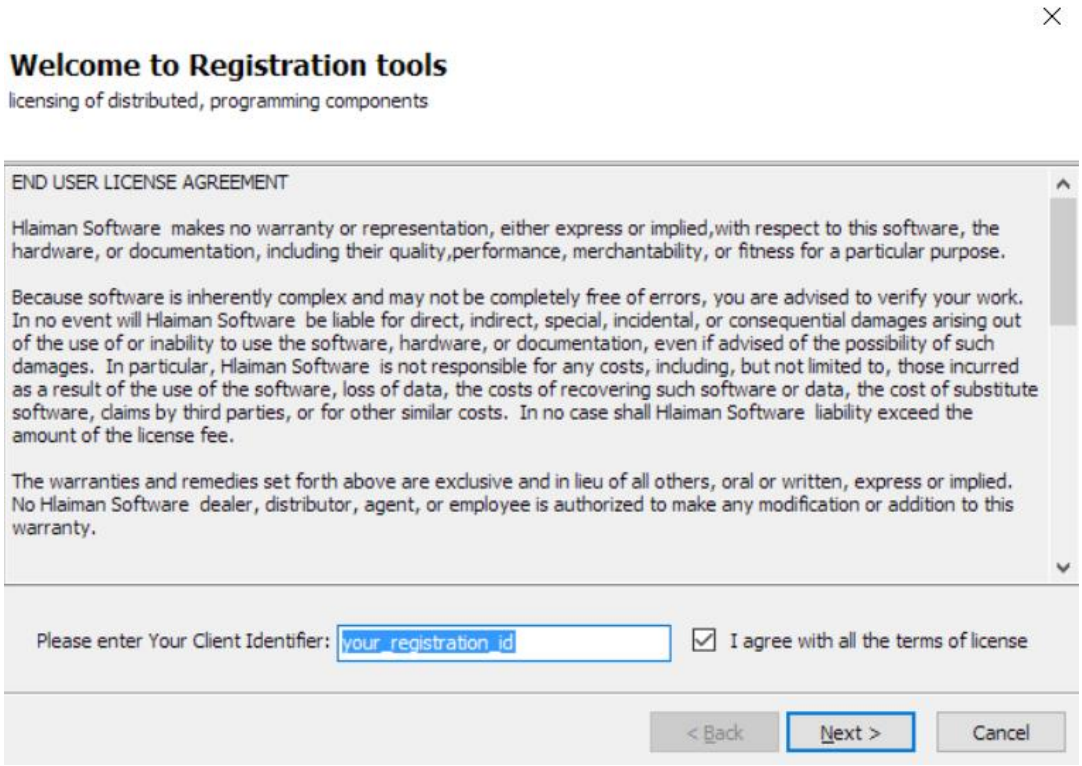
Using Hlaiman EA Generator.

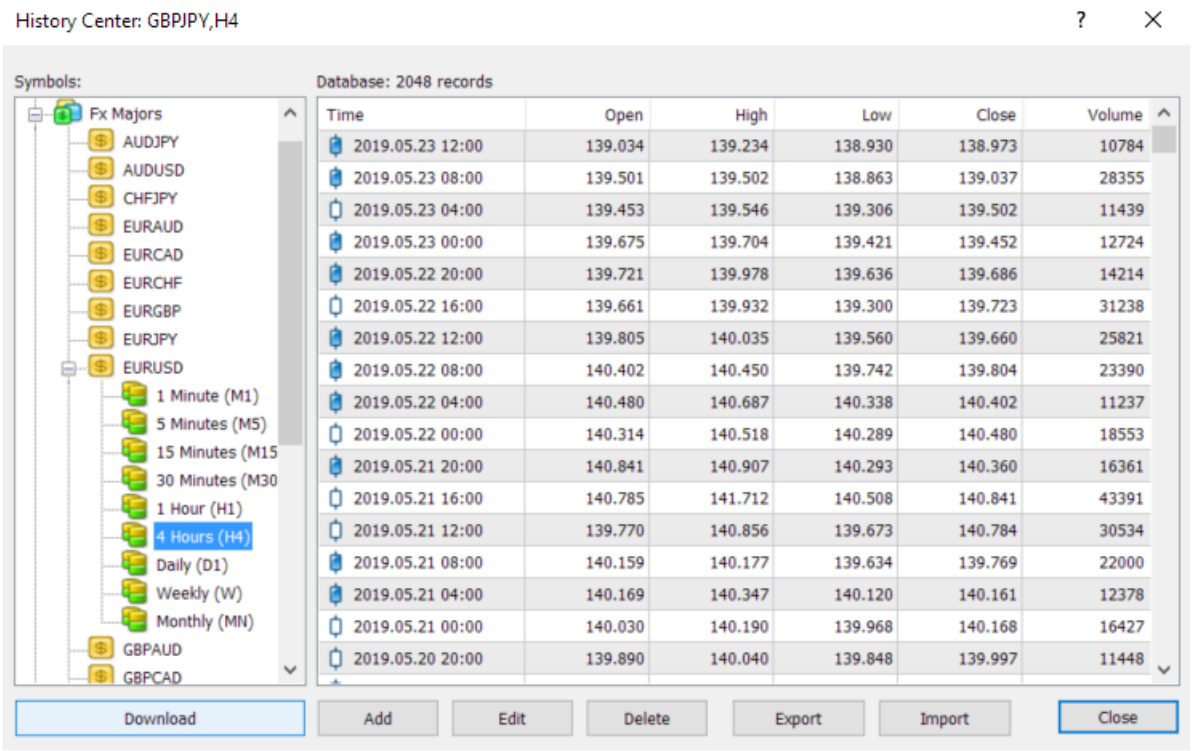
Installation.

