Usage of EA Generator for MT4

Installation

Launch the EA Generator installation package. During the installation process you will be offered to select MT4 and MT5 terminals that will work with EA Generator. Press “Browse…” and select the necessary terminals. As a rule, the terminal folder looks like “C:\Program Files\Broker Name - Terminal Name”. You can skip the terminal selection step and copy the necessary EA Generator files manually. During the installation process you will be asked to disable User Access Control (UAC), because it helps to facilitates the usage of EA Generator. However, you can use EA Generator even if UAC is enabled.
Attention: If you disable UAC - configuration of the terminals may be lost.

Preparation of EA Generator for operation

Attention: you are allowed to use EA Generator without disabling User Access Control (UAC) only in case the MT4 terminal is not installed in the system folders (Program Files, etc). When using EA Generator via remote desktop connection, it is recommended to use the terminal in «portable» mode.
EA Generator can work on several MT4, MT5 terminals. The folder of each terminal intended to work with EA Generator must contain the files necessary for correct operation of EA Generator. If you turn off UAC, these files will be automatically copied to the selected EA Generator terminals.
If you want to copy the necessary files manually, simply open the Hlaiman EA Generator installation folder (for example, “C:\Program Files\Hlaiman\”).

On the MT4 terminal

The files “MakeSignals.ex4” and “MakeSignals.mq4” should be copied from the folder “Hlaiman\MQL4\Experts\” to the MT4 terminal data folder “MQL4\Experts”.
The files “makeEA.ex4” and “makeIndicator.ex4” should be copied from the folder “Hlaiman\MQL4\Experts\scripts\” to the MT4 terminal data folder “MQL4\Experts\scripts\”.

In order for EA Generator to work correctly, you should enable the option “Allow DLL imports” and disable the option “Confirm DLL function calls” in the terminal settings. To do it, select “Tools” – “Options”, then open the tab “Expert Advisors” and do the necessary changes.

On the MT5 terminal

The file “SignalHNN.mqh” should be copied from the folder “Hlaiman\MQL5\Include\Expert\Signal\” to the MT5 terminal data folder “MQL5\Include\Expert\Signal\”.
The files “TeachHNN.ex5” and “makeIndicator.ex5” should be copied from the folder “Hlaiman\MQL5\Scripts\” to the MT5 terminal data folder “MQL5\Scripts\”.

In order for EA Generator to work correctly, you should enable the option “Allow DLL imports” in the terminal settings.

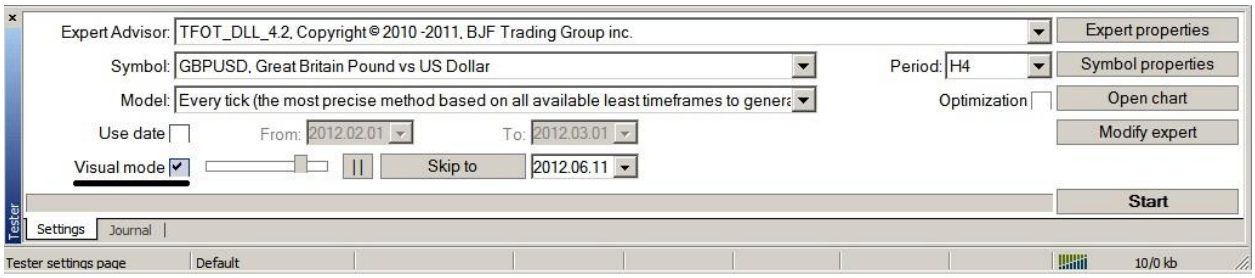
Input Data for Creation of an MT4 Expert Advisor

The EA Generator software can use trade signals on any instrument chart as input data for creation of an advisor algorithm. Trade signals are the following graphic objects: “Arrow Up” – buying, “Arrow Down” – selling. The work with graphic objects in the MT4 terminal is a built-in function. For more detail, please, read the Help section of the MT4 terminal.
It is recommended to disable the option “Auto Scroll” on the selected chart for a more convenient placement of signals. In order to place a signal on the chart, select “Insert” – “Arrows” – “Arrow Up” for the buy signal or “Arrow Down” for the sell signal. Then left-click on the chart in the place you want to add the signal to.

Using the expert advisor makeSignals that is included to EA Generator, you can automatically place profitable trade signals on a chart of any instrument. On the chart the expert advisor makeSignals searches bars the difference between the minimal and the maximal price of which is more that the “BarPoints” variable, and places corresponding signals (“buy” if price is rising and “sell” if price is falling) before these bars.
The makeSignals expert advisor variables:
“BarsCount” - the number of successive bars the comparison of min. and max. price difference is carried out for;
“BarPoints” - the value of minimal signal placement threshold (in points);
“StartTime”, “EndTime” – the period the expert advisor places signals in;
“ClearOnExit” – delete all “Arrow Up” and “Arrow Down” objects from the chart in case of removal of the expert advisor makeSignals.

After launching the expert advisor makeSignals, signals creation results will be displayed on the chart: Profit = 50 pips (BarPoints) in 1 bars (BarsCount), arrows upBUY = 343 dnSELL = 358 (the number of detected signals)

The EA Generator software can also use the “Arrow” graphic objects as trade signals. These graphic objects are created on the chart by a tester during testing of any expert advisor in the “Visual Mode”.



You can edit these graphic objects to make the best of the EA Generator expert advisor trading algorithm.

To create expert advisors, the EA Generator software uses fuzzy logic algorithms – neural networks the most important factor of successful work of which is input data. It is recommended using not less than 150 and no more than 300 signals in each direction to create profitable expert advisors (in case of default training data values). Excessive number of signals may increase neural network training time. A substantial increase in the number of input data and complexity of neural networks increases the demands on computer resources.

MT4 Expert Advisor Creation

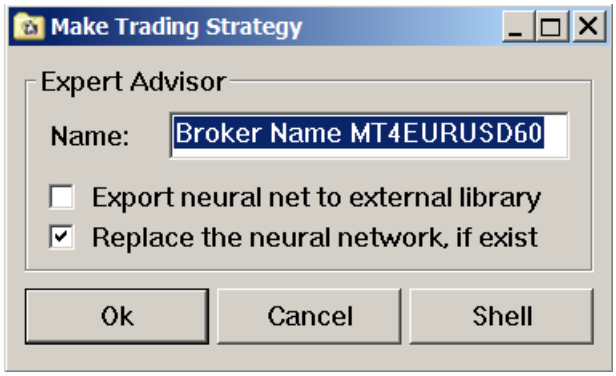
Using the EA Generator software, you can create an infinite number of expert advisors. An expert advisor created by means of EA Generator can contain trading algorithms for any number of instruments. The expert advisor can trade only on the instruments trading algorithms of which it contains. An expert advisor trading algorithm is a trained neural network. In order to create the expert advisor trading algorithm, you should place trade signals on a chart of a chosen instrument and start the process of neural network training. The makeEA script is used for training.

The MakeEA script variables:
“PattrenBarsCount” – the number of bars from a trade signal for using as input data for neural network training;
“NetLayersCount” – the number of neural network layers;
“NetNeuronsCount” – the number of neurons of a neural network layer;
“NetEpochCount” – the number of neural network training epochs;

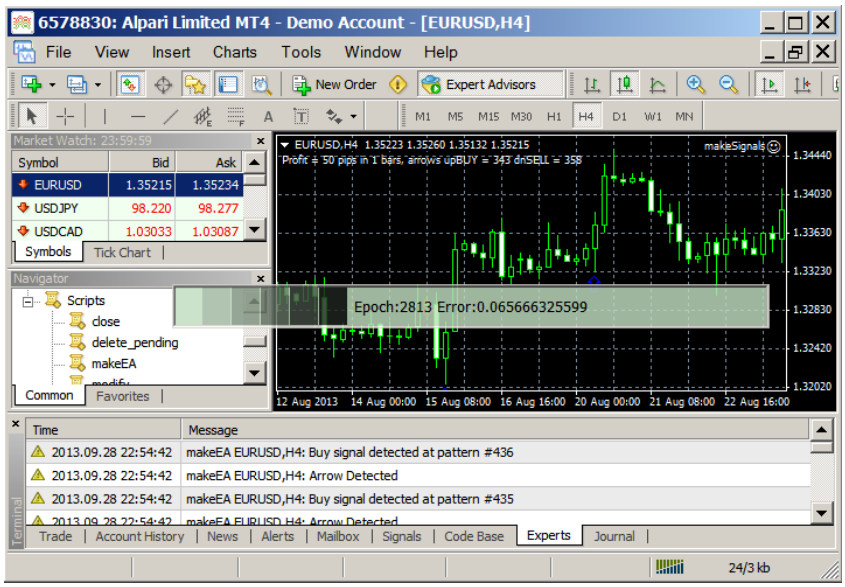
“Normalize” – neural network data normalization (you should also enable normalization in settings of a trained expert advisor).

