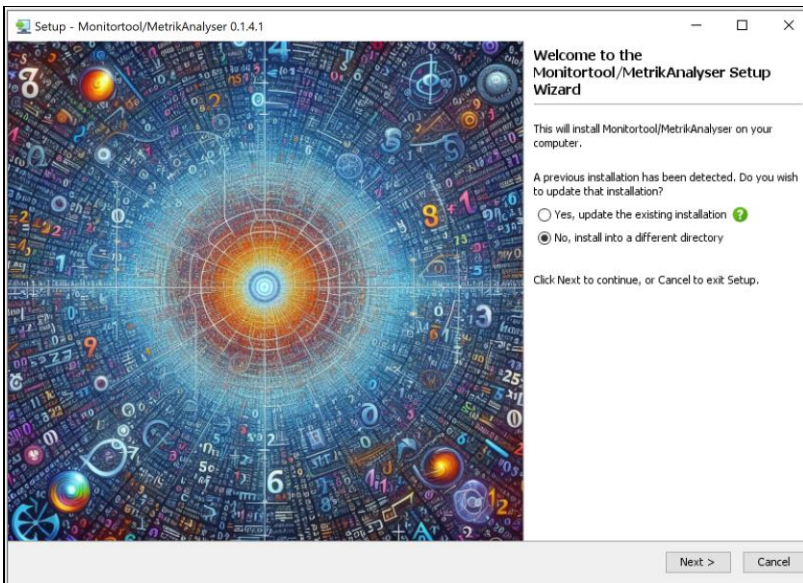


Abbildung 1: The best location to install the metrikanalyser is in C:\Forex\Metrikanalyser.

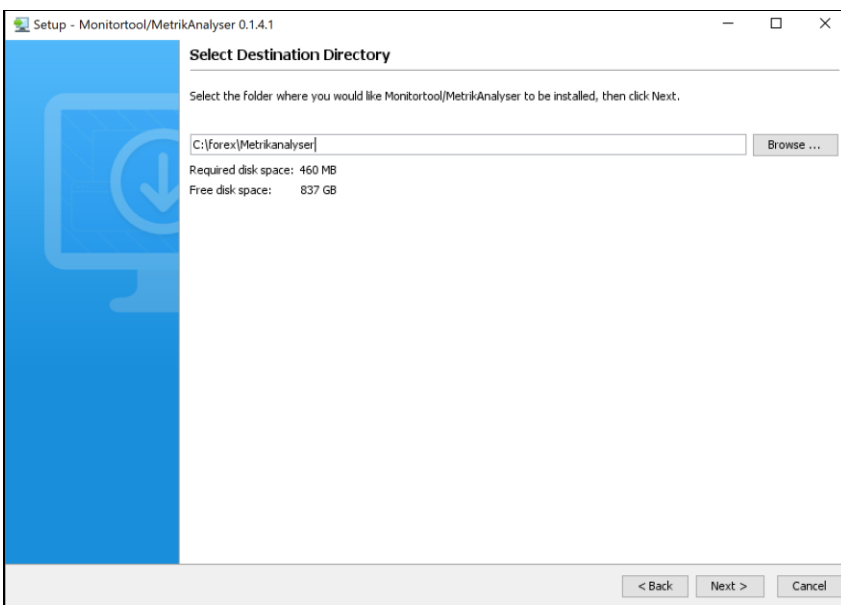


Abbildung 2: Click next and the installation will be done.

Sometime Windows 10/11 real-time protection shows an error message. The best is to switch off the installation protection for this installation. I did a small documentation about this problem in the Appendix.

After the installation you can find a Desktop icon on your desktop.

Doubleclick to start the Metrikanalyser.



Abbildung 3: After Installation of the Metrikanalyser you will find this desktop icon on your desktop.

After clicking on this Desktop-Icon the Metrikanalyser starts with the following screen.

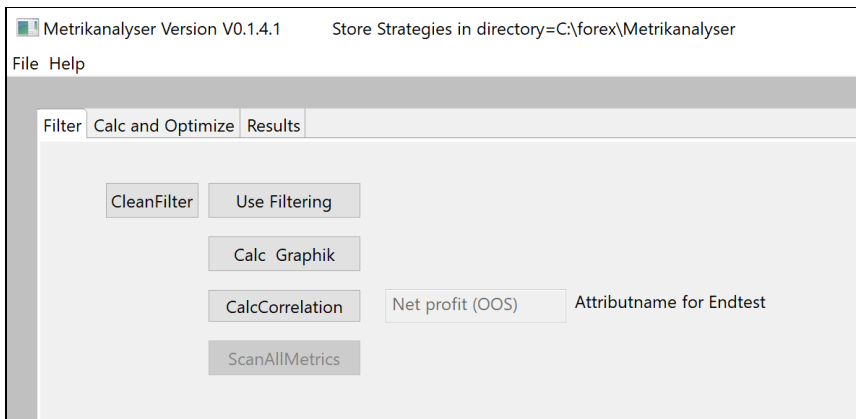
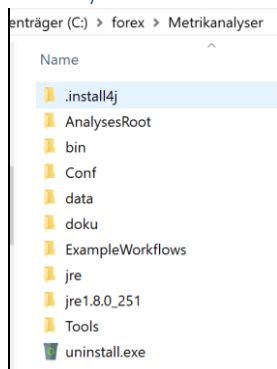


Abbildung 4: This is the main window of the Metrikanalyser.

2 Configuration

Directory Structure of the Metrikanalyser



Directory	Explanation
.install4j	This directory contains some information for the installer.
AnalysesRoot	This is the Root directory for the Analyses. The Metrikanalyser needs data from the StrategyQuantX to analyse. In this directory you should store your data. I will explain the exact structure of this directory below this table.
Bin	Here is the Directory which contains the javafile of Metrikanalyser
Conf	In this directory the Configuration of the Metrikanalyser will be stored.
Data	Ist empty at the moment
Doku	This documentation will be stored as pdf document in this folder.
ExampleWorkflow	I will store some example Workflows in this folder
Jre/Jre1.8....	The Java library
Tools	I will store in this directory some tools or batchfiles.

The Metrikanalyser has only on configuration at the moment.

Set Tableroot-Path and directories

We need to tell the Metrics Analyzer where to get its data for its analysis. To do this, we set the tableroot path. This is the root directory for the current analysis.

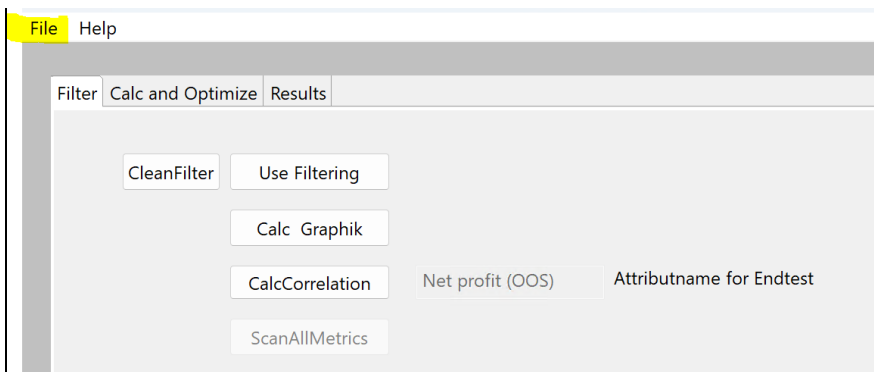


Abbildung 5: To set the tableroot path set File/config.

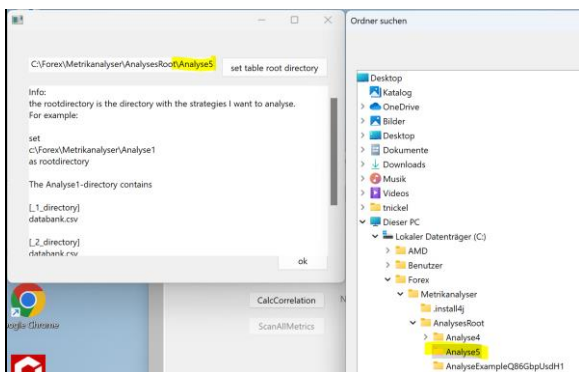


Abbildung 6: For our example we set the path to c:\Forex\Metrikanalyser\AnalysesRoot\Analyse5

We need two subdirectories under this path.

The directory names are fixed.

Generate two folders by hand.



Abbildung 7: Generate this two folders by hand.

_0_dir: Contains the metrics information for the generation process

_99_dir: Contains the metrics information for the endtest

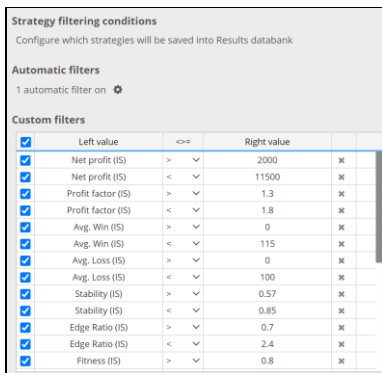
3 CalcCorrelation StepByStep

In one of my earlier analyses, we found that the generator is the most important component in strategy development. If the generator only produces waste, nothing useful will come out of it in the end.

The metric analyser's job is to find a set of rules so that the generator produces more good strategists than bad ones.

How can we fulfil this task?

A central point in all this is the metrics. With metrics I mean the following filter rules. Here's an example:



Left value	Operator	Right value	
<input checked="" type="checkbox"/>	>	2000	X
<input checked="" type="checkbox"/>	<	11500	X
<input checked="" type="checkbox"/>	>	1.3	X
<input checked="" type="checkbox"/>	<	1.8	X
<input checked="" type="checkbox"/>	>	0	X
<input checked="" type="checkbox"/>	<	115	X
<input checked="" type="checkbox"/>	>	0	X
<input checked="" type="checkbox"/>	<	100	X
<input checked="" type="checkbox"/>	>	0.57	X
<input checked="" type="checkbox"/>	<	0.85	X
<input checked="" type="checkbox"/>	>	0.7	X
<input checked="" type="checkbox"/>	<	2.4	X
<input checked="" type="checkbox"/>	>	0.8	X

Abbildung 8: This are some Metrics in the generator.

The metrics determine what "type" of strategies I'm looking for. If the metrics aren't good, I won't find strategies.

I will use the Pearson correlation¹ to determine how strongly the metrics relate to profit. The statistical function that determines how strongly the metrics are correlated with profit.

So for each metric you can determine a value of how much the metric affects the final profit. I will not pay attention to metrics with little correlation.

I will show you how you can calc the PearsonCorrelation Step by step

Step1: Generate 5000 Strategies with the StrategyQuantX

For this example, I will use a workflow form the StrategyQuantX website.

I use the following Workflow <https://strategyquant.com/shared/gbpjpy-strategylab-workflow/>

Feldfunktion geändert

This is one of the best workflows I found at the moment.

For our purposes we only need the generator and the first OOS filter. I added an end test for our analysis. The final test period is 1 year.

I will call this workflow Q103 GBPJPY H1_Metrikanaylser.

The Workflow:

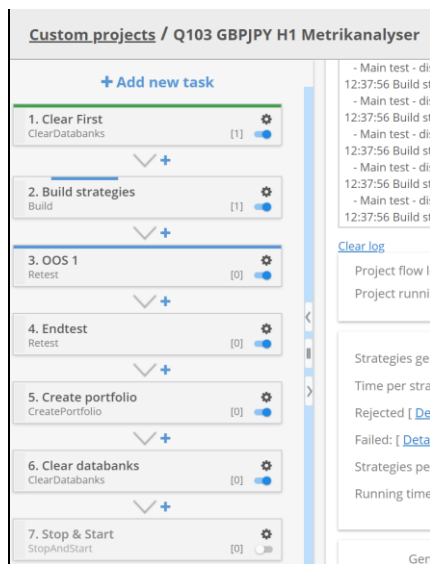


Abbildung 9: I used this simplified Workflow for strategy generation.

¹ <https://www.scribbr.com/statistics/pearson-correlation-coefficient/>

The generator:

Abbildung 10: This are the settings for the generator. I generated 5000 Strategies in the generation process.

<input type="checkbox"/>	Left value	<=>	Right value	
<input checked="" type="checkbox"/>	Avg. Trades Per Month	>	2	✕
<input checked="" type="checkbox"/>	Profit factor	>	1.3	✕
<input type="checkbox"/>	Ret/DD Ratio	>	5	✕

Abbildung 11: I used this simplified filter rules.

The OOS1-Filter

Abbildung 12: This is the datarange for the OOS1 Filter. I use ranking filter profitfaktor >1.

The Endtest

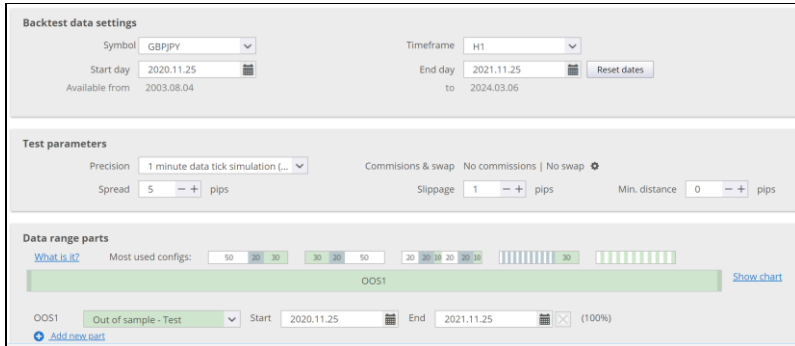


Abbildung 13: The endtest contains only a OOS1 Period of one year.

I switched the View to Metrikanalyser. This view will installed by the Metrikanalyser installer if you install this demo workflow.

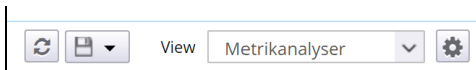


Abbildung 14: I use this Metrikanalyser View. This is the standart view without equity chart. The Metrikanalyser uses all attributes in the selected view to find an optimal portfolio. You can add or remove some metrics out of this view. You can clone the view or generate an new view. The Metrikanalyser uses all time the selected view in the SQX.

Step2: Export Databases

2.1 Check Config

We will store our data under C:\forex\Metrikanalyser\AnalysesRoot\Analyse5

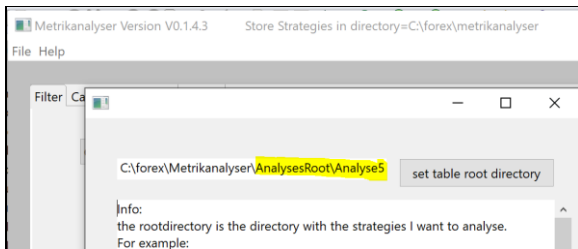


Abbildung 15: Check in the config if the path is correct. Choose File\config and check the path.

2.2 Check Metrikanalyser View

Filter by correlation	Filters result	Net profit (IS)	Net profit (OOS)	Profit facto...	Profit facto...	Avg. Win (IS)	Avg. Loss (IS)	Stabi...
<input type="checkbox"/> Strategy 13.36.168	PASSED	\$ 5 709.42	\$ 0	1.43	0	\$ 158.71	\$ 81.32	0.78
<input type="checkbox"/> Strategy 5.59.174	PASSED	\$ 8 551.71	\$ 0	1.31	0	\$ 138.25	\$ 82.03	0.83
<input type="checkbox"/> Strategy 3.9.168	PASSED	\$ 5 626.26	\$ 0	1.39	0	\$ 100.92	\$ 96.41	0.83
<input type="checkbox"/> Strategy 13.36.164	PASSED	\$ 9 013.95	\$ 0	1.27	0	\$ 118.8	\$ 77.11	0.77
<input type="checkbox"/> Strategy 13.36.161	PASSED	\$ 4 903.74	\$ 0	1.33	0	\$ 117.83	\$ 99.4	0.75
<input type="checkbox"/> Strategy 5.59.175	PASSED	\$ 7 781.22	\$ 0	1.39	0	\$ 134.44	\$ 86.58	0.83

Abbildung 16: Check if Retested have the view “Metrikanalyser”

Remark: We export the last database for the Endtest into the Metrikanalyser in _0_dir.