Launch the Hlaiman EA Generator install package. During installation you will be prompted to select the MT4 terminal data path. Click "Browse ..." and select “origin.txt” or “terminal.exe” file (depending on where the data path of the terminal stored). To open the data path from the terminal please select the "File" - "Open data folder" menu item. You can skip this selection and copy necessary files later. Files that are necessary for the functioning of Hlaiman EA Generator are stored in the installation directory "Hlaiman\MQL4". The rest of the installation options can be left as default. At the end you will be asked to register Hlaiman EA Generator plugins. Please enter the registration id obtained when you purchased the program and select the "I agree with all terms of license". It is necessary to register each plugin, the number depends of program version.



Preparation of the MT4 terminal to work with Hlaiman EA Generator.

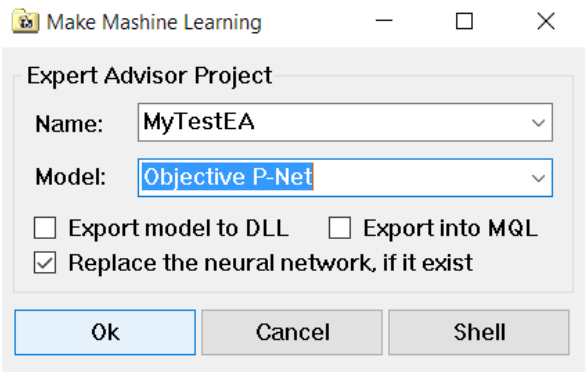
There must be present necessary expert advisors files In the data directory of each terminal which is used to work with Hlaiman EA Generator. Files are stored in the Hlaiman EA Generator installation directory "Hlaiman\MQL4". To open Hlaiman installation directory please select the program group Hlaiman - "Open Data Path" ("C:\Program Files (x86)\Hlaiman"\ by default).
To work with Hlaiman EA Generator please turn on "Tools" - "Options" - "Expert Advisors" - "Allow DLL imports" option in the terminal settings. To allow generated EAs to trade automatically please turn on "Allow automated trading".
Hlaiman EA Generator uses historical quotes data of the terminal to create EAs. You need to download or import quotes data in the terminal History Center. To open the History Center please select "Tools" - "History Center" menu item. Select necessary instruments and timeframes by the double-clicking on them and click "Download".



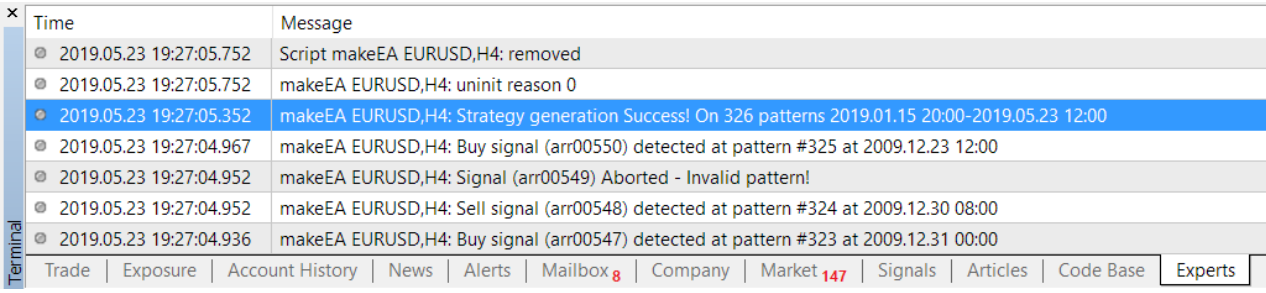
Generating a simple EA in MT4 terminal.