The MakeEA script variables serve for delicate adjustment of a neural network. It is recommended not to change the default values unless necessary.

To start expert advisor training, launch the MakeEA script on a chart with placed signals, change neural network settings on the tab “Inputs” (if necessary) and press “OK”. The window “Make Trading Strategy” will be displayed.



Input the name of the expert advisor in the field “Name”. If necessary, change additional expert advisor creation settings and press “OK” to start training. If the expert advisor with such name doesn’t exist it will be created. A neural network will be created and trained for the expert advisor. The duration of the training process depends of training parameters and can take from one to several dozen minutes. “Process Bar” will be displayed. Reports about the training process will be displayed on the tab “Experts” of the trading terminal. The MakeEA script excludes data from the training set if session breaks take place – the message “Aborted – Invalid pattern!” will be displayed. The message “Strategy generation Success! On X patterns” indicates successful neural network training. A newly created expert advisor will be displayed in the list of advisors only after restarting the terminal.



Additional expert advisor creation settings:
“Export neural net to external library” – if this option is disabled, the trained neural network will be saved in a temporary expert advisor file in the MT4 terminal folder “Experts\Files\EA name.nnb”. If this option is enabled, the neural network will be integrated to the expert advisor external dynamic library in the MT4 terminal folder “Experts\libraries\EA name.dll”.
“Replace the neural network, if exists” – replacement of the existing neural network.
If you press the button “Shell”, GUI Hlaiman EA Generator will be displayed. In the current version, the EA Generator GUI has constrained functionality and serves for illustrative purposes only.

Important: Expert advisors with neural networks integrated to the dynamic library can be used for trading on any MT4 terminal installed on any computer, independently of EA Generator.

You should restart the terminal before integrating the neural network to the dynamic library (“Export neural net to external library” = true) in case the advisor was used for trading or in the tester since the launch of the terminal. If the neural network was trained for the expert advisor on a certain instrument at “Export neural net to external library” = false, then the last neural network trained on this instrument will be integrated to the expert advisor library during the next training of this expert advisor on the same instrument at “Export neural net to external library” = true (it will be done from a temporary file).

The expert advisor can keep neural networks for each accessible instrument in the library. You can retrain and test the expert advisor on different instruments without restarting the terminal as many times as you wish at “Export neural net to external library” = false. When you are completely satisfied with the trading results – restart the terminal and integrate the last trained neural networks of each instrument from temporary files to the expert advisor library (“Export neural net to external library” = true).

Important: If a neural network for a certain instrument exists both in temporary files and the expert advisor library, the neural network from temporary files will be used for trading or testing. Don’t forget cleaning temporary files of expert advisors. Temporary files are placed in “MQL4\Experts\Files” folder in the data folder of the terminal.

MT4 Expert Advisor

An MT4 expert advisor created by means of the EA Generator software consists of the following files:

<EA name>.mq4 – the expert advisor source code. It can be modified by a programmer to add new features. You can find it in the MT4 terminal folder “Experts”.
<EA name>.ex4 – the expert advisor compiled code. You can find it in the MT4 terminal folder “Experts”.
<EA name>.dll – the expert advisor external dynamic library. You can find it in the MT4 terminal folder “Experts\libraries”.

If you want to use expert advisors with trained neural networks integrated to the dynamic library on another MT4 terminal – simply transfer these files to the specified folders.
Temporary files of expert advisor neural networks are situated in the MT4 terminal data folder “MQL4\Experts\Files”.

Variables of the expert advisor created by means of EA Generator:

“Lots” – the number of lots for trade;
“LotsPercentBalance” – per cent of current balance for dynamic calculation of the number of used lots;
“LotsPercentEquity” – per cent of current own funds amount for dynamic calculation of the number of used lots;
“LotsPercentFreeMargin” – per cent of current margin for dynamic calculation of the number of used lots.

Calculation of the number of used lots is carried out according to the formula Lots + LotsPercentBalance + LotsPercentEquity + LotsPercentFreeMargin

“TakeProfit”, “StopLoss” – TakeProfit and StopLoss parameters;
“UseTrailingStop” – break-even function. Moves StopLoss to the break-even level when the trade profit is equal to the specified value, “0” – disabled.
“UseChannelOnBars” – the number of bars for channel calculation, channel trading strategy, “0” – disabled.
“UseMartingaleLot” – Usage of the martingale strategy.

“DelayedStops” – “Market Execution” support (for ECN brokers)
Opening of a trade is carried out in two stages:
1. Open a new order with “StopLoss” and “TakeProfit” values = 0;
2. Change StopLoss” and “TakeProfit” values of the order to the specified values.

“Normalize” – input data normalization (it should also be enabled at neural network training).

“AddFilter” – Usage of expert advisor neural networks trained on instruments different from the current one for filtering a signal about opening a trade.
Examples of values:
“+EURUSD60” – adds a filter of a neural network trained for the instrument “EURUSD” on the timeframe “H1”.
“+EURUSD60-USDCHF240” – adds a filter of a neural network trained for the instrument “EURUSD” on the timeframe “H1” and an inverted filter of a neural network for the instrument “USDCHF” on the timeframe “H4”. There could be even more filters.

“SoftFilter” – the value “false” – to open a trade, all filtering neural networks must send trade signals along with a trade signal from the neural network of a current instrument; otherwise a trade won’t be opened. The value “true” – a trade will be opened even in case of neutral signals of one or several filtering neural networks.

Expert advisor time trading filters:
“TradeTime” – time interval during which the expert advisor is allowed to open trades;
“MondayOn”, “TuesdayOn”, “WednesdayOn”, “ThursdayOn”, “FridayOn”, “SaturdayOn”, “SundayOn” – days of week;
“SunStartTime” – expert advisor trading start time on Sunday (by default – 23:00);
“FriStopTime” – expert advisor trading end time on Friday (by default – 15:00).