This are the Metrics from Database **RETESTED** we want to optimize. Not the metrics from Result. We use the Metrics for the last filterstep.

Filter by correlation	Filters result	Net profit (IS)	Net profit (OOS)	Profit facto...	Profit facto...	Avg. Win (IS)	Avg. Loss (IS)	Stabi...
<input type="checkbox"/> Strategy 13.36.168	PASSED	\$ 0	\$ 423.27	0	1.71	\$ 0	\$ 0	0
<input type="checkbox"/> Strategy 5.59.175	PASSED	\$ 0	\$ -371.79	0	0.72	\$ 0	\$ 0	0

Abbildung 17: Check if Endtest have the view “Metrikanalyser”

2.3 Export Database Retested into Metrikanalyser _0_dir

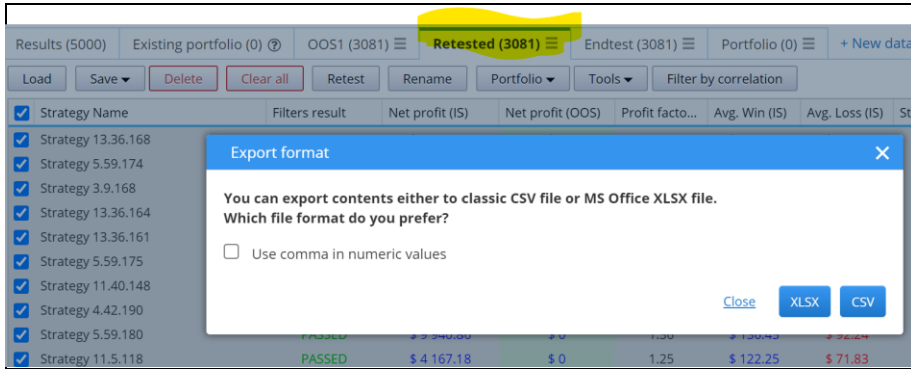


Abbildung 18: First Select all Strategies in Database Retested, than "Export databank contents".

Remark: We export the last database for the Endtest into the Metrikanalyser in _0_dir.

This are the Metrics from Database **RETESTED** we want to optimize. Not the metrics from Result. We use the Metrics for the last filterstep.

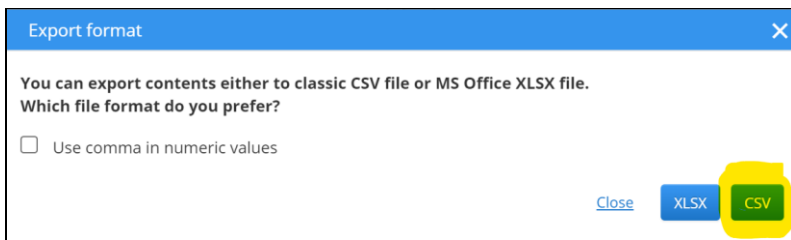


Abbildung 19: Choose CSV-Format

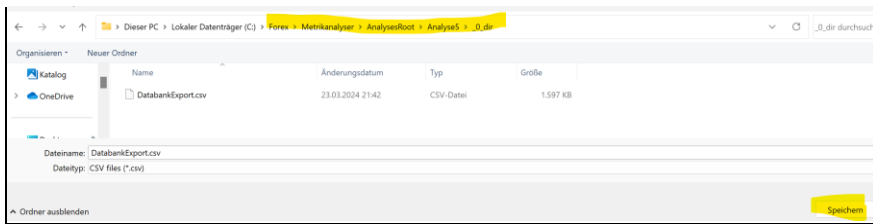
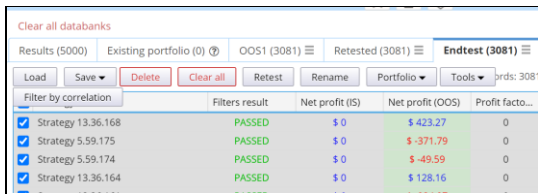


Abbildung 20: Store this DatabankExport.csv in Analyse5_0_dir

2.4 Export Database Endtest into Metrikanalyser

Do the same for the Endtest-Database.

I will make the Screenshots step by step.



Filter by correlation	Filters result	Net profit (IS)	Net profit (OOS)	Profit facto...
<input checked="" type="checkbox"/>	PASSED	\$ 0	\$ 423.27	0
<input checked="" type="checkbox"/>	PASSED	\$ 0	\$ -371.79	0
<input checked="" type="checkbox"/>	PASSED	\$ 0	\$ -49.59	0
<input checked="" type="checkbox"/>	PASSED	\$ 0	\$ 128.16	0

Abbildung 21: Select all Strategies in Endtest.

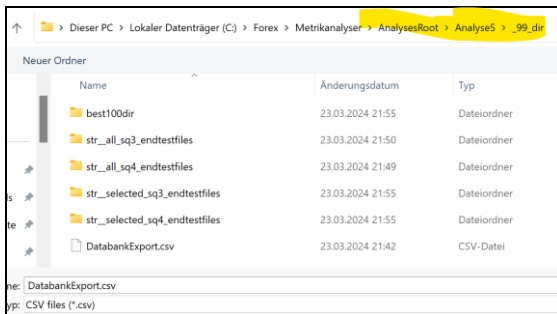


Abbildung 22: Save Databank content for Endtest same, the same procedure as before as csv. But in this case into the _99_dir

Step3: Calc Correlation

The next Step is to use the correlation function. We are searching at attributes which are strong correlated to the Endtest Profits.

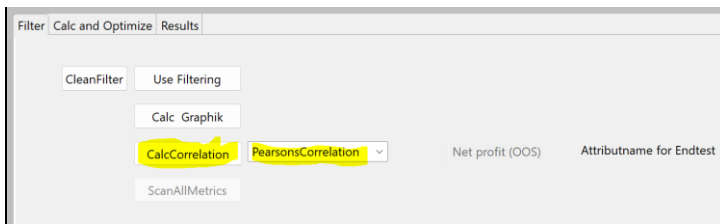


Abbildung 23: Choose the Correlation-Function and click "CalcCorrelation"

You will get the result.

attribname	correlation
Corelator=	PearsonsCorrelation
Avg. Win (IS)	0.1997
Avg. Abs Trade (IS)	0.1974
AHPR (IS)	0.1888
Net profit (IS)	0.1888
Annual % Return (IS)	0.1888
Avg. Bars in Trade (IS)	0.1801
Expectancy (IS)	0.1783
SQN Score (IS)	0.1698
Exit quality (IS)	0.163
Avg. Loss (IS)	0.1623
Kelly formula (IS)	0.1508
Profit factor (IS)	0.1489
Fitness (IS)	0.1418
Stability (IS)	0.1355
Ret/DD Ratio (IS)	0.1109
Ret/DD Ratio (IS)	0.1109
CAGR/Max DD % (IS)	0.1017
CalmarRatio (IS)	0.1017
Max DD % (IS)	0.0868
Edge Ratio (IS)	0.0774
Edge Ratio (IS)	0.0774
Strategy Name	0
Filters result	0
Net profit (OOS)	0
Avg. Parameters Stability (IS)	0
Win/Loss ratio (IS)	-0.0095
Backtest Duration (s) (IS)	-0.016
Stagnation (IS)	-0.018
Degrees of freedom (IS)	-0.0318
Avg. Trades Per Month (IS)	-0.0323
anz of trades (IS)	-0.0323
Complexity (IS)	-0.047
Complexity (IS)	-0.047
Actual Drawdown (IS)	-0.1471
Actual Drawdown / Max DD (IS)	-0.1537
.....
avg_cor+=0,1458	avg_cor=-0,0535
anz=21	anz=10

Correlation=0 means, the attribute don't have a connection to the Netto Profit in the Endtest.

Correlation>0.2: You can use this attribute to filter

Correlation>0.3: This is a better result

In statistics, the **Pearson correlation coefficient (PCC)**^{en} is a correlation coefficient that measures linear correlation between two sets of data. It is the ratio between the covariance of two variables and the product of their standard deviations; thus, it is essentially a normalized measurement of the covariance, such that the result always has a value between -1 and 1. As with covariance itself, the measure can only reflect a linear correlation of variables, and ignores many other types of relationships or correlations. As a simple example, one would expect the age and height of a sample of teenagers from a high school to have a Pearson correlation coefficient significantly greater than 0, but less than 1 (as 1 would represent an unrealistically perfect correlation).

https://en.wikipedia.org/wiki/Pearson_correlation_coefficient

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Feldfunktion geändert

Feldfunktion geändert

Feldfunktion geändert

Feldfunktion geändert

Feldfunktion geändert

Feldfunktion geändert

Abbildung 24: This is the result from the correlation calculation.

4 Calc and Optimize

Some more data preparation

To get the results in a more convenient way you should export some more Strategies into the Metrikanalyser.

Generate 4 Directory's. In the later version of Metrikanalyser I will generate this process automatically.

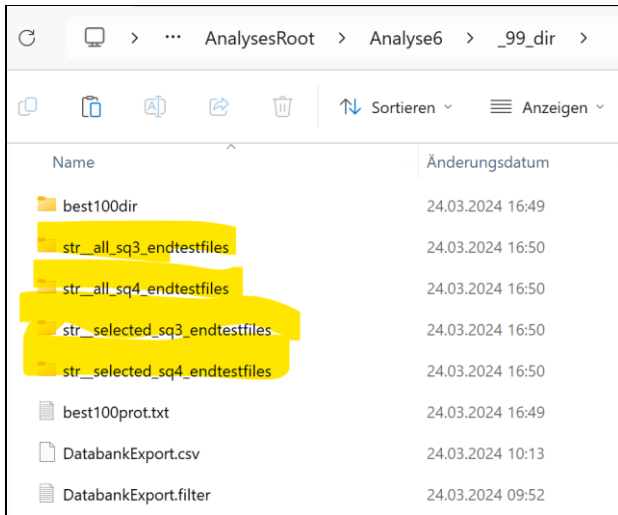


Abbildung 25: Generate this 4 subdirectories by hand.

Export all the endtests into **str_all_sq3_endtestfiles** and **str_all_sq4_endtestfiles**.

I will show this step by step:

Step1: Export SQX3/SQX4-Format:

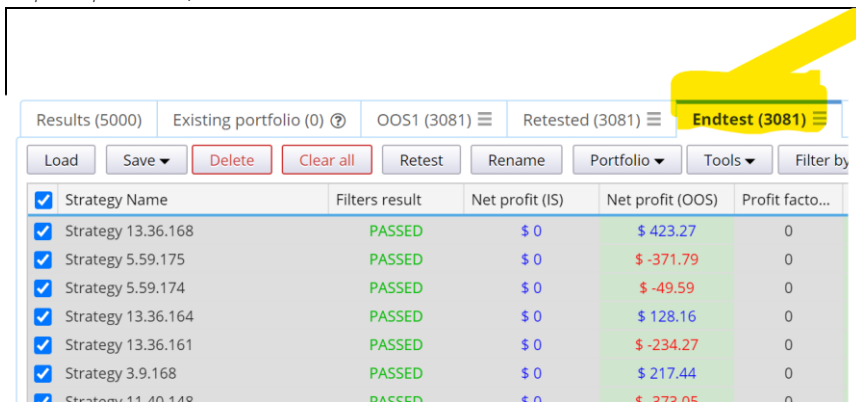


Abbildung 26: Click on Endtest Database and Select all Strategies

Step2: Export SQX3-Format:

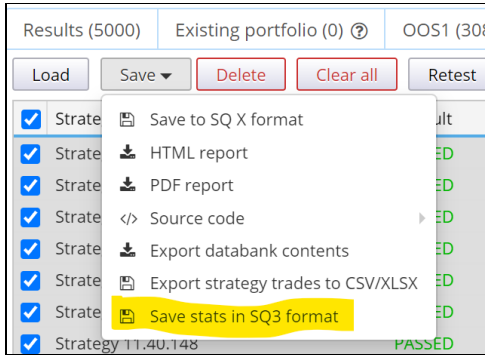


Abbildung 27: Select all Strategies and Save Strategies in SQ3 format into the folder endtestfolder for the sq3-files

C:\Forex\Metrikanalyser\AnalysesRoot\Analyse6_99_dir\str_all_sq3_endtestfiles

Step3: Export SQX4-Format

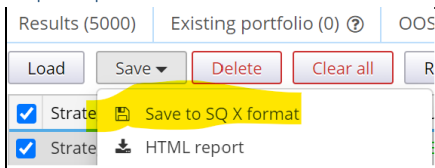


Abbildung 28: Store all Strategies from Endtest into the sq4_endtestfolder

C:\Forex\Metrikanalyser\AnalysesRoot\Analyse5_99_dir\str_all_sq4_endtestfiles

The preparation is ready.

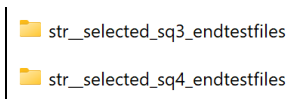


Abbildung 29: You don't need to do something with this directory. The Metrikanalyser will fill this directory with the found portfolio. If the calculation is ready you can load this files in the SQX retester and check the results.

(I) Use all Metrics

In this case I will search with all Metrics.

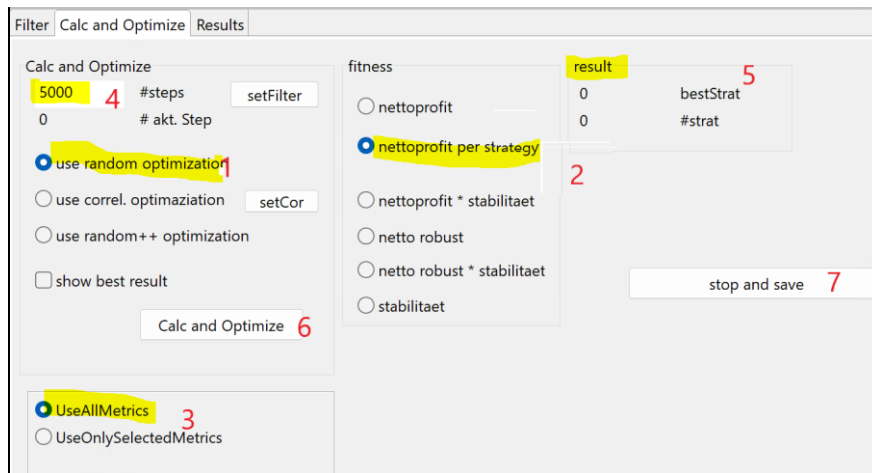


Abbildung 30: This is the main window for Calc and Optimize.

You can choose this setting and click “calc and Optimize”

1: There are different optimizer implemented. In this case we use the random optimizer. The random optimizer search for every metric a minimum and maximum value for the filtering. The search process is random.

2b: This is the fitness criteria “nettoprofit per strategy” for the search process. If this is selected, the optimizer does the following. It randomly selects filter barriers for the metrics and filters down the output strategies. Then the total profit for this set of strategies is calculated from the final tests. This total profit is divided by the number of strategies found. This calculates an average profit per strategy. In principle, this method calculates an optimal filter setting. Unfortunately, I suspect that this method involves a lot of over-optimization.