“BuyOpenDelta”, “SellOpenDelta” – neural network signal inaccuracy parameters of opening trades in %. The lesser the inaccuracy parameter is the stronger trade signal should be provided by the neural network

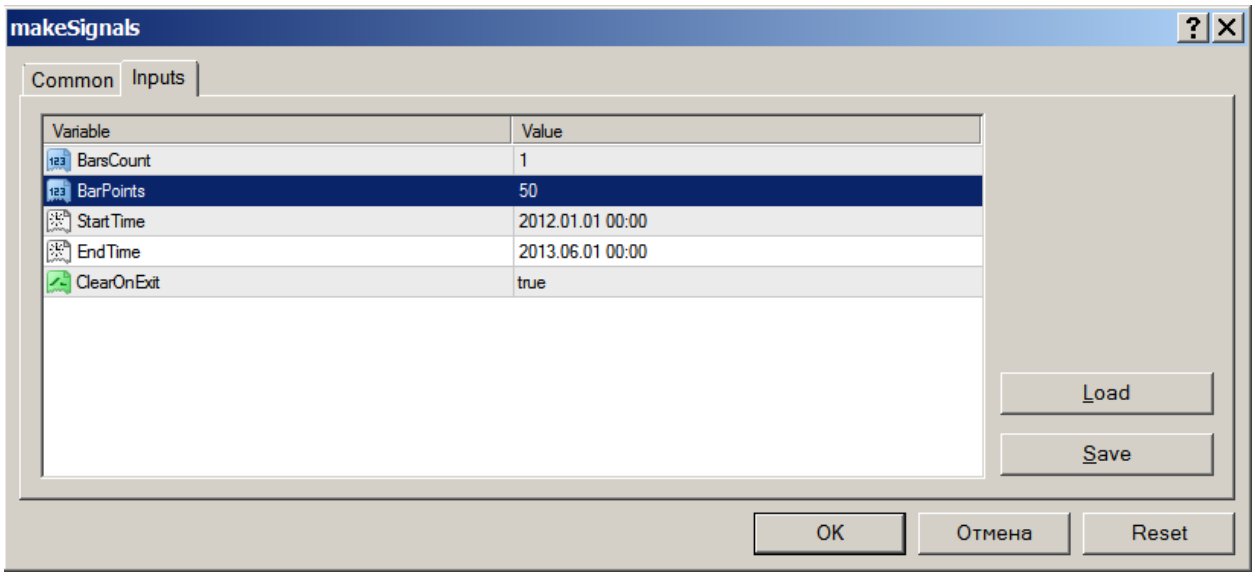
to open a trade. A signal weakens at insufficient amount of training input data or inconsistency of these data. You can increase signal inaccuracies if the expert advisor opens too little trades, but in this case their quality might become worse.
“BuyCloseDelta”, “SellCloseDelta” – neural network signal inaccuracy parameters of closing trades in %. The lesser the inaccuracy parameter is the stronger the signal opposite to the opened trade should be to close the trade. Value “0” – close at “StopLoss” or “TakeProfit”.
Signal inaccuracy values are common both for the current instrument neural network and all its filters.

“MinOpenPoint” – the minimal number of points from bar open price in the direction of a trade that allows its opening;
“MaxClosePoint” – the maximal number of points of trade profit that allows its closing;
“MaxSpread” – the maximal spread value above which trading is forbidden;
“Slippage” – acceptable slippage;
“ShellConnection” – displaying GUI Hlaiman EA Generator;
“MagicNumber” - ID of an order opened by the automated expert advisor. It should be unique for each expert advisor, if you use several EA Generator expert advisors simultaneously on different instruments.

Examples of Expert Advisor Creation by means of EA Generator

Creation of a Profitable Expert Advisor on EURUSD H4 for MT4

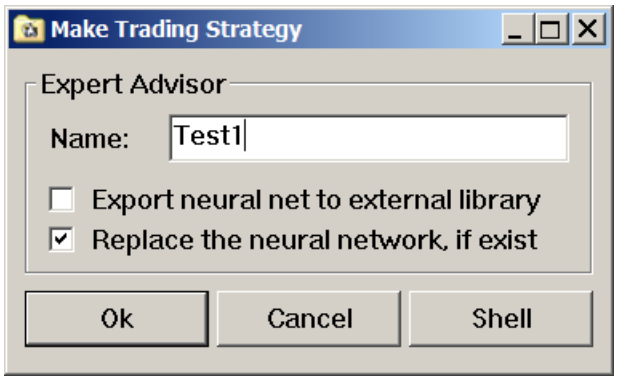
Open EURUSD, H4 chart and launch the MakeSignals expert advisor. Let’s take trade signals placement period from “2012.01.01” to “2013.06.01” (StartTime, EndTime variables). Other variables should be default.



Expert advisor results: 80 buy signals, 79 sell signals.

The recommended number of signals for neural network training with default parameters ("PattrenBarsCount" = 12, "NetLayersCount" = 3, "NetNeuronsCount" =60, "NetEpochCount" = 10000) is 150 in each direction. If you want to increase the number of MakeSignals expert advisor signals on a chart you should increase the period and/or change values of "BarsCount" and "BarsPoint" variables. Set "BarsCount" = 3. The number of signals increased to 152 and 173 correspondingly.

Let's launch the training script makeEA. Leave all default values of variables and press "OK". Type the expert advisor name in the window "Make Trading Strategy", for example, "Test 1". Press "OK" to start expert advisor neural network training for EURUSD, H4.

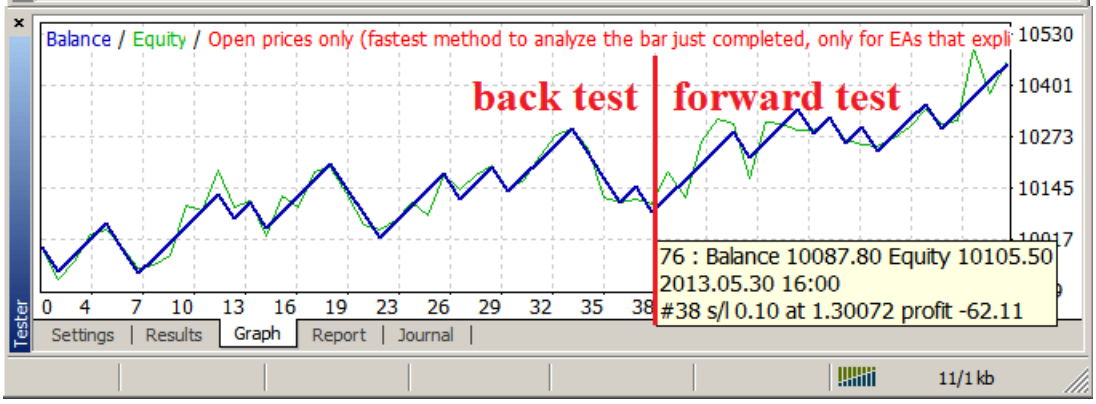


Wait till the end of neural network training and creation of a new expert advisor "Test1".

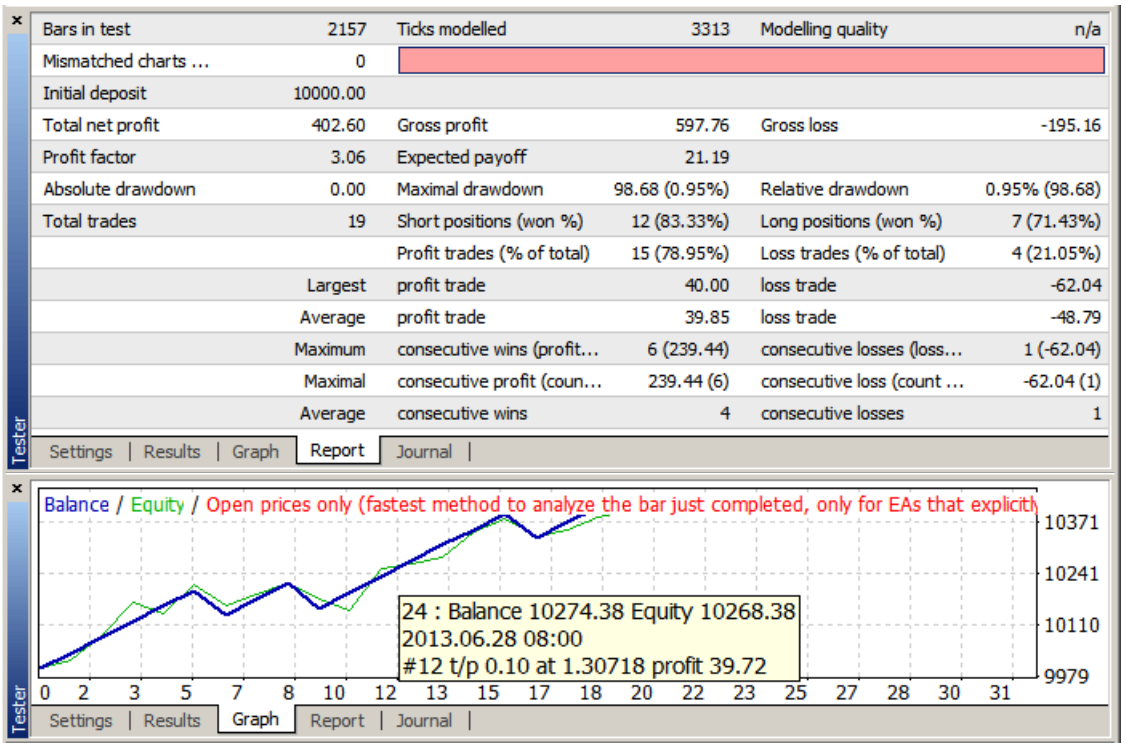
Restart the terminal to add the advisor to the MT4 terminal expert advisors list. Open Strategy Tester, select our expert advisor for testing, select the symbol and period EURUSD, H4. To speed up testing, let's use the model "Open prices only". Specify testing period from "2013.01.01" to "2013.10.01" – expert advisor trade till "2013.06.01" will be a back-test, and after "2013.06.01" – a forward-test.
Launch testing.