2a: If I select nettoprofit, the optimizer search for a portfolio with the maximum of profit.

3: In this section I can select to use AllMetrics or only a Selection of Metrics.

4: #steps means the number of optimization steps I tries to find a portfolio. The number of 5000 is a good choice.

5: Here is the result. Und the value “bestStrat” is the value of the best found portfolio. #strat say me how many strategies are in the found portfolio

6: This is the button to start the optimizer.

7: This is the button to stop the optimizer.

The Results

The calculation is ready.

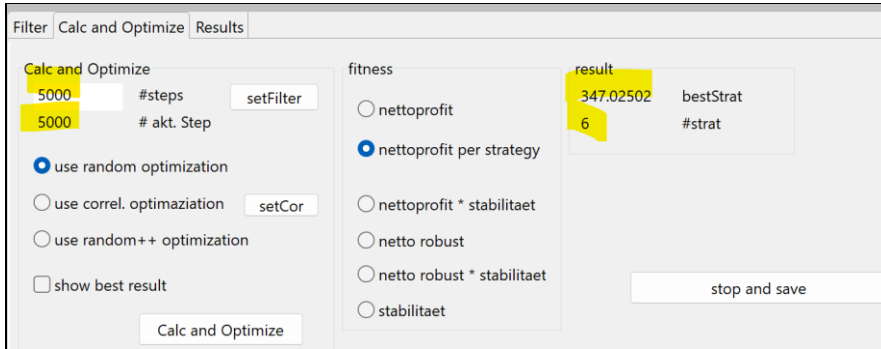


Abbildung 31: The optimizer calculated 5000 different configurations.

The best result is a portfolio which contains 6 strategies. The average result per Strategy is 347 Euro.

We now want to look at where we can find the results.

The bestdir

You will find the results of the 100 best results in Directory **best100dir**

In my example it is:

C:\Forex\Metrikanalyser\AnalysesRoot\Analyse5_99_dir\best100dir

Wie look into this directory>:

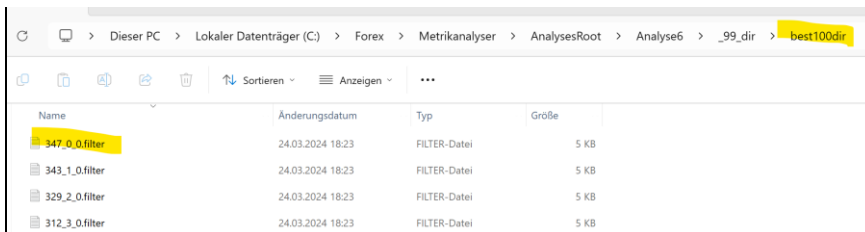


Abbildung 32: We can easy find the corresponding filterfile. The profit of 347 Euro is in the name.

The file "347_0_0.filter" contains the following filter rules.

```

0.0 < Strategy Name < 0.0
0.0 < Filters result < 0.0
1082.25 < Net profit (IS) < 9171.99 value modified original range = 1082.25---14565.15
0.0 < Net profit (OOS) < 0.0
1.2 < Profit factor (IS) < 1.744 value modified original range = 1.2---1.88
42.385 < Avg. Win (IS) < 120.354996 value modified original range = 29.39---159.34
40.18 < Avg. Loss (IS) < 89.380005 value modified original range = 20.5---118.9
0.508 < Stability (IS) < 0.844 value modified original range = 0.46---0.94
1.034 < Edge Ratio (IS) < 1.7780001 value modified original range = 0.91---2.15
0.58 < Fitness (IS) < 0.86 value modified original range = 0.58---0.93
3.065 < Ret/DD Ratio (IS) < 16.865 value modified original range = 1.34---18.59
1.94 < Avg. Trades Per Month (IS) < 6.026 value modified original range = 1.94---8.75
0.96699995 < Win/Loss ratio (IS) < 1.483 value modified original range = 0.58---1.87
7.3 < Complexity (IS) < 15.1 value modified original range = 6.0---19.0
261.0 < Degrees of freedom (IS) < 1134.9 value modified original range = 261.0---1232.0
11.166 < Kelly formula (IS) < 20.981 value modified original range = 7.24---26.87
0.1 < SQN Score (IS) < 0.892 value modified original range = 0.1---0.98
2.0240002 < AHPR (IS) < 8.768 value modified original range = 0.9---12.14
0.0 < Actual Drawdown (IS) < 2585.43
0.0 < Actual Drawdown / Max DD (IS) < 100.0
0.98 < Annual % Return (IS) < 10.788 value modified original range = 0.98---13.24
0.12 < CAGR/Max DD % (IS) < 1.1159999 value modified original range = 0.12---1.78
46.23 < Avg. Abs Trade (IS) < 110.87999 value modified original range = 24.68---132.43
8.239 < Avg. Bars in Trade (IS) < 39.634 value modified original range = 1.96---64.75
0.0 < Avg. Parameters Stability (IS) < 0.0
9.636999 < Max DD % (IS) < 19.593 value modified original range = 2.17---27.06
1.193 < Backtest Duration (s) (IS) < 2.117 value modified original range = 0.5---2.81
0.28599998 < CalmarRatio (IS) < 1.1159999 value modified original range = 0.12---1.78
3.31 < Expectancy (IS) < 34.099 value modified original range = 3.31---37.52
0.0812 < Exit quality (IS) < 0.27794 value modified original range = 0.0812---0.2998
11.2 < Complexity (IS) < 13.8 value modified original range = 6.0---19.0
1.034 < Edge Ratio (IS) < 2.026 value modified original range = 0.91---2.15
244.0 < Stagnation (IS) < 2294.4 value modified original range = 244.0---2807.0
1.34 < Ret/DD Ratio (IS) < 16.865 value modified original range = 1.34---18.59
371.8 < anz of trades (IS) < 855.8 value modified original range = 275.0---1243.0

```

Abbildung 33: The file 347_0_0.filter contains the filterrules. You can use this filterrules to optimize your Strategy generation.

The selected SQX4 Endtestfiles

And you find the strategies of the best portfolio in str__selected_sq4_endtestfiles.

The Metrikanalyser copy automatically the files from the best portfolio from str__all_sq4_endtestfiles into str__selected_sq4_endtestfiles.

These are the strategies that survived the filter rules found.

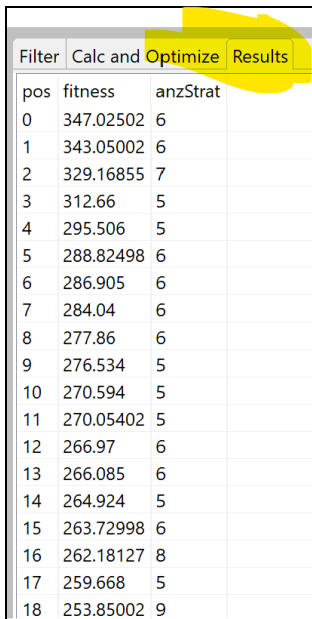
I loaded the found Strategies in the SQX.

Net profit (Port...	Mini equity cha...	# of trad...	Mini equity cha...	# of trad...
\$ 381.15		0		39
\$ 341.55		0		37
\$ -116.82		0		41
\$ 306.9		0		47
\$ 353.61		0		48
\$ 815.76		0		31

Abbildung 34: This is the best found portfolio. You can find the corresponding filter rule in best100dir.

The Resulttab

In the Tab "Results" you find an overview about the best 100 portfolios. You get as information the fitness criterium and an the numbers of found strategies in this portfolio.



Filter	Calc and Optimize	Results
pos	fitness	anzStrat
0	347.02502	6
1	343.05002	6
2	329.16855	7
3	312.66	5
4	295.506	5
5	288.82498	6
6	286.905	6
7	284.04	6
8	277.86	6
9	276.534	5
10	270.594	5
11	270.05402	5
12	266.97	6
13	266.085	6
14	264.924	5
15	263.72998	6
16	262.18127	8
17	259.668	5
18	253.85002	9

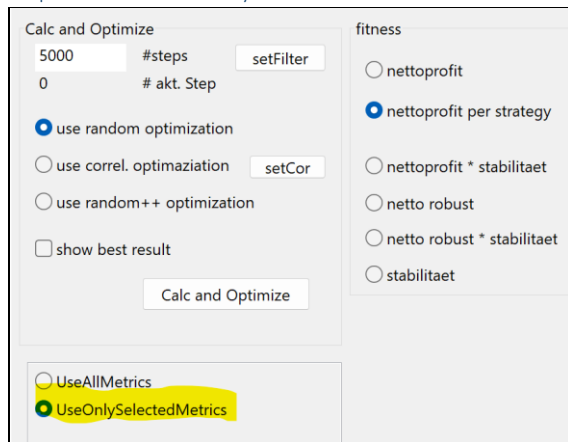
Abbildung 35: You can Click on Results to get an overview about the found portfolios.

(II) Use only some Metrics

In the last chapter we used all Metrics to find the best filtering. But sometimes

Sometimes we decide that we don't want to optimize all metrics but only some. In the correlation overview we can pick out the metrics that have a good correlation with the final test profit. This chapter is about optimizing just some of these metrics. In extreme cases, this can only be a single metric. I will show you how to configure the metrics analyzer so that only some metrics are optimized.

Step1: Switch to UseOnlySelectedMetrics



The screenshot shows a configuration window titled "Calc and Optimize". It has two main sections: "Calc and Optimize" on the left and "fitness" on the right. In the "Calc and Optimize" section, there are input fields for "#steps" (5000) and "# akt. Step" (0), a "setFilter" button, and radio buttons for "use random optimization" (selected), "use correl. optimaziation" (with a "setCor" button), and "use random++ optimization". There is also a checkbox for "show best result" and a "Calc and Optimize" button. In the "fitness" section, there are radio buttons for "nettoprofit", "nettoprofit per strategy" (selected), "nettoprofit * stabilitaet", "netto robust", "netto robust * stabilitaet", and "stabilitaet". At the bottom, there are two radio buttons: "UseAllMetrics" and "UseOnlySelectedMetrics" (selected and highlighted in yellow).

Figure 1: You can decide between UseAllMetrics and UseOnlySelectedMetrics

Step2: Select Metrics to optimize.

If you want to optimize only some metrics you need to configure the DatabankExport.Filter file in the `_O_dir` directory.

The directory contains the DatabankExport.filter file.

Attribut	minMalue	Maxvalue	Minfilevalue	Maxfilevalue	#Steps	aktMinValue	aktMaxValue	optflag	*Infozeile*
Strategy Name	0.0	0.0	0.0	10	0.0	0.0	0		
Filters result	0.0	0.0	0.0	10	0.0	0.0	0		
Profit factor (IS)	1.56	12.14	1.56	12.14	10	1.56	12.14	0	
Stability (IS)	0.49	0.94	0.49	10	0.49	0.94	0		
Win/Loss ratio (IS)	0.21	18.0	0.21	18.0	10	0.21	18.0	0	
Net profit (00S)	24.0	757.0	24.0	757.0	10	24.0	757.0	0	
anz of trades (IS)	30.0	38.0	30.0	38.0	10	30.0	38.0	0	
Mini equity chart	0.0	0.0	0.0	10	0.0	0.0	0		


```

0.0 < Strategy Name < 0.0
0.0 < Filters result < 0.0
1.56 < Profit factor (IS) < 12.14
0.49 < Stability (IS) < 0.94
0.21 < Win/Loss ratio (IS) < 18.0
24.0 < Net profit (00S) < 757.0
30.0 < anz of trades (IS) < 38.0
0.0 < Mini equity chart < 0.0
    
```

Abbildung 36: This is the whole file.

I will explain the different columns of the table.

Attribut: This is the Attribut

minValue: This Is the configured minValue. This Value has the MetricAnalyser calculated. You can change this value If you want to change this filter.

maxValue: This Is the configured maxValue. This Value has the MetricAnalyser calculated. You can change this value If you want to change this filter.

Minfilevalue: This is the minimum attribute value of the whole database. For this example, the Minimum Profit factor (IS) of all Strategies in the database is 1.56. Don't change this value by hand. This value will be automatically calculated by the Metrikanalyser.

Maxfilevalue: This is the minimum attribute value of the whole database. For this example, the Maximum Profit factor (IS) of all Strategies in the database is 12.14. Don't change this value by hand. This value will be automatically calculated by the Metrikanalyser.

#Steps: The metric analyzer calculates the stepsize from the number of steps. The random generator uses the stepsize to calculate min-max limits. The larger the number of steps, the finer the barriers are moved.

AktMinValue: Do not pay attention to these values, the metric analyzer only uses them internally.

aktMaxValue: Do not pay attention to these values, the metric analyzer only uses them internally.

I will give a concrete example for an individual calculation.

Attribut	minMalue	Maxvalue	Minfilevalue	Maxfilevalue	#S
Strategy Name	0.0	0.0	0.0	0.0	10
Filters result	0.0	0.0	0.0	0.0	10
Profit factor (IS)	1.56	12.14	1.56	12.14	10
Stability (IS)	0.49	0.94	0.49	0.94	10
Win/Loss ratio (IS)	0.21	18.0	0.21	18.0	10
Net profit (00S)	24.0	757.0	24.0	757.0	10
anz of trades (IS)	30.0	38.0	30.0	38.0	10
Mini equity chart	0.0	0.0	0.0	0.0	10

Abbildung 37: I switched on the flag for the profit factor and the Stability. The Metrikanalyser tries to optimize the Profit factor and the Stability.

Step3: Click Calc and Optimize

After modification of the DatabankExport.filter in the directory _0_dir this next step follows.

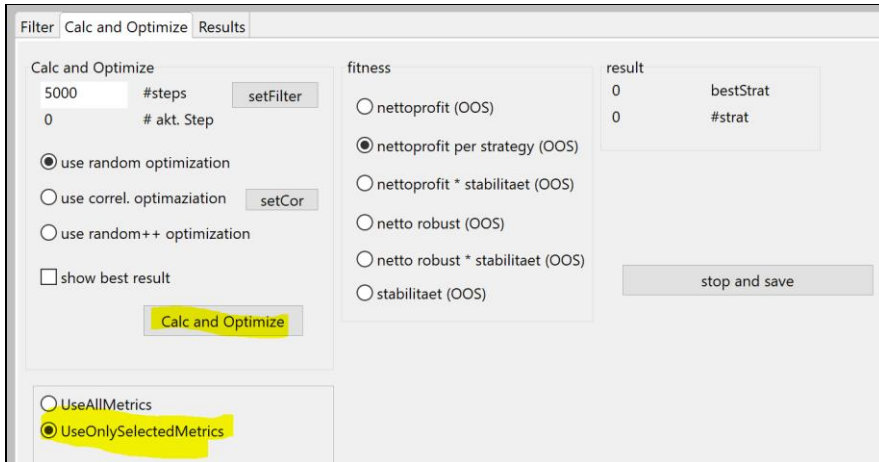


Abbildung 38: After clicking Calc and Optimize the Metrikanalyser search a best solution for Profitfaktor and Stability. I use random optimization to find the best barriers for this two attributes.

Step4: Evaluation of the Result

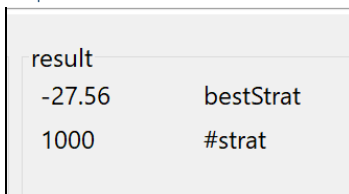


Abbildung 39: The Metrikanalyser uses all 1000 Strategies. The metrics analyzer could not find optimal filtering. Only the attributes profit factor and stability were used in the optimization.

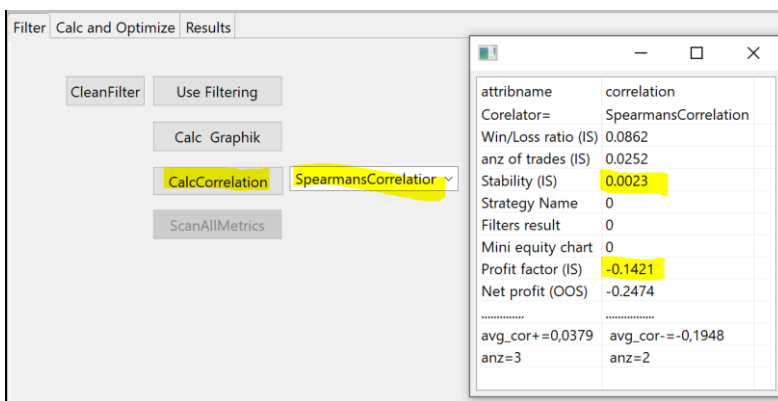


Abbildung 40: We take another look at the correlation values of the individual metrics. The profit factor and stability performed very poorly here.

DatabankExport.filter - Editor									
Datei Bearbeiten Format Ansicht Hilfe									
Attribut	minMalue		Maxvalue		Minfilevalue		Maxfilevalue		#S
Strategy Name	0.0	0.0	0.0	0.0	10	0.0	0.0	0	
Filters result	0.0	0.0	0.0	0.0	10	0.0	0.0	0	
Profit factor (IS)	1.56	12.14	1.56	12.14	10	1.56	12.14	0	
Stability (IS)	0.49	0.94	0.49	0.94	10	0.49	0.94	0	
Win/Loss ratio (IS)	0.21	18.0	0.21	18.0	10	0.21	18.0	1	
Net profit (00S)	24.0	757.0	24.0	757.0	10	24.0	757.0	0	
anz of trades (IS)	30.0	38.0	30.0	38.0	10	30.0	38.0	1	
Mini equity chart	0.0	0.0	0.0	0.0	10	0.0	0.0	0	

Abbildung 41: We found out that the correlation of Win/Loss ratio and anz of trades have better correlation. So we repeat this optimization with this values. I switched on this values in the DatabankExport.filter settings.

result	
109.0	bestStrat
5	#strat

Abbildung 42: The Metrikanalser found a good filtersetting. With this optimized filter only 5 Strategies are passed this filtersettings.

Step5: Show deeper in the Result

Filter	Calc and Optimize	Results
pos	fitness	anzStrat
0	109.0	5
1	81.52941	17
2	62.590908	22
3	0.5673077	104
4	-3.5	10
5	-5.2	5
6	-6.1823897	159
7	-13.662222	225
8	-25.833334	24
9	-27.56	1000
10	-27.915066	989

Abbildung 43: This is the overview about the found results. Only 5 Strategies passed filter 0. I think filter 1 is a better solution, because this filter passed 17 Strategies.

We will look into the best three solutions.

You can find the solutions in

nträger (C:) > forex > Metrikanalser > AnalysesRoot > Analyse6 > .99_dir	
Name	Änderungsdatum
best100dir	26.03.2024 20:12

Abbildung 44: The best100dir contains the best 100 solutions.

The filter name contains the fitness value, so you can easily find the corresponding solution.

-41_25_0.filter	26.03.2024 20:12
-44_26_0.filter	26.03.2024 20:12
-50_27_0.filter	26.03.2024 20:12
62_2_0.filter	26.03.2024 20:12
-76_28_0.filter	26.03.2024 20:12
-78_29_0.filter	26.03.2024 20:12
-78_30_0.filter	26.03.2024 20:12
-79_31_0.filter	26.03.2024 20:12
81_1_0.filter	26.03.2024 20:12
-83_32_0.filter	26.03.2024 20:12
109_0_0.filter	26.03.2024 20:12

Abbildung 45: I marked the three best filterfiles found in this directory.

Attribut	minMalue	Maxvalue	Minfilevalue	Maxfilevalue	#Steps	aktMinValue
Strategy Name	0.0	0.0	10	0.0	0	
Filters result	0.0	0.0	10	0.0	0	
Profit factor (IS)	1.56	12.14	10	1.56	12.14	0
Stability (IS)	0.94	0.49	10	0.49	0.94	0
Win/Loss ratio (IS)	3.7680001	12.663	0.21	18.0	10	3.7680001 12.663 1
Net profit (OOS)	24.0	757.0	24.0	757.0	10	24.0 757.0 0
anz of trades (IS)	30.0	37.2	30.0	38.0	10	30.0 37.2 1
Mini equity chart	0.0	0.0	0.0	10	0.0	0

0.0 < Strategy Name < 0.0
 0.0 < Filters result < 0.0
 1.56 < Profit factor (IS) < 12.14
 0.49 < Stability (IS) < 0.94
 3.7680001 < Win/Loss ratio (IS) < 12.663 value modified original range = 0.21---18.0
 24.0 < Net profit (OOS) < 757.0
 30.0 < anz of trades (IS) < 37.2 value modified original range = 30.0---38.0
 0.0 < Mini equity chart < 0.0

Abbildung 46: I marked the found filtervalues for the filter 109_0_0.filter. Only 5 Strategies passed this filter.

Attribut	minMalue	Maxvalue	Minfilevalue	Maxfilevalue	#Steps	aktMinValue
Strategy Name	0.0	0.0	10	0.0	0	
Filters result	0.0	0.0	10	0.0	0	
Profit factor (IS)	1.56	12.14	10	1.56	12.14	0
Stability (IS)	0.94	0.49	10	0.49	0.94	0
Win/Loss ratio (IS)	3.7680001	10.884	0.21	18.0	10	3.7680001 10.884 1
Net profit (OOS)	24.0	757.0	24.0	757.0	10	24.0 757.0 0
anz of trades (IS)	30.0	38.0	30.0	38.0	10	30.0 38.0 1
Mini equity chart	0.0	0.0	0.0	10	0.0	0

0.0 < Strategy Name < 0.0
 0.0 < Filters result < 0.0
 1.56 < Profit factor (IS) < 12.14
 0.49 < Stability (IS) < 0.94
 3.7680001 < Win/Loss ratio (IS) < 10.884 value modified original range = 0.21---18.0
 24.0 < Net profit (OOS) < 757.0
 30.0 < anz of trades (IS) < 38.0
 0.0 < Mini equity chart < 0.0

Abbildung 47: This filter passed 17 Strategies.

I will try this found filter 3.76 < Win/Loss ratio (IS) < 10.884 in the StrategyQuantX

Step6: Configure the found Filter in SQX

Delete FAILED strategies from databank

Automatic filters
1 automatic filter on

Custom filters

<input checked="" type="checkbox"/>	Left value	<=>	Right value	
<input checked="" type="checkbox"/>	Win/Loss ratio (IS)	>	3.76	✖
<input checked="" type="checkbox"/>	Win/Loss ratio (IS)	<	10.8	✖

Filter	Calc and Optimize	Results
pos	fitness	anzStrat
0	109.0	5
1	81.52941	17
2	62.590908	22
3	0.5673077	104
4	-3.5	10

Abbildung 48: I added this filter in the SQX. We remember that after filtering with this filter only 17 Strategies passed this filter. I will check this in the SQX.

Retested 1000

Passed 17 (1.7 %)

Duration 8.251 Seconds

Abbildung 49: 17 Strategies passed this filter. This is a quality check. The Metrikanalyser found a portfolio of 17 Strategies. The SQX filtered 17 strategies after the Win/Loss ratio Filter. This is fine.

In the next step I did an Endtest to show the strategies.

<input checked="" type="checkbox"/>	Strategy Name	Filters result	Profit facto...	Stability (IS)	Win/Loss ra...	Net profit (OOS)	# of trad...	Mini equity chart
<input checked="" type="checkbox"/>	Strategy 2.13.134(1)	PASSED	0	0	0	\$ 115	0	
<input checked="" type="checkbox"/>	Strategy 4.29.151	PASSED	0	0	0	\$ -13	0	
<input checked="" type="checkbox"/>	Strategy 4.27.123	PASSED	0	0	0	\$ 179	0	
<input checked="" type="checkbox"/>	Strategy 1.19.131(1)	PASSED	0	0	0	\$ -93	0	
<input checked="" type="checkbox"/>	Strategy 2.29.178	PASSED	0	0	0	\$ 168	0	
<input checked="" type="checkbox"/>	Strategy 2.9.186	PASSED	0	0	0	\$ 218	0	
<input checked="" type="checkbox"/>	Strategy 4.25.147	PASSED	0	0	0	\$ -45	0	
<input checked="" type="checkbox"/>	Strategy 2.12.181	PASSED	0	0	0	\$ 115	0	
<input checked="" type="checkbox"/>	Strategy 4.31.136	PASSED	0	0	0	\$ 147	0	
<input checked="" type="checkbox"/>	Strategy 1.20.112	PASSED	0	0	0	\$ -93	0	
<input checked="" type="checkbox"/>	Strategy 3.5.181	PASSED	0	0	0	\$ 218	0	
<input checked="" type="checkbox"/>	Strategy 2.30.181	PASSED	0	0	0	\$ -152	0	
<input checked="" type="checkbox"/>	Strategy 4.28.171	❗ FAILED ❗	0	0	0	\$ 150	0	
<input checked="" type="checkbox"/>	Strategy 4.31.152	PASSED	0	0	0	\$ 250	0	
<input checked="" type="checkbox"/>	Strategy 4.26.143	PASSED	0	0	0	\$ 147	0	
<input checked="" type="checkbox"/>	Strategy 4.18.128	PASSED	0	0	0	\$ 120	0	
<input checked="" type="checkbox"/>	Strategy 4.36.129	PASSED	0	0	0	\$ -45	0	

Abbildung 50: This is an Endtest of the found 17 strategies.

In the next Step I build a Portofolio of this 17 Strategies.

Net profit (Port...	Mini equity cha...	# of trad...	Mini equity cha...	# of trad...
\$ 1 386		0		81

Abbildung 51: This is the equitycurve of the generated portfolio. The portfolio result is 1386 Euro. To calculate the average profit per strategy we have to calculate 1386/17=81.52 Euro.

81.52 is the average profit per Strategy.

We check the result with the result from the Metrikanalyser.

Filter	Calc and Optimize	Results
pos	fitness	anzStrat
0	109.0	5
1	81.52941	17
2	62.590908	22
3	0.5673077	104
4	-3.5	10

Abbildung 52: The result looks perfect. 81.52 is the value from the metrikanalyser and the same value we got from the SQX portfolio.

The great end result

The end result is absolutely great. With just one rule that we discovered, we were able to optimize the overall result so that we end up with a great portfolio.

Portfolio without optimization

In the following we will look at the two final tests again. This final test was done by simply doing a final test of one year for all 1000 strategies and then creating a portfolio from them.



Abbildung 53: portfolio of final test without optimization

Portfolio with optimization

The metrics analyser found the following filter rule to improve the result. With just a single filter rule, the result could be significantly improved.

<input checked="" type="checkbox"/>	Win/Loss ratio (IS)	>	3.76
<input checked="" type="checkbox"/>	Win/Loss ratio (IS)	<	10.8

Abbildung 54: This is the only rule to optimize the result.

Net profit (Port...	Mini equity cha...	# of trad...	Mini equity cha...	# of trad...
\$ 1 386		0		81

5 The Demo Step by Step

Step1: The Installation process

Download the **Metrikanalyser_windows-x64_0_x_x_x.exe** and make a double click to start the installation process. You can install this program on Windows10/11.

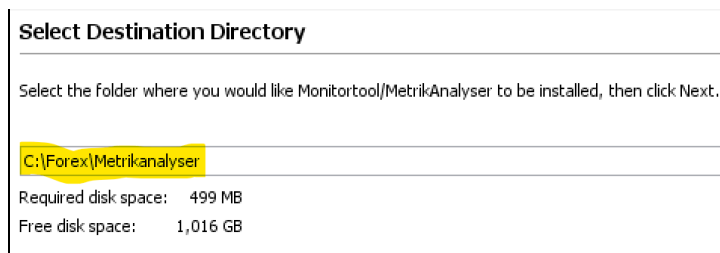


Figure 2: In the installation process you will be asked for the installation path. Choose c:\Forex\Metrikanalyser

Use C:\Forex\Metrikanalyser for the Installation path of the Metrikanalyser so we have the same Path.

In the next step you will be asked If you will install the Demo1. Demo1 is a demonstration for the basic functionality of the Metrikanalyser. This demo installs a workflow in the SQX too.

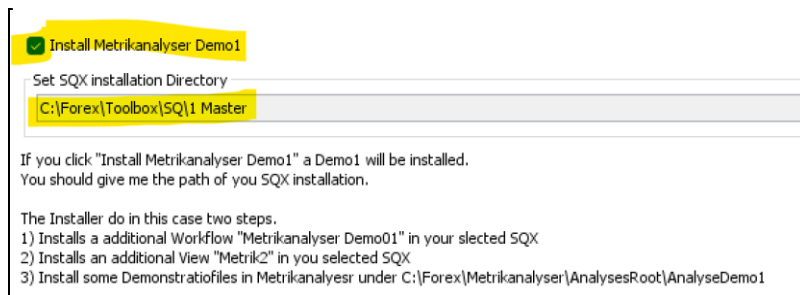


Figure 3: Install Metrikanalyser Demo1

Before click next, you should stop the SQX because the Installer installs the Metrikanalyser Demo01-Workflow and an additional View "Metrik2". If the SQX is actual running the installer give you the instruction to stop the SQX to continue the installation.

After the installation you will find a new desktop icon on your desktop.



Step2: Check configuration

Start Metrikanalyser with the desktop icon.

Allow user permission if windows ask you something.

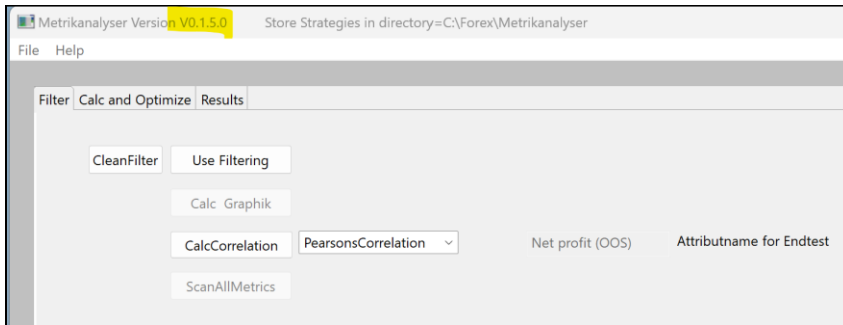


Figure 4: You will find the version of the product in the headline. At the moment 0.1.5.0 is the actual version. But program is in development. I will update frequently.

Under "File/Config" you can check that the installer set the actual configuration to our AnalyseDemo1.