Bars in test	2157	Ticks modelled	3313	Modelling quality	n/a
Mismatched chart...	0				
Initial deposit	10000.00				
Total net profit	454.17	Gross profit	1632.72	Gross loss	-1178.55
Profit factor	1.39	Expected payoff	7.57		
Absolute drawdown	114.26	Maximal drawdown	227.94 (2.2...	Relative drawdown	2.21% (227...
Total trades	60	Short positions (won %)	42 (66.67%)	Long positions (won %)	18 (72.22%)
		Profit trades (% of total)	41 (68.33%)	Loss trades (% of total)	19 (31.67%)
	Largest	profit trade	40.00	loss trade	-62.74
	Average	profit trade	39.82	loss trade	-62.03
	Maximum	consecutive wins (profi...	5 (198.88)	consecutive losses (los...	3 (-186.54)
	Maximal	consecutive profit (cou...	198.88 (5)	consecutive loss (count...	-186.54 (3)
	Average	consecutive wins	3	consecutive losses	1

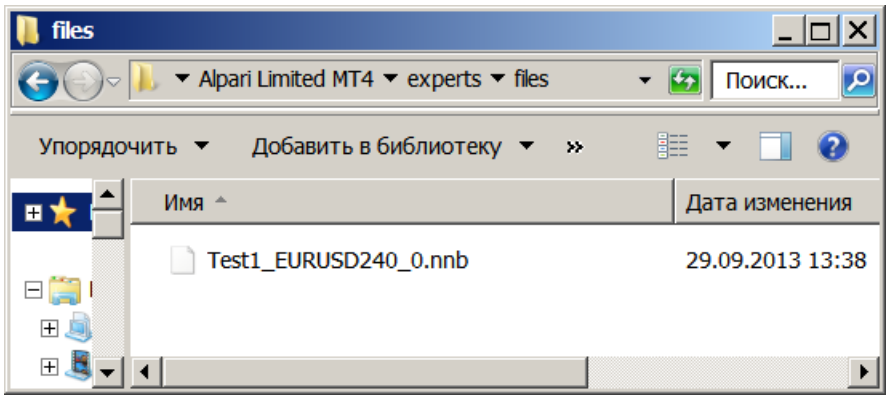
Settings | Results | Graph | Report | Journal



The results may be called satisfactory. Let's try to retrain the expert advisor to achieve better results. Launch the training script makeEA. Leave all default values of variables and start training. When the training process is finished, launch testing.



The expert advisor trading results became significantly better after retraining. Let's try to improve results, but keep the current expert advisor trading algorithm (the neural network). Open the expert advisor temporary files folder of the MT4 terminal, for example, "C:\Program Files\Alpari Limited MT4\experts\files".

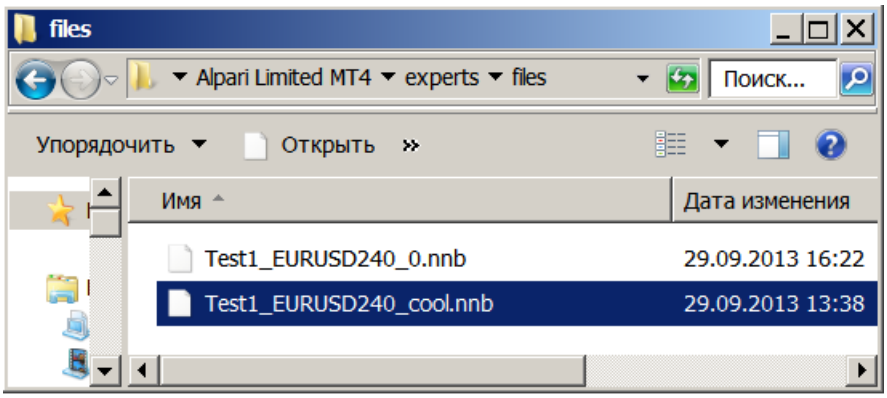


Rename the expert advisor neural network file Test1 for EURUSD, H4 from "Test1_EURUSD240_0.nnb" to "Test1_EURUSD240_cool.nnb". Repeat the training process of the expert advisor Test1 once again. Launch testing.

Bars in test	1511	Ticks modelled	2021	Modelling quality	n/a
Mismatched charts...	0				
Initial deposit	10000.00				
Total net profit	85.49	Gross profit	478.25	Gross loss	-392.76
Profit factor	1.22	Expected payoff	4.50		
Absolute drawdown	134.77	Maximal drawdown	134.77 (1.3...	Relative drawdown	1.35% (134....
Total trades	19	Short positions (won %)	15 (66.67%)	Long positions (won %)	4 (50.00%)
		Profit trades (% of total)	12 (63.16%)	Loss trades (% of total)	7 (36.84%)
	Largest	profit trade	40.00	loss trade	-62.74
	Average	profit trade	39.85	loss trade	-56.11
	Maximum	consecutive wins (profit...	5 (199.37)	consecutive losses (loss...	2 (-123.87)
	Maximal	consecutive profit (cou...	199.37 (5)	consecutive loss (count...	-123.87 (2)
	Average	consecutive wins	2	consecutive losses	1

Tester | Settings | Results | Graph | Report | Journal |

This time, we couldn't improve the expert advisor results, so let's go back to the previous results. Open the expert advisor temporary files folder, delete a newly created neural network file "Test1_EURUSD240_0.nnb" and rename the file "Test1_EURUSD240_cool.nnb" to "Test1_EURUSD240_0.nnb".



Now let's integrate the successfully trained neural network to the external dynamic library of the expert advisor Test1. Restart the MT4 terminal and launch the training script makeEA on the chart EURUSD H4 with the enabled option "Export neural net to external library". The training progress bar won't be displayed, and the message "Strategy generation Success! On X patterns" indicates successful integration of the neural network from the temporary file to the dynamic library Test1.dll.