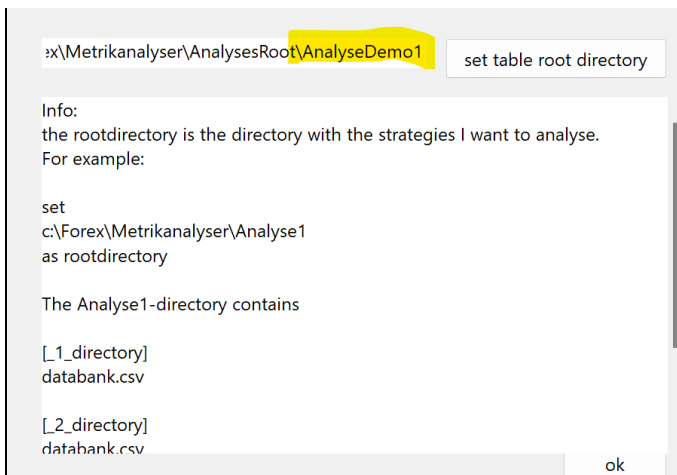


Figure 5: The tablet root directory contains the data we want to analyse. We want to make demo1 here, so this directory fits here.

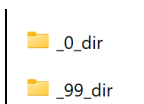


Figure 6: AnalyseDemo1 contains this subdirectory. The installer installed this directory with the content for the demonstration.

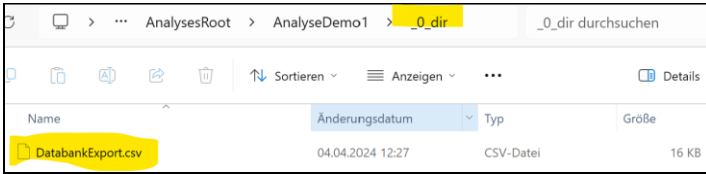


Figure 7: The _0_dir contains only the DatabankExport.csv.

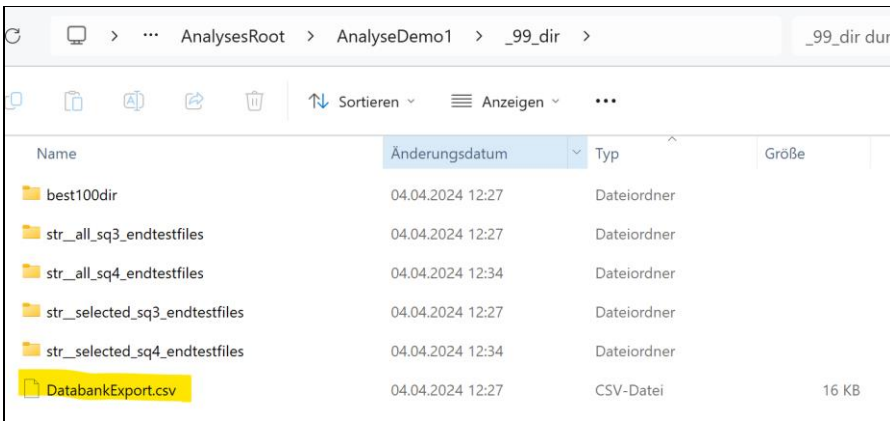


Figure 8: The _99_dir contains DatabankExport.csv and SQX-Files stored in the str_all..... directory.

From now we make a short demonstration how to work with the Metrikanalyser step by step.

Step3: Calc Correlation

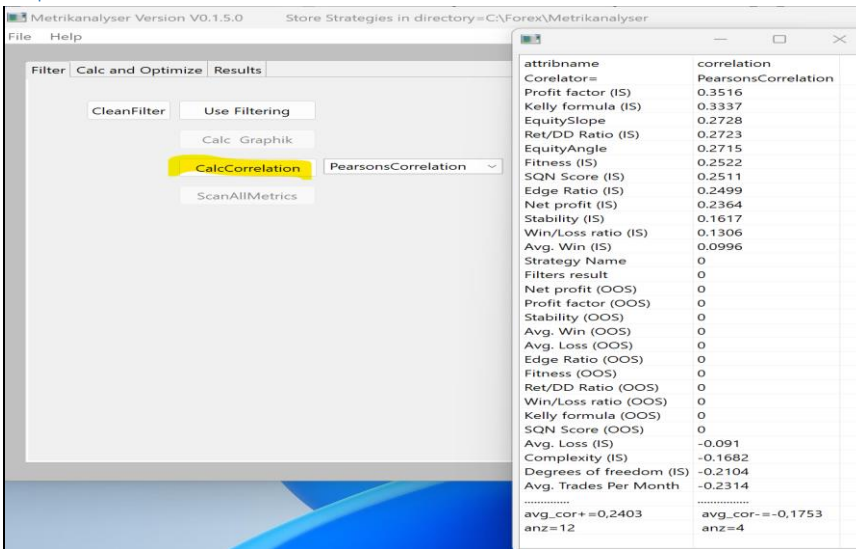


Figure 9: With CalcCorrelation you start the correlation. The Metrikanalyser check attributes and calculate for every attribute a correlation value.

The correlation is calculated for every attribute to Net Profit (OOS) in the Endtest.

Higher correlation values mean that the attribute are stronger connected to higher profits in the endtest.

Correlation values >0.3 are good values.

3 different correlation types are implemented.

PearsonCorrelation, KendallsCorrelation and SpearmannsCorrelation

In this example are only 70 strategies. For statistical analysis we need more strategies > 10000 or more. This is only a demonstration of the functionality of the Analyser.

In the next step, we are searching a good filtering for this pool of strategies. We are searching optimal filter rules for a maximum profit in the endtest. We will do this in the next step.

Step4: Searching optimal filter rules

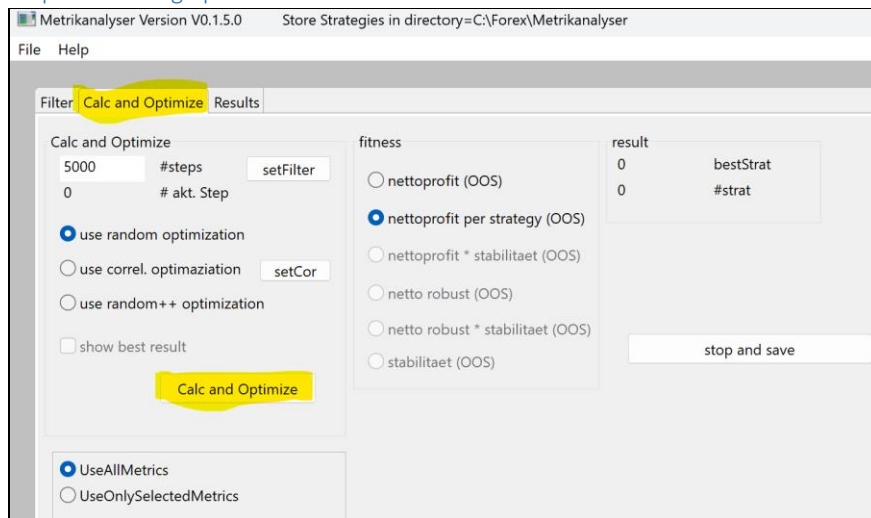


Figure 10: Click „Calc and Optimize“ for starting the optimizer.

The optimizer search in 5000 steps for optimal filterrules. We use all Metrics in this example.

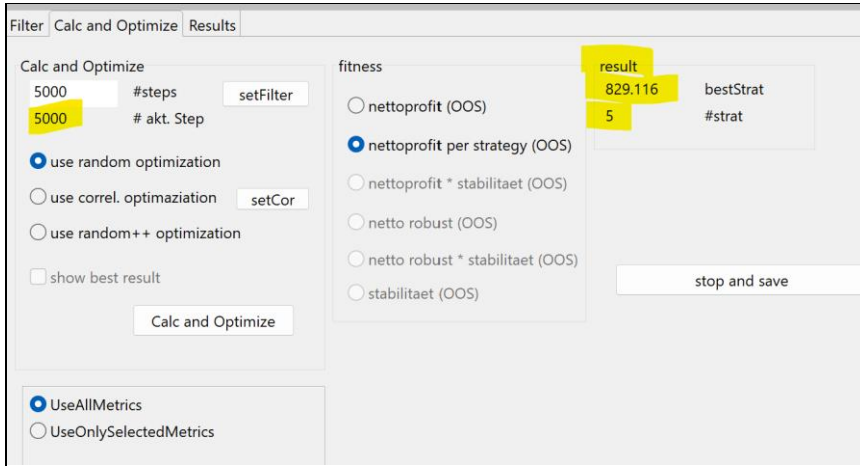


Figure 11: After the calculation the optimizer found an optimal filter rule.

The found portfolio contains 5 strategies with an average nettoprofit per Strategy of 829 Euro.

If you clicked the Result-Tab you will get the following view.

pos	fitness	anzStrat
0	829.116	5
1	816.38995	5
2	800.60394	5
3	774.36005	6
4	771.8786	7
5	771.33856	7
6	771.102	5
7	767.93146	7
8	764.19	5
9	763.34393	5
10	752.29193	5
11	747.045	6
12	746.6063	8
13	744.354	5
14	726.585	6
15	710.4214	7
16	707.55426	7
17	698.2088	8
18	689.29205	5
19	686.0128	11
20	685.71	5
21	685.11597	5

Figure 12: The best solution is shown in the first line.

You can find the result in the best100dir

Name	Änderungsdatum	Typ	Größe
526_98_0.filter	04.04.2024 13:16	FILTER-Datei	4 KB
526_99_0.filter	04.04.2024 13:16	FILTER-Datei	4 KB
528_97_0.filter	04.04.2024 13:16	FILTER-Datei	4 KB
531_96_0.filter	04.04.2024 13:16	FILTER-Datei	4 KB
534_95_0.filter	04.04.2024 13:16	FILTER-Datei	4 KB

Figure 13: You can find the best 100 result in the best100dir.

We want to look for our best result.

```

0.0 < Strategy Name < 0.0
0.0 < Filters result < 0.0
361.962 < Net profit (IS) < 2341.4941      value modified original range = 32.04---3331.26
0.0 < Net profit (OOS) < 0.0
1.01 < Profit factor (IS) < 1.9269999     value modified original range = 1.01---2.32
0.0 < Profit factor (OOS) < 0.0
45.49 < Avg. Win (IS) < 104.136           value modified original range = 45.49---129.27
43.772 < Avg. Loss (IS) < 81.432         value modified original range = 36.24---111.56
0.452 < Stability (IS) < 0.732           value modified original range = 0.34---0.9
0.0 < Stability (OOS) < 0.0
0.0 < Avg. Win (OOS) < 0.0
0.0 < Avg. Loss (OOS) < 0.0
1.113 < Edge Ratio (IS) < 1.834          value modified original range = 1.01---2.04
0.0 < Edge Ratio (OOS) < 0.0
0.326 < Fitness (IS) < 0.556             value modified original range = 0.28---0.74
0.0 < Fitness (OOS) < 0.0
0.6999999 < Ret/DD Ratio (IS) < 5.3900003 value modified original range = 0.03---6.73
0.0 < Ret/DD Ratio (OOS) < 0.0
2.085 < Avg. Trades Per Month < 4.6949997 value modified original range = 1.65---6.0
0.784 < Win/Loss ratio (IS) < 1.1719999   value modified original range = 0.59---1.56
0.0 < Win/Loss ratio (OOS) < 0.0
8.0 < Complexity (IS) < 13.0             value modified original range = 7.0---17.0
35.0 < Degrees of freedom (IS) < 159.2    value modified original range = 35.0---173.0
0.38 < Kelly formula (IS) < 20.924        value modified original range = 0.38---34.62
0.0 < Kelly formula (OOS) < 0.0
0.075 < SQN Score (IS) < 0.53000003      value modified original range = 0.01---0.66
0.0 < SQN Score (OOS) < 0.0
16.473999 < EquityAngle < 59.955997     value modified original range = 1.98---74.45
0.0 < EquitySlope < 71.47

```

Figure 14: The 829_0_0.filter file contains the filterrules to reach the best result.

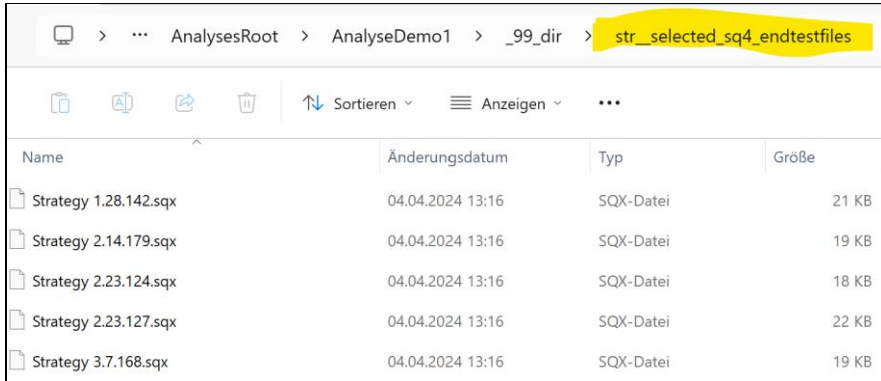


Figure 15: The directory str_selected_sq4_endtestfiles contains the filtered strategies. You can load this files in the SQX.

Step5: Load found SQX files in the StrategyQuantX

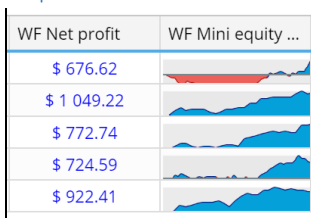


Figure 16: I loaded this files into the SQX retester



I made a portfolio of these 5 strategies. The Equitycurve of this portfolio looks fine.

The result of this best portfolio was 829 Euro. I will check this result $4145/5=829$ => that is fine.

Step6: Optimize only selected Attributes

In the next step I optimize only some metrics.

attribname	correlation
Corelator=	PearsonsCorrelation
Profit factor (IS)	0.3516
Kelly formula (IS)	0.3337
EquitySlope	0.2728
Ret/DD Ratio (IS)	0.2723
EquityAngle	0.2715
Fitness (IS)	0.2522
SQN Score (IS)	0.2511

Figure 17: I will only optimize Profit fator and Kelly formula

C:\Forex\Metrikalanalyse\AnalysesRoot\AnalyseDemo1_0_dir\DatabankExport.filter - Notepad++

File Edit Search View Encoding Language Settings Tools Macros Run Plugins Help

DatabankExport.filter

Attribut	minMalue	Maxvalue	Minfilevalue	Maxfilevalue	#Steps	aktMi
Strategy Name	0.0	0.0	0.0	0.0	10	0.0
Filters result	0.0	0.0	0.0	0.0	10	0.0
Net profit (IS)	32.04	3331.26	32.04	3331.26	10	32.04
Net profit (OOS)	0.0	0.0	0.0	0.0	10	0.0
Profit factor (IS)	1.01	2.32	1.01	2.32	10	1.01
Profit factor (OOS)	0.0	0.0	0.0	0.0	10	0.0
Avg. Win (IS)	45.49	129.27	45.49	129.27	10	45.49
Avg. Loss (IS)	36.24	111.56	36.24	111.56	10	36.24
Stability (IS)	0.34	0.9	0.34	0.9	10	0.34
Stability (OOS)	0.0	0.0	0.0	0.0	10	0.0
Avg. Win (OOS)	0.0	0.0	0.0	0.0	10	0.0
Avg. Loss (OOS)	0.0	0.0	0.0	0.0	10	0.0
Edge Ratio (IS)	1.01	2.04	1.01	2.04	10	1.01
Edge Ratio (OOS)	0.0	0.0	0.0	0.0	10	0.0
Fitness (IS)	0.28	0.74	0.28	0.74	10	0.28
Fitness (OOS)	0.0	0.0	0.0	0.0	10	0.0
Ret/DD Ratio (IS)	0.03	6.73	0.03	6.73	10	0.03
Ret/DD Ratio (OOS)	0.0	0.0	0.0	0.0	10	0.0
Avg. Trades Per Month	1.65	6.0	1.65	6.0	10	1.65
Win/Loss ratio (IS)	0.59	1.56	0.59	1.56	10	0.59
Win/Loss ratio (OOS)	0.0	0.0	0.0	0.0	10	0.0
Complexity (IS)	7.0	17.0	7.0	17.0	10	7.0
Degrees of freedom (IS)	35.0	173.0	35.0	173.0	10	35.0
Kelly formula (IS)	0.38	34.62	0.38	34.62	10	0.38
Kelly formula (OOS)	0.0	0.0	0.0	0.0	10	0.0
SQN Score (IS)	0.01	0.66	0.01	0.66	10	0.01
SQN Score (OOS)	0.0	0.0	0.0	0.0	10	0.0
EquityAngle	1.98	74.45	1.98	74.45	10	1.98
EquitySlope	0.0	71.47	0.0	71.47	10	0.0

Figure 18: To optimize only Profit faktor and Kelly formula I have to modify DatabankExport.filter in the _0_dir

Filter Calc and Optimize Results

Calc and Optimize

5000 #steps setFilter

5000 # akt. Step

use random optimization

use correl. optimaziation setCor

use random++ optimization

show best result

Calc and Optimize

fitness

nettoprofit (OOS)

nettoprofit per strategy (OOS)

nettoprofit * stabilitaet (OOS)

netto robust (OOS)

netto robust * stabilitaet (OOS)

stabilitaet (OOS)

stop and save

result

475.38547 bestStrat

33 #strat

UseAllMetrics

UseOnlySelectedMetrics

Figure 19: Select UseOnlySelectedMetrics and click „Calc and Optimize“

You will find the best portfolio in the directory **str_selected_sq4_endtestfiles**

We find the corresponding filter in the **best100_dir**

I will show this filter file.

```

C:\Forex\Metrikanalyser\AnalysesRoot\AnalyseDemo\1_99_dir\best100dir\475_0_0.filter - Notepad++
Datei Bearbeiten Suchen Ansicht Codierung Sprache Einstellungen Werkzeuge Makros Ausfuehren Plugins Fenster ?
475_0_0.filter
34 32.04 < Net profit (IS) < 3331.26
35 0.0 < Net profit (OOS) < 0.0
36 1.01 < Profit factor (IS) < 2.32
37 0.0 < Profit factor (OOS) < 0.0
38 45.49 < Avg. Win (IS) < 129.27
39 36.24 < Avg. Loss (IS) < 111.56
40 0.34 < Stability (IS) < 0.9
41 0.0 < Stability (OOS) < 0.0
42 0.0 < Avg. Win (OOS) < 0.0
43 0.0 < Avg. Loss (OOS) < 0.0
44 1.01 < Edge Ratio (IS) < 2.04
45 0.0 < Edge Ratio (OOS) < 0.0
46 0.28 < Fitness (IS) < 0.74
47 0.0 < Fitness (OOS) < 0.0
48 0.03 < Ret/DD Ratio (IS) < 6.73
49 0.0 < Ret/DD Ratio (OOS) < 0.0
50 1.65 < Avg. Trades Per Month < 6.0
51 0.59 < Win/Loss ratio (IS) < 1.56
52 0.0 < Win/Loss ratio (OOS) < 0.0
53 7.0 < Complexity (IS) < 17.0
54 35.0 < Degrees of Freedom (IS) < 173.0
55 10.651999 < Kelly formula (IS) < 20.924 value modified original range = 0.38---34.62
56 0.0 < Kelly formula (OOS) < 0.0
57 0.01 < SQN Score (IS) < 0.66
58 0.0 < SQN Score (OOS) < 0.0
59 1.98 < EquityAngle < 74.45
60 0.0 < EquitySlope < 71.47

```

Figure 20: The result was found in 475_0_0.filter. Only one rule was modified.

You can add this new Rule to the custom filters for the generator.

Custom filters					
<input checked="" type="checkbox"/>	Left value	<=>	Right value		
<input checked="" type="checkbox"/>	Avg. Trades Per Month	> ∨	2		✘
<input checked="" type="checkbox"/>	Profit factor	> ∨	1.3		✘
<input checked="" type="checkbox"/>	Ret/DD Ratio	> ∨	5		✘
<input checked="" type="checkbox"/>	Kelly formula (IS)	> ∨	10.65 %		✘
<input checked="" type="checkbox"/>	Kelly formula (IS)	< ∨	20.9 %		✘

Figure 21: I found a new Rule with the metrikanalyser to generate better strategies.

Step7: Introduce the Demo workflow (Metrikanalyser Demo01)

With the Demo installation comes the demo workflow. I will describe this workflow in more detail.

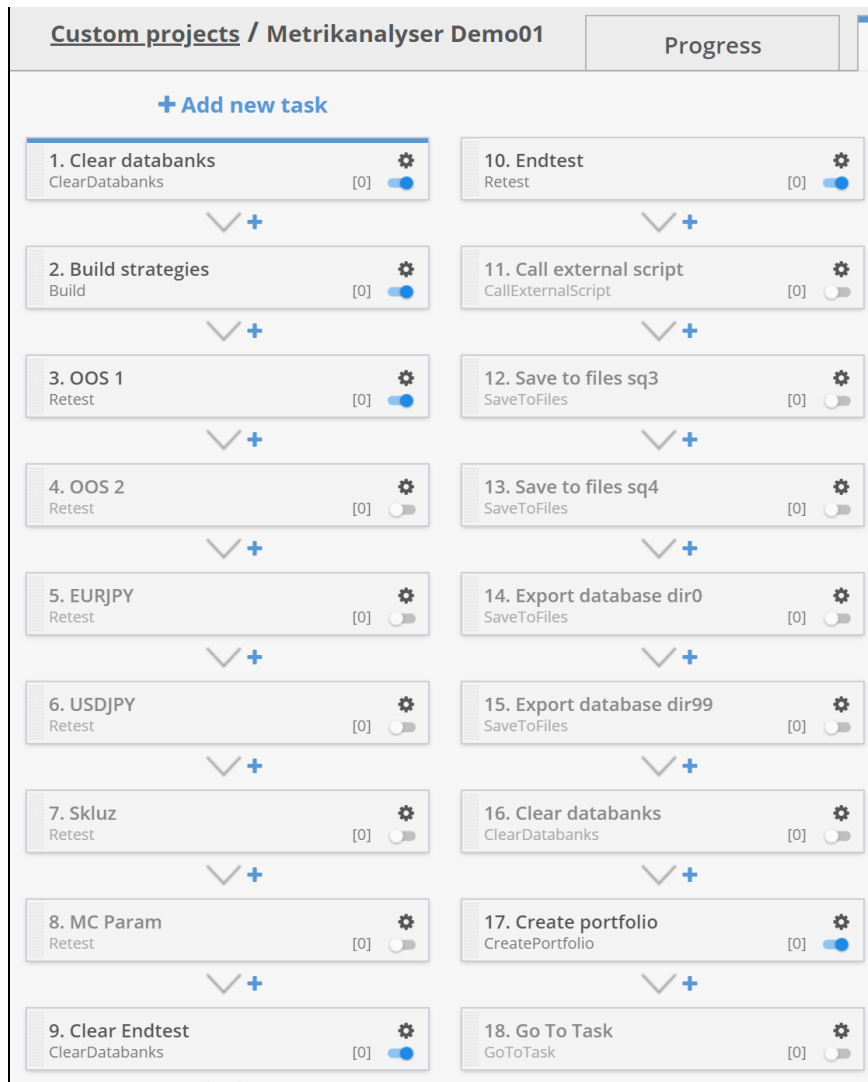


Abbildung 55: This is the workflow which comes with the Demo installation.

1: Clear Databanks

This should be clear, no additional explanation needed.

2: Build Strategies

This is the original generator from the SQX Forum. In this example I only generate 100 Strategies. If you want to do more analysis you can expand this value to 10000 or 100K Strategies. But you will need a powerful computer. It would be ideal to have a computer with at least 64GB of RAM memory.

I have a Ryzen 7950X with 128GB of memory. A Ryzen 3700 with 64GB also serves its purposes. On a computer with 32GB of memory it becomes a bit tight. Here I would limit the number of processors to 4 to save memory. I would also limit the number of islands to 4, which also saves memory.

If you find the optimal metrics you can loosen the filter criteria. If you loosen the filter criteria, more strategies will be found. You can then use the analyser to examine which attributes are good or bad.

The screenshot shows a configuration window with two sections: 'Automatic filters' and 'Custom filters'. Under 'Automatic filters', it says '1 automatic filter on' with a gear icon. The 'Custom filters' section contains a table with columns for 'Left value', a comparison operator, and 'Right value'. There are also checkboxes for each filter and a column with an 'x' icon.

<input type="checkbox"/>	Left value	<=>	Right value		
<input type="checkbox"/>	Avg. Trades Per Month	>	2	x	
<input checked="" type="checkbox"/>	Profit factor	>	1.3	x	
<input type="checkbox"/>	Ret/DD Ratio	>	5	x	

Abbildung 56: This is only an example. I have never tested this setting. But you can do this.

3: OOS1

In my example I use an OOS1-Filter, this is the original filter from the SQX forum. I have tested an OOS1 filter many time. It makes sense to use such filter.

4: OOS2

It makes sense to use an additional OOS2 Filter. But in my case I want to concentrate on finding optimal metrics. I switched this filter off to generate more strategies.

5: EURJPY

It makes sense to use this Filter. But in my case I want to concentrate on finding optimal metrics. I switched this filter off to generate more strategies.

6: USDJPY

It makes sense to use this Filter. But in my case I want to concentrate on finding optimal metrics. I switched this filter off to generate more strategies.

7: Skluz

It makes sense to test with increased spread and slippage. But in my case I switched this off

8: MC Param

In my case I want to concentrate to find good metrics. I switched this off. It will be an interesting test if I leave this filter on. Montecarlofilter removes many curve fitted strategies. You can test this if you find Metrics with better correlations if you use this filter.

9: Clear Endtest

Delete only the Endtest Database. This is necessary if you want to repeat this Workflow many times.

10: Endtest

The Endtest will be done with unseen data. We want to check if the generation produces good strategies. We make an end test of one year. We use only OOS settings.

Backtest data settings

Symbol: GBPJPY Timeframe: H1

Start day: 2021.04.09 End day: 2022.04.09 Reset dates

Available from: 2003.08.04 to: 2023.12.20

Test parameters

Precision: 1 minute data tick simulation (...)

Commissions & swap: No commissions | No swap

Spread: 5 pips Slippage: 0 pips Min. distance: 0 pips

Data range parts

What is it? Most used configs: 50 20 30 30 20 20 20 18 20 20 18 30

OOS1

Show chart

Abbildung 57: It is important that we use the OOS1 data, because the Metrikanalyser use only the OOS1 values for the Analysis.

11 Call external script

```
make_clean.bat - Editor
Datei Bearbeiten Format Ansicht Hilfe
del C:\Forex\Metrikanalyser\AnalysesRoot\AnalyseDemo1\_99_dir\str_all_sq3_endtestfiles\*.str
del C:\Forex\Metrikanalyser\AnalysisRoot\AnalyseDemo1\_99_dir\str_all_sq4_endtestfiles\*.sqx
```

Abbildung 58: Make Clean is a simple script if you want to delete some strategies in the folder. You need this only if you want to automate this workflow in a loop.

12 Save to files sq3

From databank: Endtest

Overwrite existing files:

Save in SQX format:

Destination folder: Browse

Save in STR (SQ3) format:

Destination folder: C:\forex\Metrikanalyser\AnalysesRoot\AnalyseDemo1_99! Browse

Abbildung 59: You need this only if you want to automate you workflow. We store in our case all str-files in the specific folder. In our case it is the directory `str_all_sq3_endtestfiles`

We don't need this task at the moment. This step will be used if the feature to display the portfolio equity curves with the metric analyser. The STR-Files contains the equity charts for the strategies. I will use this to display the found strategies and the found portfolio.

But this feature is not implemented at the moment.

13 Save to files sq4

The screenshot shows a configuration window titled "Save to files". It has a dropdown menu for "From databank" set to "Endtest". To the right is a toggle switch for "Overwrite existing files" which is turned on. Below this, there are two sections. The first section is "Save in SQX format", which is also turned on. It has a text input field for "Destination folder" containing the path "C:\forex\Metrikanalyser\AnalysesRoot\AnalyseDemo1\9\" and a "Browse" button. The second section is "Save in STR (SQ3) format", which is turned off. It has an empty text input field for "Destination folder" and a "Browse" button.

Abbildung 60: Wee store all Endtests in the folder **str__all_sq4_endtestfiles**

This directory contains all endtestfiles. Metrikanalyser needs this files to build the optimal endtest. He copy's the best portfolio files from this directory to **str__selected_sq4_endtestfiles**.

You can find the best portfolio files in the str__selected..... directory.

14 Export databasedir dir0 (The OOS1-Database)

The screenshot shows a configuration window titled "Save to files". It has a dropdown menu for "From databank" set to "OOS1". To the right is a toggle switch for "Overwrite existing files" which is turned on. Below this, there are two sections. The first section is "Export databank contents", which is turned on. It has a text input field for "Destination folder" containing the path "C:\forex\Metrikanalyser\AnalysesRoot\AnalyseDemo1_0_" and a "Browse" button. The second section is "Export list of trades for every strategy", which is turned off. It has an empty text input field for "Destination folder" and a "Browse" button. Below these sections is an "Additional options" section. It has a dropdown menu for "Data" set to "Main backtest". It has a "Format" section with two buttons: "XLSX" and "CSV", where "CSV" is selected. There is also a toggle switch for "Use comma in numeric values" which is turned off.

Abbildung 61: We export Databank contents to C:\forex\Metrikanalyser\AnalysesRoot\AnalyseDemo1_0_dir

The Metrikanalyser needs Information from the Databank to analyse. So we export the Databank contents to the **_0_dir** –directory.

Remark:

We export in our case not the Result-Database, **we export the OOS1-Database**.

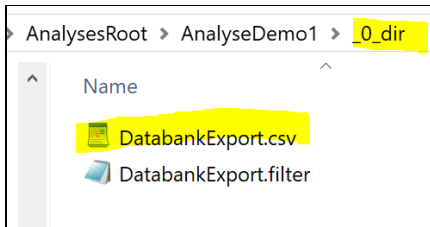


Abbildung 62: After exporting the databank is stored under this location

15 Export databasedir dir99

It is the same as before. But we export in this case the Endtest data base in the `_99_dir`.

Attention:

Important is that the Database OSS1 and Endtest **must have the same View**. Please Check the View setting before the exporting.

Avg. Win (IS)	Avg. Loss (IS)	Stability (IS)	Stability (O...)	Avg. Win (O...)	Avg. Loss (...)	Edge Ratio (...)	Edge Ratio (...)	Fitne...	Fitne...	Ret/DD Rati...	Ret/DD Rati...	Avg. Tr
\$ 111.56	\$ 67.57	0.68	0	\$ 0	\$ 0	1.61	0	0.58	0	2.99	0	1.

Abbildung 63: OOS1 and Endtest should have the same view. Best is to set View to Metrikanalyser before exporting the database.

16 Clear databanks

If you want to repeat this workflow you need to clear the databases.

17 Create portfolio

You can create a portfolio if you want.

18 Go To Task

If you want to automate this process, you can use this.