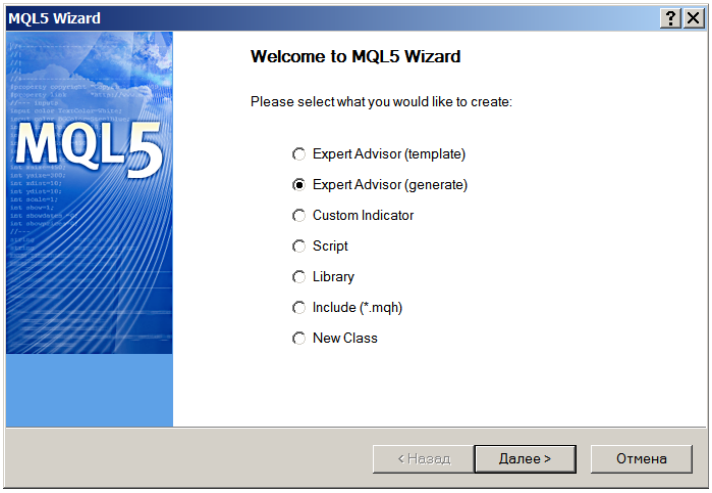
Time	Message
2013.09.29 1...	makeEA EURUSD,H4: removed
2013.09.29 1...	makeEA EURUSD,H4: uninit reason 0
2013.09.29 1...	makeEA EURUSD,H4: Strategy generation Success! On 199 patterns

Terminal | Trade | Account History | News | Alerts | Mailbox | Signals | Code Base | Experts | Journal |

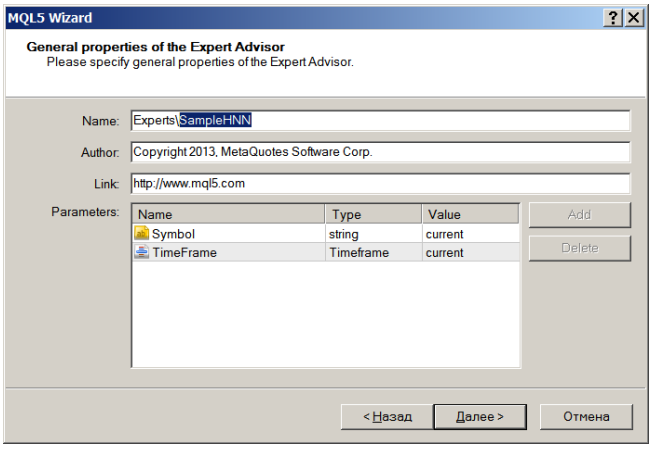
Copy expert advisor files "Test1.mq4" and "Test1.dll" from the MT4 terminal folders to use them on another computer.

Creation of a Profitable Expert Advisor for MT5

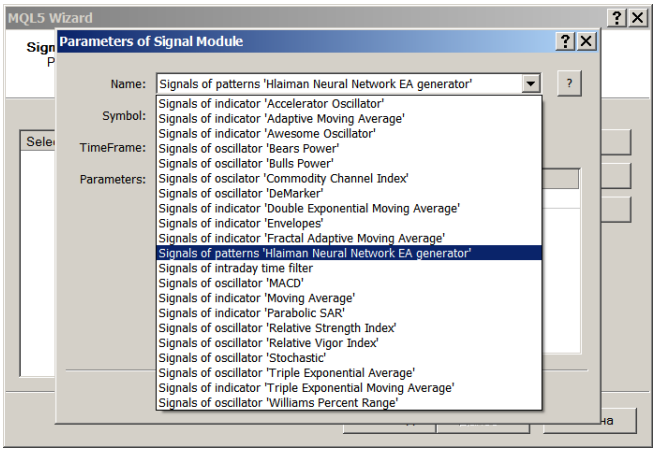
Start MT5 terminal. Enter the MQL5 wizard. In the wizard, select "Expert Advisor (generate)" and click "Next."



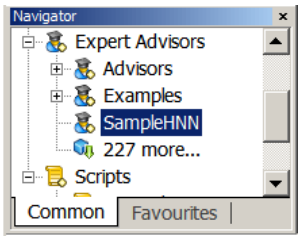
Enter the path and name of the advisor, for example "Experts\SampleHNN" and click "Next."



Click "Add" button, select the module signals "Signals of patterns Hlaiman Neural Network EA generator" from the drop down list in "Parameters of Signal Module " window and click "OK".

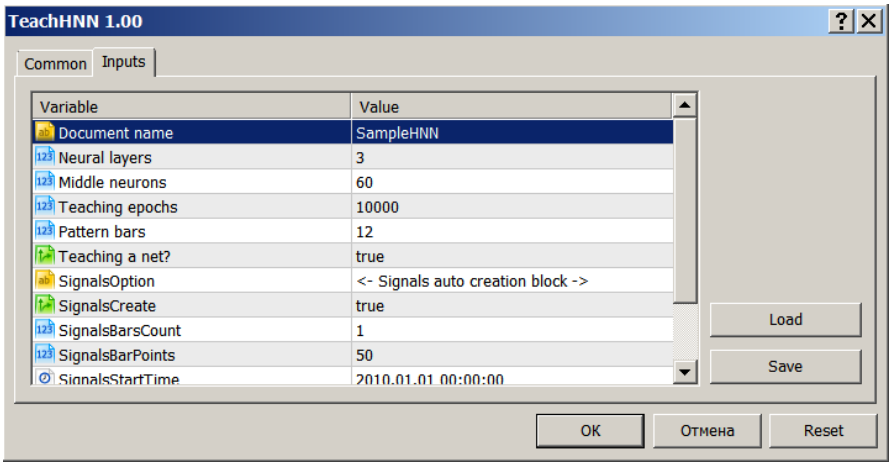


On the remaining stages of the MQL5 master, in the simplest case realization, can click "Next". At the end of the code generation process, click "Compile" and close the "MetaEditor" window. Created advisor will be displayed in the "Navigator" panel.



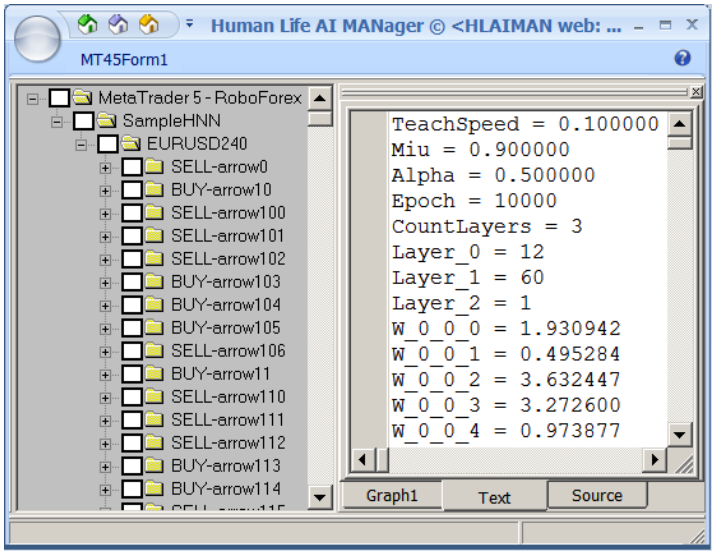
Before you start training advisor, you need to open the chart with the desired symbol and timeframe. Hlaiman EA Generator application, have to be running. For training advisor you need to run the "TheachHNN" script on desired chart.

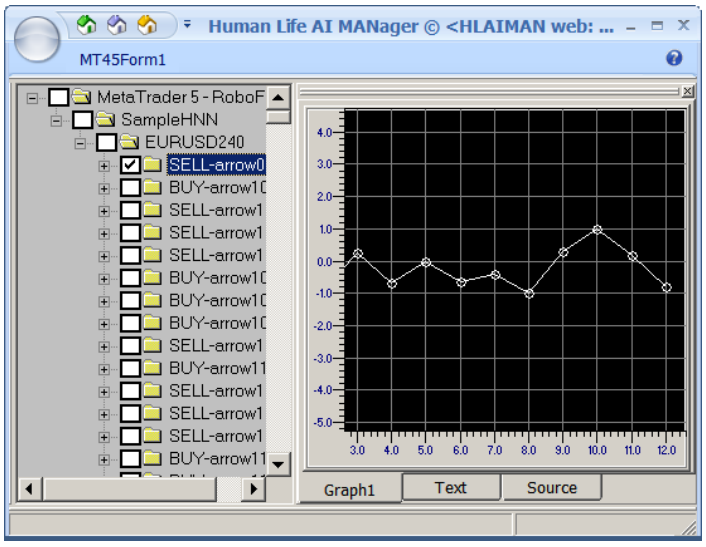
Script "TheachHNN" can be configured with the following variables:
"Document name" - advisor name;
"Neural layers" - the number of layers in a neural network;
"Middle neurons" - the number of neurons;
"Teaching epochs" - the number teaching epochs;
"Pattern bars" - the number of bar in the pattern;
"Teaching a net?" - Start training a neural network (maybe only the creation of signals);
"SignalsCreate" - automatically create signals.
"SignalsBarPoints" - the number of points - the threshold for signal generation;
"SignalsBarsCount" - the number of bar to count the number of points;
"SignalsStartTime", "SignalsEndTime" - the start and end of the period to create signals;
"SignalsClear" - automatically delete the signals on completion of training.