Some Hints:

Play with this workflow. Try to find a good generation process.

A generation process is good if the generator produces more good than bad strategies.

6 Metrikanalyser with Robustnesstests

In order to implement robustness tests with the metric analyzer, you have to divide the original set of strategies into several pools. I use pool 0 to find filter rules. I use pools 1-5 to check what I found.

In the configuration you specify how many percent of the strategies are used for pool 0. The default value here is 50%.

The remaining strategies are divided evenly between pools 1-5.

The entire distribution is random.

If you want to have the same result in every test with the original set of strategies, you have to set a fixed seed for the random generator.

The percentage distribution and whether I want to use a seed can be specified in the following configuration.

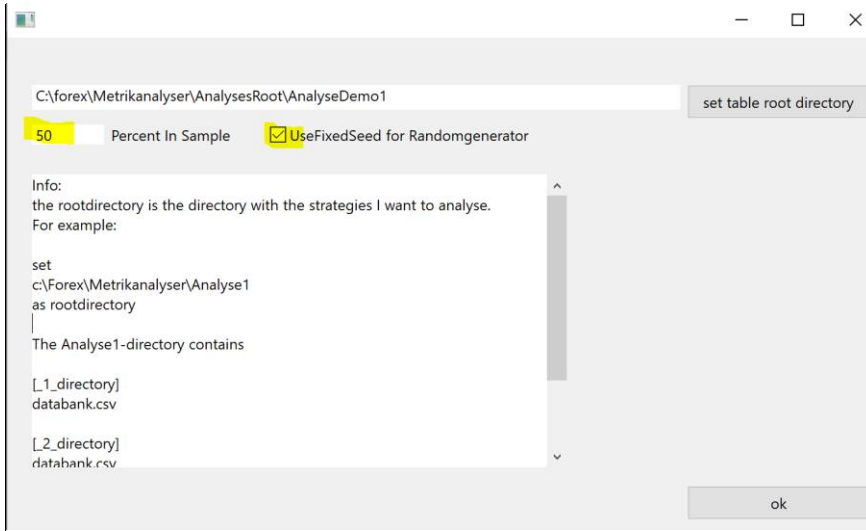


Abbildung 64: You can specify the percent for In Sample and the FixedSeed in File/config.

For example, If you have generated 10000 Strategies. The pool distribution is as follows: Pool0 contains 5000 strategies, and each subsequent pool, such as Pool1 and Pool2, contains approximately 1000 strategies.

Calc Correlation

attribname	correlation	attribname	correlation	attribname	correlation
Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation
SQN Score (IS)	0.1999	SQN Score (IS)	0.1999	SQN Score (IS)	0.1999
Net profit (IS)	0.1567	Net profit (IS)	0.1567	Net profit (IS)	0.1567
Fitness (IS)	0.1307	Fitness (IS)	0.1307	Fitness (IS)	0.1307
EquitySlope	0.122	EquitySlope	0.122	EquitySlope	0.122
EquityAngle	0.1141	EquityAngle	0.1141	EquityAngle	0.1141
Stability (IS)	0.1128	Stability (IS)	0.1128	Stability (IS)	0.1128
Avg. Trades Per Month	0.1024	Avg. Trades Per Month	0.1024	Avg. Trades Per Month	0.1024
Degrees of freedom (IS)	0.0991	Degrees of freedom (IS)	0.0991	Degrees of freedom (IS)	0.0991
Avg. Win (IS)	0.0432	Avg. Win (IS)	0.0432	Avg. Win (IS)	0.0432
Complexity (IS)	0.0294	Complexity (IS)	0.0294	Complexity (IS)	0.0294
Avg. Loss (IS)	0.0192	Avg. Loss (IS)	0.0192	Avg. Loss (IS)	0.0192
Strategy Name	0	Strategy Name	0	Strategy Name	0
Filters result	0	Filters result	0	Filters result	0
Net profit (OOS)	0	Net profit (OOS)	0	Net profit (OOS)	0
Profit factor (OOS)	0	Profit factor (OOS)	0	Profit factor (OOS)	0
Stability (OOS)	0	Stability (OOS)	0	Stability (OOS)	0
Avg. Win (OOS)	0	Avg. Win (OOS)	0	Avg. Win (OOS)	0
Avg. Loss (OOS)	0	Avg. Loss (OOS)	0	Avg. Loss (OOS)	0
Edge Ratio (OOS)	0	Edge Ratio (OOS)	0	Edge Ratio (OOS)	0
Fitness (OOS)	0	Fitness (OOS)	0	Fitness (OOS)	0
Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0
Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0
Kelly formula (OOS)	0	Kelly formula (OOS)	0	Kelly formula (OOS)	0
SQN Score (OOS)	0	SQN Score (OOS)	0	SQN Score (OOS)	0
Edge Ratio (IS)	-0.015	Edge Ratio (IS)	-0.015	Edge Ratio (IS)	-0.015
Ret/DD Ratio (IS)	-0.0171	Ret/DD Ratio (IS)	-0.0171	Ret/DD Ratio (IS)	-0.0171
Profit factor (IS)	-0.0179	Profit factor (IS)	-0.0179	Profit factor (IS)	-0.0179
Kelly formula (IS)	-0.0191	Kelly formula (IS)	-0.0191	Kelly formula (IS)	-0.0191
Win/Loss ratio (IS)	-0.0196	Win/Loss ratio (IS)	-0.0196	Win/Loss ratio (IS)	-0.0196
avg_cor+=0.1027	avg_cor=-0.0177	avg_cor+=0.1027	avg_cor=-0.0177	avg_cor+=0.1027	avg_cor=-0.0177
anz=11	anz=5	anz=11	anz=5	anz=11	anz=5

Abbildung 65: This is the result if you use a fixed Seed for the correlation function. I clicked three times calc Correlation.

attribname	correlation	attribname	correlation	attribname	correlation
Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation
SQN Score (IS)	0.288	SQN Score (IS)	0.308	SQN Score (IS)	0.2268
Net profit (IS)	0.2517	Net profit (IS)	0.2741	Net profit (IS)	0.1943
Fitness (IS)	0.2434	Fitness (IS)	0.2251	EquitySlope	0.1867
EquitySlope	0.2143	EquityAngle	0.2125	Stability (IS)	0.1645
Avg. Trades Per Month	0.193	EquitySlope	0.2105	Fitness (IS)	0.1557
Degrees of freedom (IS)	0.1921	Degrees of freedom (IS)	0.2068	Avg. Trades Per Month	0.141
EquityAngle	0.185	Avg. Trades Per Month	0.1994	Degrees of freedom (IS)	0.1407
Stability (IS)	0.1488	Stability (IS)	0.1373	EquityAngle	0.1332
Avg. Win (IS)	0.03	Avg. Win (IS)	0.0682	Avg. Win (IS)	0.0775
Avg. Loss (IS)	0.0159	Avg. Loss (IS)	0.034	Complexity (IS)	0.0056
Complexity (IS)	0.0014	Edge Ratio (IS)	0.0091	Strategy Name	0
Strategy Name	0	Strategy Name	0	Filters result	0
Filters result	0	Filters result	0	Net profit (OOS)	0
Net profit (OOS)	0	Net profit (OOS)	0	Profit factor (OOS)	0
Profit factor (OOS)	0	Profit factor (OOS)	0	Stability (OOS)	0
Stability (OOS)	0	Stability (OOS)	0	Avg. Win (OOS)	0
Avg. Win (OOS)	0	Avg. Win (OOS)	0	Avg. Loss (OOS)	0
Avg. Loss (OOS)	0	Avg. Loss (OOS)	0	Edge Ratio (OOS)	0
Edge Ratio (OOS)	0	Edge Ratio (OOS)	0	Fitness (OOS)	0
Fitness (OOS)	0	Fitness (OOS)	0	Ret/DD Ratio (OOS)	0
Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0	Win/Loss ratio (OOS)	0
Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0	Kelly formula (OOS)	0
Kelly formula (OOS)	0	Kelly formula (OOS)	0	SQN Score (OOS)	0
SQN Score (OOS)	0	SQN Score (OOS)	0	Avg. Loss (IS)	-0.002
Edge Ratio (IS)	-0.0119	Win/Loss ratio (IS)	-0.0245	Edge Ratio (IS)	-0.007
Ret/DD Ratio (IS)	-0.0247	Kelly formula (IS)	-0.0247	Ret/DD Ratio (IS)	-0.0103
Win/Loss ratio (IS)	-0.0309	Ret/DD Ratio (IS)	-0.0253	Profit factor (IS)	-0.0116
Profit factor (IS)	-0.0378	Profit factor (IS)	-0.0422	Kelly formula (IS)	-0.0302
Kelly formula (IS)	-0.0475	Complexity (IS)	-0.0767	Win/Loss ratio (IS)	-0.0385
-----	-----	-----	-----	-----	-----
avg_cor+=0.1603	avg_cor=-0.0306	avg_cor+=0.1714	avg_cor=-0.0387	avg_cor+=0.1426	avg_cor=-0.0166
anz=11	anz=5	anz=11	anz=5	anz=10	anz=6

Abbildung 66: This is the result if you use random distribution for the random generator. I clicked three times calc Correlation.

The result differs a little.

You will get better results if you generate more Strategies or if you use 90% for the Pool0

attribname	correlation	attribname	correlation	attribname	correlation
Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation
SQN Score (IS)	0.2256	SQN Score (IS)	0.2305	SQN Score (IS)	0.2371
Net profit (IS)	0.2131	Net profit (IS)	0.2016	Net profit (IS)	0.2146
Fitness (IS)	0.1809	Fitness (IS)	0.1933	Fitness (IS)	0.1964
EquitySlope	0.173	EquitySlope	0.1712	EquitySlope	0.1765
EquityAngle	0.1586	EquityAngle	0.1673	EquityAngle	0.1703
Avg. Trades Per Month	0.1518	Avg. Trades Per Month	0.1634	Avg. Trades Per Month	0.1598
Degrees of freedom (IS)	0.1508	Degrees of freedom (IS)	0.1623	Degrees of freedom (IS)	0.1562
Stability (IS)	0.1312	Stability (IS)	0.1392	Stability (IS)	0.1243
Avg. Win (IS)	0.0319	Avg. Win (IS)	0.0398	Avg. Win (IS)	0.0388
Avg. Loss (IS)	0.0172	Avg. Loss (IS)	0.0168	Avg. Loss (IS)	0.0252
Complexity (IS)	0.0004	Complexity (IS)	0.0068	Complexity (IS)	0.0086
Strategy Name	0	Strategy Name	0	Strategy Name	0
Filters result	0	Filters result	0	Filters result	0
Net profit (OOS)	0	Net profit (OOS)	0	Net profit (OOS)	0
Profit factor (OOS)	0	Profit factor (OOS)	0	Profit factor (OOS)	0
Stability (OOS)	0	Stability (OOS)	0	Stability (OOS)	0
Avg. Win (OOS)	0	Avg. Win (OOS)	0	Avg. Win (OOS)	0
Avg. Loss (OOS)	0	Avg. Loss (OOS)	0	Avg. Loss (OOS)	0
Edge Ratio (OOS)	0	Edge Ratio (OOS)	0	Edge Ratio (OOS)	0
Fitness (OOS)	0	Fitness (OOS)	0	Fitness (OOS)	0
Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0
Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0
Kelly formula (OOS)	0	Kelly formula (OOS)	0	Kelly formula (OOS)	0
SQN Score (OOS)	0	SQN Score (OOS)	0	SQN Score (OOS)	0
Edge Ratio (IS)	-0.0057	Edge Ratio (IS)	-0.002	Edge Ratio (IS)	-0.0086
Ret/DD Ratio (IS)	-0.0137	Ret/DD Ratio (IS)	-0.0157	Ret/DD Ratio (IS)	-0.014
Profit factor (IS)	-0.0148	Profit factor (IS)	-0.0167	Profit factor (IS)	-0.015
Kelly formula (IS)	-0.0302	Win/Loss ratio (IS)	-0.0287	Kelly formula (IS)	-0.0273
Win/Loss ratio (IS)	-0.0306	Kelly formula (IS)	-0.033	Win/Loss ratio (IS)	-0.0331
-----	-----	-----	-----	-----	-----
avg_cor+=0.1322	avg_cor=-0.019	avg_cor+=0.1357	avg_cor=-0.0192	avg_cor+=0.1373	avg_cor=-0.0196
anz=11	anz=5	anz=11	anz=5	anz=11	anz=5

Abbildung 67: In this example I used 90% for pool0. The results differ not so strong.

Calc and Optimize Example1

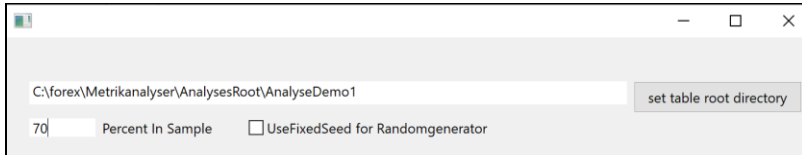


Abbildung 68: For the next example I use this setting.

What does this set mean exactly? Answer: We use 70% of the strategies generated to develop rules and regulations. The remaining 30% of strategies are divided into 5 pots. These pots contain strategies that we set aside at the beginning. These are our testing strategies, so to speak.

So I only use the 70% of the generated strategies for the development process.

I use the following setting.

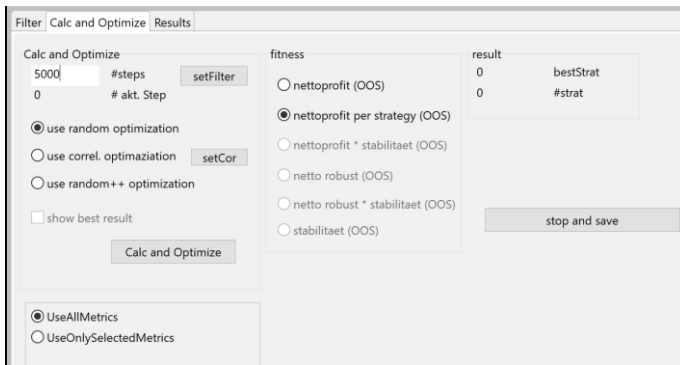


Abbildung 69: To find good metrikrules it is necessary to generate more Strategies. In this example I have generated 881 Strategies in the Endtest.

Filter	Calc and Optimize	Results					
pos	fitness	anzStrat	Pool1	Pool2	Pool3	Pool4	Pool5
0	268.90198	5	NaN	NaN	NaN	NaN	NaN
1	177.0948	25	122.399994	266.07	349.7175	172.188	NaN
2	143.265	6	-322.29	283.32	348.38988	219.57	NaN
3	142.01	9	103.14	NaN	NaN	NaN	NaN
4	134.62636	33	-51.372	NaN	16.469994	263.4975	299.07
5	131.65927	42	185.15999	-56.849995	266.31	288.57	386.28
6	128.37	18	39.15	NaN	-215.46	NaN	NaN
7	98.67836	61	217.96199	37.224007	248.295	177.09428	365.535
8	73.59706	51	-86.4	-94.634995	131.09401	63.495003	324.31497
9	66.24783	23	-230.85	283.32	141.66	163.44	7.0200005
10	64.03213	47	82.70999	353.25	179.29286	306.27002	214.77856
11	64.01454	11	NaN	NaN	NaN	NaN	NaN
12	59.598	5	NaN	NaN	49.14	-20.79	NaN
13	51.255962	47	-51.372	61.74	16.469994	152.41501	186.48001
14	51.132	15	NaN	-312.57	NaN	NaN	433.89
15	50.051247	8	-52.02	NaN	248.4	NaN	344.79
16	48.92479	23	-189.85498	NaN	378.07498	21.5775	343.26
17	45.017998	5	NaN	NaN	NaN	NaN	NaN
18	44.96586	29	-154.98	83.497505	49.14	12.689999	-137.79
19	42.564007	15	259.62	NaN	49.14	-20.79	162.576
20	41.613564	59	151.4025	265.22998	-195.15001	-56.97	303.08624
21	39.181213	268	105.47744	235.72638	175.91249	122.39592	129.492
22	36.280804	100	268.2	-63.292496	131.32286	288.1543	-84.712494
23	35.909996	9	NaN	61.74	-215.46	NaN	NaN
24	34.848637	140	-69.73499	162.64635	112.72846	69.426	187.62355
25	31.492807	25	117.98999	283.32	220.005	NaN	274.05

Abbildung 70: This is the resulttable. Some results are marked with NaN=not a Number. This means that no strategies are left after filtering. The results vary greatly.

Result: The results vary greatly. There's a lot of curve fitting/over-optimization at play here.

For example: I will examine line 1 of the table.

1	177.0948	25	122.399994	266.07	349.7175	172.188	NaN
---	----------	----	------------	--------	----------	---------	-----

Abbildung 71: This is the found filtering on position 1

On position 1 in the table we found a filter rule which filter the strategies of the Pool1 to a portfolio which contains 25 strategies after filtering. The average result per strategy is here 177 Euro.

I will show this found filter rules.

```

0.0 < Strategy Name < 0.0
0.0 < Filters result < 0.0
798.3 < Net profit (IS) < 1195.74 value modified original range = 3.42---1990.62
0.0 < Net profit (OOS) < 0.0
1.01 < Profit factor (IS) < 1441.001 value modified original range = 1.01---1601.0
0.0 < Profit factor (OOS) < 0.0
58.522803 < Avg. Win (IS) < 105.78205 value modified original range = 39.47---149.99
0.0 < Avg. Loss (IS) < 159.57 value modified original range = 0.23---0.88
0.23 < Stability (IS) < 0.75
0.0 < Stability (OOS) < 0.0
0.0 < Avg. Win (OOS) < 0.0
0.0 < Avg. Loss (OOS) < 0.0
0.67 < Edge Ratio (IS) < 3.2080002 value modified original range = 0.67---4.9
0.0 < Edge Ratio (OOS) < 0.0
0.214 < Fitness (IS) < 0.58599997 value modified original range = 0.09---0.71
0.0 < Fitness (OOS) < 0.0
0.01 < Ret/DD Ratio (IS) < 1280.002 value modified original range = 0.01---1600.0
0.0 < Ret/DD Ratio (OOS) < 0.0
1.2479999 < Avg. Trades Per Month < 3.624 value modified original range = 0.06---6.0
0.5 < Win/Loss ratio (IS) < 59999.6 value modified original range = 0.5---99999.0
0.0 < Win/Loss ratio (OOS) < 0.0
6.0 < Complexity (IS) < 13.7 value modified original range = 6.0---17.0
0.0 < Degrees of freedom (IS) < 173.0
0.69 < Kelly formula (IS) < 60.276 value modified original range = 0.69---100.0
0.0 < Kelly formula (OOS) < 0.0
0.0 < SQN Score (IS) < 0.5
0.0 < SQN Score (OOS) < 0.0

```

Abbildung 72: This filter rules contains many filters.

Again to repeat. We weren't looking for strategies; we were looking for filter rules using the metric analyser. The metrics analyser always provides us with filter rules in the search process.

Filter rules are the result of the search.

What's next? We now have to examine how good the filter rules we found are.

To determine this, we do the following tasks.

We take a pot of new strategies that the metrics analyser has never seen before. We then apply the filter rules we found to these unknown strategies. We then look at how many strategies are left after the filtering process. And we look at the profits too.

Several cases can occur.

- 1) The filter process simply filters out the new strategies. So there's nothing left. (Result: NaN)
- 2) Strategies remain. The metrics analyser builds a portfolio from the strategies and displays the final test of this portfolio in the table. This are the entries for Pool1....Pool2....etc.

1	177.0948	25	122.399994	266.07	349.7175	172.188	NaN
---	----------	----	------------	--------	----------	---------	-----

Let's now take a closer look at the row in the table.

The generated Portfolio contains 25 Strategies. This Portfolio yield an average Profit per Strategy of 177 Euro.

Pool1 contains a portfolio. The average Profit of a strategy is 122 Euro

Pool2 contains a portfolio. The average Profit of a strategy is 266 Euro

Pool3 contains a portfolio. The average Profit of a strategy is 349 Euro

Pool4 contains a portfolio. The average Profit of a strategy is 172 Euro

Pool5 contains no Strategies.

[How can we interpret the result now?](#)

The set of rules we have found is better when there are smaller deviations in the profits of the portfolios from the original portfolio.

In this example, we looked for optimal rules on all metrics. In the next example we want to see whether we get a better result if we only optimize 1-2 metrics.

Example2:

In this Example I have generated 34943 Strategies. After OOS1-Filtering 23207 Strategies left. So we have now this amount of 23207 strategies for analysis.

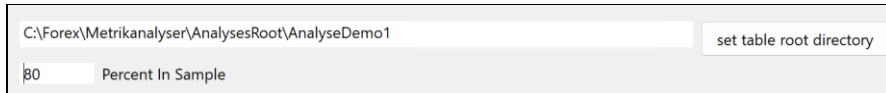


Abbildung 73: I used this setting for the analysis. I search the strategies on a pool of 80% of the generated strategies.

I clicked three times the correlation function.

attribname	correlation	attribname	correlation	attribname	correlation
Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation
Profit factor (IS)	0.3041	Profit factor (IS)	0.2996	Profit factor (IS)	0.3435
Kelly formula (IS)	0.2796	Kelly formula (IS)	0.285	Kelly formula (IS)	0.3256
EquitySlope	0.2712	Ret/DD Ratio (IS)	0.2449	EquitySlope	0.2755
SQN Score (IS)	0.2682	Edge Ratio (IS)	0.217	EquityAngle	0.2725
Fitness (IS)	0.2578	EquitySlope	0.2169	Ret/DD Ratio (IS)	0.2584
EquityAngle	0.2571	Fitness (IS)	0.2048	Fitness (IS)	0.2465
Ret/DD Ratio (IS)	0.2513	EquityAngle	0.1999	Net profit (IS)	0.2192
Stability (IS)	0.2315	Net profit (IS)	0.1807	Win/Loss ratio (IS)	0.2038
Net profit (IS)	0.215	Net profit (IS)	0.1624	SQN Score (IS)	0.2004
Edge Ratio (IS)	0.214	SQN Score (IS)	0.1546	Edge Ratio (IS)	0.1908
Avg. Win (IS)	0.1067	Stability (IS)	0.1198	Stability (IS)	0.1508
Win/Loss ratio (IS)	0.0851	Avg. Win (IS)	0.0623	Avg. Win (IS)	0.0972
Strategy Name	0	Strategy Name	0	Strategy Name	0
Filters result	0	Filters result	0	Filters result	0
Net profit (OOS)	0	Net profit (OOS)	0	Net profit (OOS)	0
Profit factor (OOS)	0	Profit factor (OOS)	0	Profit factor (OOS)	0
Stability (OOS)	0	Stability (OOS)	0	Stability (OOS)	0
Avg. Win (OOS)	0	Avg. Win (OOS)	0	Avg. Win (OOS)	0
Avg. Loss (OOS)	0	Avg. Loss (OOS)	0	Avg. Loss (OOS)	0
Edge Ratio (OOS)	0	Edge Ratio (OOS)	0	Edge Ratio (OOS)	0
Fitness (OOS)	0	Fitness (OOS)	0	Fitness (OOS)	0
Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0
Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0
Kelly formula (OOS)	0	Kelly formula (OOS)	0	Kelly formula (OOS)	0
SQN Score (OOS)	0	SQN Score (OOS)	0	SQN Score (OOS)	0
Avg. Loss (IS)	-0.0843	Avg. Loss (IS)	-0.0007	Avg. Loss (IS)	-0.007
Degrees of freedom (IS)	-0.1102	Complexity (IS)	-0.1186	Degrees of freedom (IS)	-0.1732
Avg. Trades Per Month	-0.1384	Degrees of freedom (IS)	-0.1876	Complexity (IS)	-0.1928
Complexity (IS)	-0.2366	Avg. Trades Per Month	-0.2051	Avg. Trades Per Month	-0.1965
-----	-----	-----	-----	-----	-----
avg_cor+=0.2285	avg_cor=-0.1424	avg_cor+=0.1957	avg_cor=-0.128	avg_cor+=0.232	avg_cor=-0.1424
anz=12	anz=4	anz=12	anz=4	anz=12	anz=4

Abbildung 74: A very interesting results. The values differ a little because the Pool0 was generated by a random process.

attribname	correlation	attribname	correlation	attribname	correlation
Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation	Corelator=	PearsonsCorrelation
Profit factor (IS)	0.3041	Profit factor (IS)	0.2996	Profit factor (IS)	0.3435
Kelly formula (IS)	0.2796	Kelly formula (IS)	0.285	Kelly formula (IS)	0.3256
EquitySlope	0.2712	Ret/DD Ratio (IS)	0.2449	EquitySlope	0.2755
SQN Score (IS)	0.2682	Edge Ratio (IS)	0.217	EquityAngle	0.2725
Fitness (IS)	0.2578	EquitySlope	0.2169	Ret/DD Ratio (IS)	0.2584
EquityAngle	0.2571	Fitness (IS)	0.2048	Fitness (IS)	0.2465
Ret/DD Ratio (IS)	0.2513	EquityAngle	0.1999	Net profit (IS)	0.2192
Stability (IS)	0.2315	Net profit (IS)	0.1807	Win/Loss ratio (IS)	0.2038
Net profit (IS)	0.215	Net profit (IS)	0.1624	SQN Score (IS)	0.2004
Edge Ratio (IS)	0.214	SQN Score (IS)	0.1546	Edge Ratio (IS)	0.1908
Avg. Win (IS)	0.1067	Stability (IS)	0.1198	Stability (IS)	0.1508
Win/Loss ratio (IS)	0.0851	Avg. Win (IS)	0.0623	Avg. Win (IS)	0.0972
Strategy Name	0	Strategy Name	0	Strategy Name	0
Filters result	0	Filters result	0	Filters result	0
Net profit (OOS)	0	Net profit (OOS)	0	Net profit (OOS)	0
Profit factor (OOS)	0	Profit factor (OOS)	0	Profit factor (OOS)	0
Stability (OOS)	0	Stability (OOS)	0	Stability (OOS)	0
Avg. Win (OOS)	0	Avg. Win (OOS)	0	Avg. Win (OOS)	0
Avg. Loss (OOS)	0	Avg. Loss (OOS)	0	Avg. Loss (OOS)	0
Edge Ratio (OOS)	0	Edge Ratio (OOS)	0	Edge Ratio (OOS)	0
Fitness (OOS)	0	Fitness (OOS)	0	Fitness (OOS)	0
Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0	Ret/DD Ratio (OOS)	0
Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0	Win/Loss ratio (OOS)	0
Kelly formula (OOS)	0	Kelly formula (OOS)	0	Kelly formula (OOS)	0
SQN Score (OOS)	0	SQN Score (OOS)	0	SQN Score (OOS)	0
Avg. Loss (IS)	-0.0843	Avg. Loss (IS)	-0.0007	Avg. Loss (IS)	-0.007
Degrees of freedom (IS)	-0.1102	Complexity (IS)	-0.1186	Degrees of freedom (IS)	-0.1732
Avg. Trades Per Month	-0.1384	Degrees of freedom (IS)	-0.1876	Complexity (IS)	-0.1928
Complexity (IS)	-0.2366	Avg. Trades Per Month	-0.2051	Avg. Trades Per Month	-0.1965
-----	-----	-----	-----	-----	-----
avg_cor+=0.2285	avg_cor=-0.1424	avg_cor+=0.1957	avg_cor=-0.128	avg_cor+=0.232	avg_cor=-0.1424
anz=12	anz=4	anz=12	anz=4	anz=12	anz=4

Abbildung 75: The results differ a litte. But if you look into the loss area you can see the same metrics. This is a good result.

I will optimize only 3 metrics of this table.

I will choose Profitfactor, Kelly Formula and RetDD

The screenshot shows a window titled 'DatabankExport.filter' with a table of metrics. The table has columns for 'Attribut', 'minValue', 'Maxvalue', 'Minfilevalue', 'Maxfilevalue', and '#Steps akt'. Several rows are highlighted in yellow, including 'Profit factor (IS)', 'Ret/DD Ratio (IS)', and 'Kelly formula (IS)'. To the right of the table is a control panel with two radio buttons: 'UseAllMetrics' (unselected) and 'UseOnlySelectedMetrics' (selected).

Attribut	minValue	Maxvalue	Minfilevalue	Maxfilevalue	#Steps akt
Strategy Name	0.0	0.0	10	0.0	0
Filters result	0.0	0.0	10	0.0	0
Net profit (IS)	141.84	2475.09	141.84	2475.09	0
Net profit (OOS)	0.0	0.0	0.0	0.0	0
Profit factor (IS)	1.02	2.32	1.02	2.32	1
Profit factor (OOS)	0.0	0.0	0.0	0.0	0
Avg. Win (IS)	45.49	128.09	45.49	128.09	0
Avg. Win (OOS)	0.0	0.0	0.0	0.0	0
Avg. Loss (IS)	36.24	111.56	36.24	111.56	0
Avg. Loss (OOS)	0.0	0.0	0.0	0.0	0
Stability (IS)	0.34	0.87	0.34	0.87	0
Stability (OOS)	0.0	0.0	0.0	0.0	0
Edge Ratio (IS)	1.05	1.81	1.05	1.81	0
Edge Ratio (OOS)	0.0	0.0	0.0	0.0	0
Fitness (IS)	0.3	0.69	0.3	0.69	0
Fitness (OOS)	0.0	0.0	0.0	0.0	0
Ret/DD Ratio (IS)	0.15	6.73	0.15	6.73	1
Ret/DD Ratio (OOS)	0.0	0.0	0.0	0.0	0
Avg. Trades Per Month	1.65	4.71	1.65	4.71	0
Win/Loss ratio (IS)	0.6	1.56	0.6	1.56	0
Win/Loss ratio (OOS)	0.0	0.0	0.0	0.0	0
Complexity (IS)	9.0	16.0	9.0	16.0	0
Degrees of freedom (IS)	35.0	135.0	35.0	135.0	0
Degrees of freedom (OOS)	0.0	0.0	0.0	0.0	0
Kelly formula (IS)	1.02	34.62	1.02	34.62	1
Kelly formula (OOS)	0.0	0.0	0.0	0.0	0
SQN Score (IS)	0.01	0.63	0.01	0.63	0
SQN Score (OOS)	0.0	0.0	0.0	0.0	0
EquityAngle	8.55	69.33	8.55	69.33	0
EquitySlope	0.0	64.39	0.0	64.39	0

Abbildung 76: To optimize this three parameters, you should edit the last column. Don't forget to switch to UseOnlySelectedMetrics.

Appendix

<https://support.microsoft.com/de-de/windows/zulassen-des-zugriffs-auf-kontrollierte-ordner-durch-eine-app-b5b6627a-b008-2ca2-7931-7e51e912b034>