When you are ready press "OK" to start the process of training advisor.
Wait until the end of the process. An early stop training is available from the context menu when you right-click on the process panel. Report on completion of training will be printed in the "Experts" tab. For example, the message "Neural net create success! On 431 patterns" - indicates successful completion of the training advisor with the 431 signals. For the most efficiency training needs at least 200 signals.

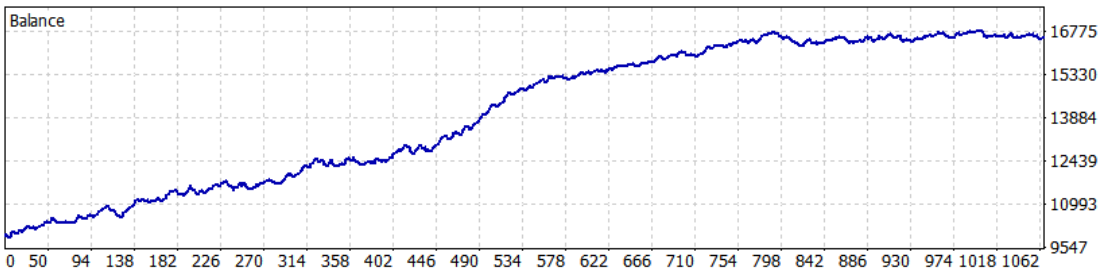
Reasons for training advisor can run with the error:
1. Without running Hlaiman EA Generator application. A message "CSignalHNN :: InitHNN: Error! initializing pipe server (possible reason: HLAIMAN APPLICATION IS NOT RUNNING!) ".
2. The absence of arrows (signals) on the chart with the "false" value of "SignalsCreate" variable. A message "OnStart: error, orders arrow not found! ". Same error can be included with the "true" value of "SignalsCreate" variable, but available on the chart some graphic objects (arrows), so advisor training better to start on a separate chart. After training advisor you can view the results on the visualization panel of Hlaiman EA Generator application.





When the Advisor is trained successfully on at least one of the trading tools, you can start testing and optimize it. You can create and train as much advisors as you want. Each advisor will only trade on the currency pairs and timeframes in which was trained. When re-training of the same advisor on the same trading tool must restart the Hlaiman EA Generator application.

Below tester report on trade advisor trained on automatically generated signals, with all default variables Symbol: EURUSD Period: H4 (2010.01.01 - 2013.08.29) Broker: RoboForex LP



Creation of a Indicator Using Hlaiman EA Generator

Indicators based on neural networks can be used for example, to trade binary options, or as a help for manual trading. Hlaiman EA Generator allows to create indicators for MT4 and MT5 terminals. Indicators can be used on any computer, regardless of the parent program. Neural networks are stored directly in indicator code without the use of dynamic libraries. To create a neural network indicator script "makeIndicator" used.
The “makeIndicator” script variables:

«SignalBarPoints» – value in pips to be taken as 100% when calculating the neural network signal strength. If the size of the bar >= SignalBarPoints, the signal strength will be 100%. If the size of the bar < SignalBarPoints, the signal strength will be calculated as follows: size of the bar \ SignalBarPoints * 100
“PattrenBarsCount” – the number of bars from a trade signal for using as input data for neural network training;
“NetLayersCount” – the number of neural network layers;
“NetNeuronsCount” – the number of neurons of a neural network layer;
“NetEpochCount” – the number of neural network training epochs;
“StartTime”, “EndTime” – the period in which indicator neural network will be trained;
Note: When training the indicator every bar in the period will be used as a signal. Specifying too large period in small timeframes - leads to an excessive number of sets of input data (patterns). The greater the number of patterns, the longer training process. The recommended period for M1 timeframe is day.

After starting trained indicator for each available bar on the chart neural network resulting signal will be calculated and will be exhibited on the chart as arrow. Neural network signal strength (Neural Signal) for the current bar will be displayed in real-time on the chart in percents, a positive value for BUY, a negative value for SELL.

High-frequency Trading Using Hlaiman EA Generator

Usage of the High-frequency Trading Module (HFT) for MT4

The HFT module operates basing on the difference of quotes of two brokers. HFT module supports MT4 as a terminal for trading. As the terminal for quotes comparison, you can use both MT4 and MT5 terminals.

In order to test the module, please, download the terminal “Global Clearing Group” for trading and “Renesource Capital” for quotes comparison. Install the terminals. Turn off the “Launch terminal after install” option during install. HFT module uses terminals in «portable» mode by default.

Open the Hlaiman EA Generator installation folder (for example, “C:\Program Files\Hlaiman\”).

The file “mt4.ex4” should be copied from the folder “Hlaiman\MQL4\Experts\” to the every MT4 terminal data folder “MQL4\Experts\”. If you are using MT5 terminal for quotes comparison, file “mt5.ex5” should be copied.

Specify correct paths to the installed terminals in the file “ActiveX\Scripts\MT4_Frontrun_Example.pas” (for example, using a standard application “Notepad”) in strings:

```
TERMINALS = 'C:\Program Files\MetaTrader - Global Clearing Group\terminal.exe' + #13 +
        ' C:\Program Files\Renesource Capital MetaTrader\terminal.exe';
```

The first terminal is for trading, and the second one is for quotes comparison.

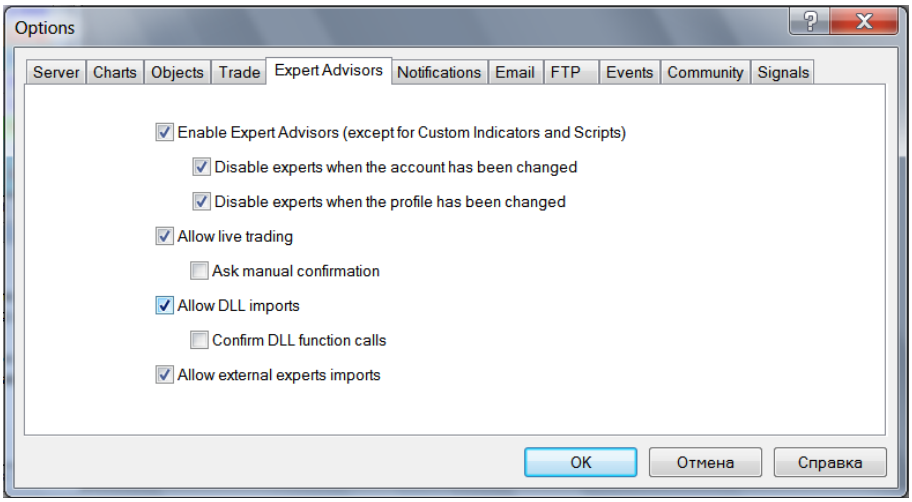
Specify the full correct path to the file “ActiveX\Scripts\MT4_Frontrun_Example.pas” in the file “ActiveX\HFT Launch.js”, the string:

```
SCRIPT = "C:\\Program Files\\Hlaiman\\ActiveX\\Scripts\\MT4_Frontrun_Example.pas";
```

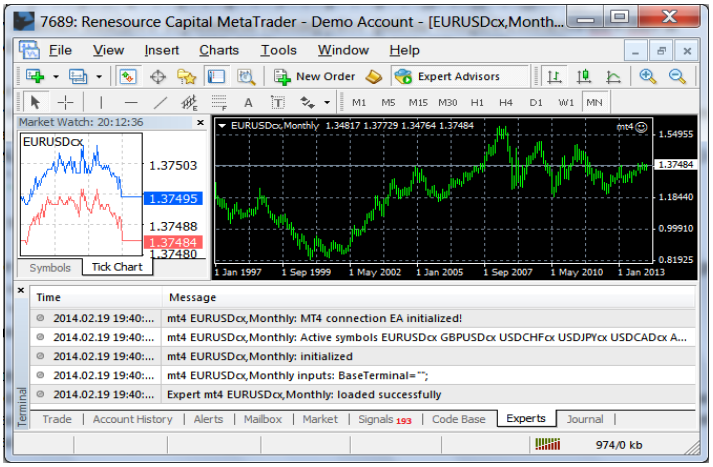
Please, notice, that the symbol “\”should be replaced with “\\”.

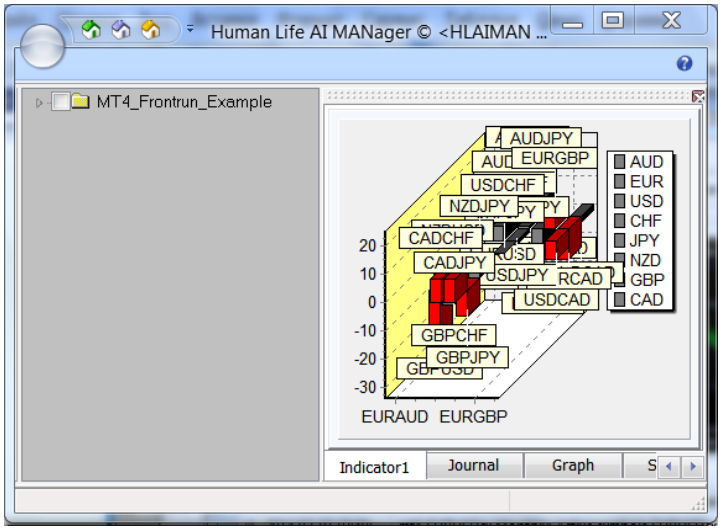
Note: please pay attention to the syntax (do not remove special symbols, etc.).

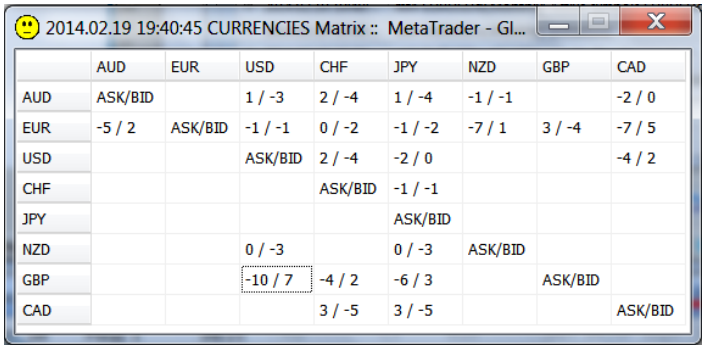
Launch the script “ActiveX\HFT Launch.js”. If all paths are specified correctly, a currency matrix, quotes visualization panel and both terminals will be opened. The first launch of the terminals may take some time. A chart EURUSD Month with an MT4 expert advisor will be opened in each terminal. Open new accounts for terminals or enter existing logins. Allow live trading for experts on the main terminal (terminal for trading).



Set up the "Market Watch" panel, add the currency pairs that you are going to use for high-frequency trading and delete unnecessary. To speed up it is recommended to close all graphics except EURUSD Month (with mt4 EA). Close the terminals. Close the Hlaiman window.
Launch the script “ActiveX\HFT Launch.js” again. After some time, information about successful initialization of the experts advisors will be displayed on the tab “Experts” of the both terminals: «Active symbols USDCHF GBPUSD EURUSD USDJPY USDCAD; MT4 connection EA initialized!;»







	AUD	EUR	USD	CHF	JPY	NZD	GBP	CAD
AUD	ASK/BID		1 / -3	2 / -4	1 / -4	-1 / -1		-2 / 0
EUR	-5 / 2	ASK/BID	-1 / -1	0 / -2	-1 / -2	-7 / 1	3 / -4	-7 / 5
USD			ASK/BID	2 / -4	-2 / 0			-4 / 2
CHF				ASK/BID	-1 / -1			
JPY					ASK/BID			
NZD			0 / -3		0 / -3	ASK/BID		
GBP			-10 / 7	-4 / 2	-6 / 3		ASK/BID	
CAD				3 / -5	3 / -5			ASK/BID

Information about successful order opening or unsuccessful attempts of opening (requotes, etc) will be displayed on the tab “Experts” of the trading terminal.

You can change additional trading parameters in the file “ActiveX\Scripts\MT4_Frontrun_Example.pas”. After every parameters changing, you must restart HFT module.

HFT module parameters:

TERMINALS - full paths to the executable files of the terminals.
CURRENCIES - currencies used for HFT and to be displayed in a matrix of quotations.
DISABLE - list of currency pairs for which trade is disabled. Might look like this: 'EURSEK' + # 13 + 'CADJPY' + # 13 + 'AUDCAD' + # 13 + 'GBPCAD';
PORTABLE - enable\disable «portable» mode for terminals. Recommended to leave the default value.
ORDER_LIVE - maximum time in seconds during which the position will be kept open. "0" - closing position by timeout is disabled.
BUY_OPEN - arbitrage profit at open BUY position pips
SELL_OPEN - arbitrage profit at open BUY position pips
PROFIT_CLOSE - arbitrage profit at close position pips
MAX_SPREAD – maximum spread value
STOP_LOSS – stop loss
TAKE_PROFIT – take profit

Lots - trading lots
Slippage - slippage value
DrawDown - max drawn down balance percentage

Pay attention that some values could be applied with inaccuracy considering high operation speed of the HFT module. To close the HFT module, close the active window Hlaiman. A delay is possible due to synchronization.

It is recommended to use the HFT module on real accounts only after long-term testing on demo accounts. The broker for trading from the abovementioned example is chosen for demonstration of work of the HFT module. We decline all responsibility for possible problems with funds withdrawal from a broker account. The most important factors for profitable HFT trading are minimal spread, orders execution speed, connection quality with brokers, servers (ping), and correct choice of brokers for trading and quotes comparison.

Usage of the High-frequency Trading Module (HFT) for MT5

The HFT module operates basing on the difference of quotes of two brokers. The HFT supports MT5 as a terminal for trading. Both MT4 and MT5 can be used as the terminals for quotes comparison.
To start using the HFT module, two terminals should be installed.

For example, let's install the first terminal to the folder "C:\Program Files\Donor MetaTrader 5\". Change the program group "MetaTrader 5" to "Donor MetaTrader 5" during installation.
Install the second terminal, for example, to the folder "C:\Program Files\Acceptor MetaTrader 5\". Change the program group "MetaTrader 5" to "Acceptor MetaTrader 5" during installation.

Copy the following files for the "Acceptor" terminal:
"SignalHFT.mqh" from the Hlaiman data folder "MQL5\Include\Expert\Signal\" to the terminal data folder "MQL5\Include\Expert\Signal\".
"SampleHMT.ex5" and "SampleHMT.mq5" from the Hlaiman data folder "MQL5\Expert\Signal\" to the terminal data folder "MQL5\Include\Expert\Signal\".
The files would be copied automatically if the terminal installed earlier was used as "Acceptor" and the path to the terminal was specified during installation of Hlaiman EA Generator
Copy the following files for the "Donor" terminal:
"mt5.ex5" from the Hlaiman data folder "MQL5\Experts\" to the terminal data folder "MQL5\ Experts".
If you use MT4 terminal for quotes comparison file "mt4.ex4" should be copied.

Launch the Hlaiman application. Open a terminal for trading (Acceptor). Open new account for terminal or enter existing login. For example it is recommended to open account on Metaquotes Demo server. Allow live trading and DLL imports for experts on the terminal. Set up the "Market Watch" panel, add the currency pairs that you are going to use for high-frequency trading and delete unnecessary. Open EURUSD M1 chart and launch SampleHMT EA on it. Specify full path to executable file of the terminal for quotes comparison (Donor) in «Arbitrage MT terminal» EA parameter. If path is specified correctly, terminal for quotes comparison (Donor) will be opened.
Open new account for Donor terminal or enter existing login. For example it is recommended to open account on ForexTime Demo server. Allow DLL imports for experts on the terminal. Set up the "Market Watch" panel, add the currency pairs that you are going to use for high-frequency trading and delete unnecessary. Open EURUSD H1 chart and launch mt5.ex5 (or mt4.ex4 for MT4) on it.
After some time, information about successful initialization of the expert advisor will be displayed on the tab "Experts" of the terminal: «Active symbols EURUSD GBPUSD USDCHF USDJPY USDCAD AUDUSD; TestMT5 initialization ok!;»

After the first launch, keep the «SampleHMT» EA settings and stop it. Close the terminal for quotes comparison. Close Hlaiman application.

For the every next start of HFT module launch the Hlaiman application. Launch SampleHMT EA on EURUSD M1 chart, with previously saved settings. Terminal for quotes comparison will be opened automatically with mt5.ex5 EA on EURUSD H1 chart. All settings of «SampleHMT» EA, except «Arbitrage MT terminal», can be changed without restarting Hlaiman application.

“SampleHMT” expert advisor settings:

“Arbitrage MT terminal“ - full path to the terminal for quotes comparison, in case of change in the MetaEditor «\» should be replaced by «\\»

“Arbitrage MT symbols“ - currency pairs for trade, through the ";" separator

“Arbitrage Ask price threshold” – price threshold for “Ask” in points for opening BUY trade, pips

“Arbitrage Bid price threshold” – price threshold for “Bid” in points for opening SELL trade, pips

“Arbitrage maximum Spread” – maximal spread of the used instrument, pips

“Arbitrage max live order time“ - maximum time in seconds during which the position will be kept open. "0" - closing position by timeout is disabled.

“Arbitrage Donor symbol prefix“ - prefix value for currency pairs of Donor terminal, «empty» - there is no prefix.

“Arbitrage Donor symbol suffix“ - suffix value for currency pairs of Donor terminal, «empty» - there is no suffix.

“Arbitrage Stop Loss level” – Stop Loss, pips

“Arbitrage Take Profit level” - Take Profit, pips

“Arbitrage fixed Volume” – trade volume

“Arbitrage term portable mode“ - enable\disable «portable» mode for Donor terminal. Recommended to leave the default value.

Other expert advisor settings are not used if the expert advisor contains only the HFT signals module.

To correctly stop HFT module, stop «SampleHMT» EA, close Hlaiman application, terminal for quotes comparison will be closed automatically.

In case of the brokers reviewed in our example, it is recommended to use the HMT expert advisor for EURUSD approximately from 8:00 to 16:00 GMT, before the beginning of USA session active trading.

It is recommended to use the HFT module on real accounts only after testing on demo-accounts. The most important factors for profitable HFT trading are minimal spread, orders execution speed, connection quality with brokers’ servers (ping), and correct choice of brokers for trading and quotes comparison.

Usage of the High-frequency Quotes Monitor (QMonitor).

QMonitor allows to register backlog of quotes for several pairs of brokers, to store and analyze data in a convenient format. MT4 or MT5 terminals can be used to monitor. QMonitor can be used to identify the most profitable terminal pairs for the HFT, to identify the most favorable time slots for use HFT within the trading session.

In order to test the QMonitor, please, download “Global Clearing Group” and “Renesource Capital” terminals. Install the terminals. Turn off the “Launch terminal after install” option during install.

Open the Hlaiman EA Generator installation folder (for example, “C:\Program Files\Hlaiman\”).

The file “mt4.ex4” should be copied from the folder “Hlaiman\MQL4\Experts\” to the every MT4 terminal data folder “MQL4\Experts\”. For MT5 terminals, file “mt5.ex5” should be copied.

Specify correct paths to the installed terminals in the file “ActiveX\Scripts\QMonitor.pas” (for example, using a standard application “Notepad”) in strings:

```
TERMINALS = 'C:\Program Files\MetaTrader - Global Clearing Group\terminal.exe' + #13 +
        ' C:\Program Files\Renesource Capital MetaTrader\terminal.exe';
```

If you use more terminals - add their paths through the '+ # 13 +' separator. For example:

```
TERMINALS = '..\MetaTrader 4 1st\terminal.exe' + #13 +
        '..\MetaTrader 4 2nd\terminal.exe' + #13 +
        '..\MetaTrader 5 3rd\terminal64.exe';
```

Specify the full correct path to the file “ActiveX\Scripts\QMonitor.pas” in the file “ActiveX\QMonitor.js”, the string:

```
SCRIPT = "C:\\Program Files\\Hlaiman\\ActiveX\\Scripts\\QMonitor.pas ";
```

Please, notice, that the symbol “\”should be replaced with “\\”.

Note: please pay attention to the syntax (do not remove special symbols, etc.).

Launch the script “ActiveX\QMonitor.js”. If all paths are specified correctly, a currency matrix and all the terminals will be opened. The first launch of the terminals may take some time.

For all the terminals:

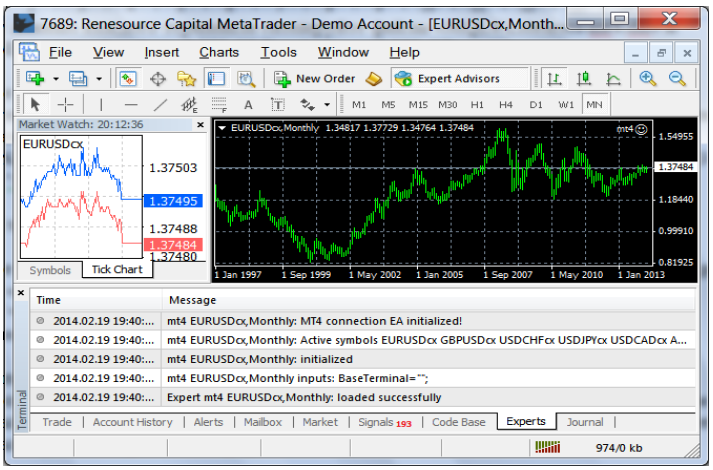
- Open new accounts or enter existing logins
- Set up the "Market Watch" panel, add the currency pairs that you are going to use for monitoring and delete unnecessary.
- Close all opened charts

Only for MT5 terminals:

- Allow DLL import for experts
- Open EURUSD MN chart and launch mt5 EA on it

Close all the terminals. Close Hlaiman application.

For every next lunch of the QMonitor a currency matrix and all the terminals will be opened. For all the terminals a EURUSD Month chart with mt4 EA will be opened (or mt5 EA for MT5 terminals). After some time, information about successful initialization of the experts will be displayed on the tab “Experts” of the terminals.



In the upper part of the currency matrix window there are tabs to switch pairs of brokers, at the bottom part there are data window and buttons for cleaning and saving data.

You can change additional trading parameters in the file “ActiveX\Scripts\QMonitor.pas”. After every parameters changing, you must restart QMonitor.

QMonitor parameters:

TERMINALS - full paths to the executable files of the terminals.

PORTABLE - enable\disable «portable» mode for terminals. Recommended to leave the default value.

COMBINATIONS - a combination of brokers for quotes comparison, will be displayed in the upper part of the currency matrix. Any number of combinations may be added.

CURRENCIES - currencies used for monitoring and to be displayed in a matrix of quotations.

DISABLE - list of currency pairs for which monitoring is disabled. Might look like this: 'EURSEK' + # 13 + 'CADJPY' + # 13 + 'AUDCAD' + # 13 + 'GBPCAD';

BUY_OPEN - arbitrage profit at open BUY position pips
SELL_OPEN - arbitrage profit at open BUY position pips
MAX_SPREAD – maximum spread value

To save the data, press «Save to file» and specify the path and file name with .csv extension. Files in this format can be opened with Excel application. When closing QMonitor, terminals will be closed automatically.

Support: support@hlaiman.com, e1.negr@gmail.com, Skype: e1.negr