1. Launch earlier prepared MT4 terminal
2. Open EURUSD H4 chart
3. Launch the MakeSignals expert to automatically create trade signals (parameters can be left by default)

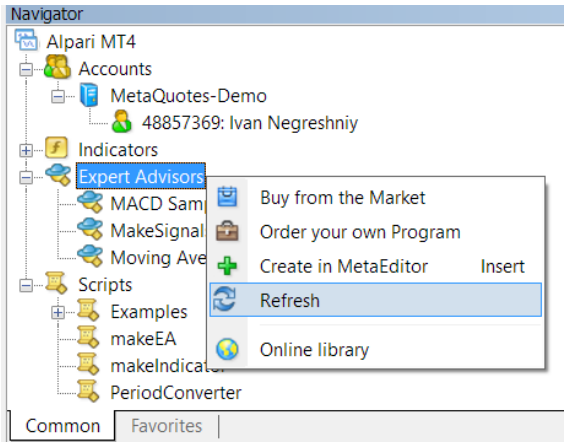
4. Launch MakeEA script (parameters can be left by default) and wait for the "Make Machine Learning" window to appear. Enter the name of the EA in the "Name" field, select the type of neural network from the drop down list "Model" and click "OK"



5. Wait for the message of finishing generation on the “Experts” tab of the terminal



6. Refresh the list of terminal expert advisors from the popup menu



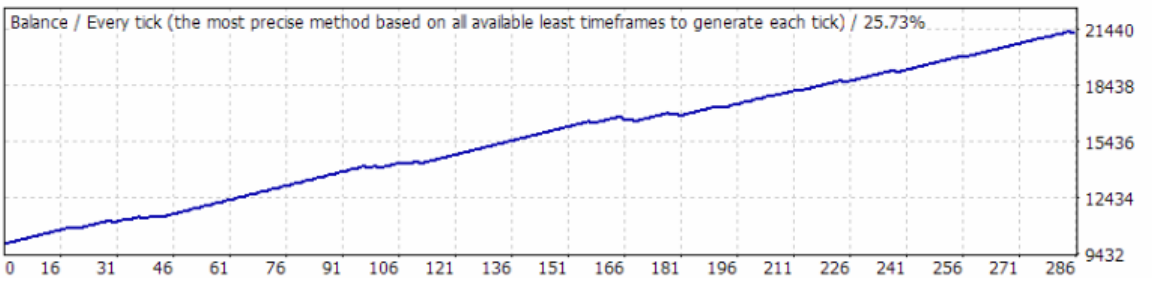
7. Launch EA in the terminal strategy tester

Strategy Tester Report

MyTestEA

MetaQuotes-Demo (Build 1170)

Symbol	EURUSD (Euro vs US Dollar)				
Period	4 Hours (H4) 2010.01.15 00:00 - 2019.05.23 20:00				
Model	Every tick (the most precise method based on all available least timeframes)				
Parameters	Lots=0.1; LotsPercentBalance=0; LotsPercentEquity=0; LotsPercentFreeMargin=0; TakeProfit=50; StopLoss=100; UseTrailingStop=0; UseChannelOnBars=0; UseMartingaleLot=0; DelayedStops=false; IndicatorsAndFilters=""; SoftFilter=false; TradeTime="00:00-24:00"; MondayOn=true; TuesdayOn=true; WednesdayOn=true; ThursdayOn=true; FridayOn=false; SaturdayOn=false; SundayOn=false; SunStartTime="23:00"; FriStopTime="15:00"; BuyOpenDelta=1; SellOpenDelta=1; BuyCloseDelta=1; SellCloseDelta=1; MinOpenPoint=0; MaxClosePoint=0; MaxSpread=0; Slippage=0; ShellConnection=false; MagicNumber=11235813; OrderComment=""; RepeatOrderClose=3; RepeatOrderSend=3;				
Bars in test	14606	Ticks modelled	156457415	Modelling quality	25.73%
Mismatched charts errors	0				
Initial deposit	10000.00			Spread	Current (20)
Total net profit	11255.81	Gross profit	13113.33	Gross loss	-1857.52
Profit factor	7.06	Expected payoff	39.49		
Absolute drawdown	59.00	Maximal drawdown	334.47 (1.99%)	Relative drawdown	1.99% (334.47)
Total trades	285	Short positions (won %)	190 (93.68%)	Long positions (won %)	95 (89.47%)
		Profit trades (% of total)	263 (92.28%)	Loss trades (% of total)	22 (7.72%)
	Largest	profit trade	50.59	loss trade	-101.04
	Average	profit trade	49.86	loss trade	-84.43
	Maximum	consecutive wins (profit in money)	55 (2749.57)	consecutive losses (loss in money)	2 (-200.63)
	Maximal	consecutive profit (count of wins)	2749.57 (55)	consecutive loss (count of losses)	-200.63 (2)
	Average	consecutive wins	13	consecutive losses	1



Input data for generate MT4 EA.

Generating EAs and indicators occurs by the training of neural networks. In the specified period of historical data the EA Generator will select the training sets. Each training set (pattern) is made up of quotes data and the trade signal. The number of bars in one pattern is specified by the "Input bars on pattern" parameter of makeEA script. As a trade signals there can be used: all bars, the arrows on the terminal chart, or the results of the trading report of any EA in the strategy tester visual mode. Trade signals can be set manually or automatically, using the Hlaiman EA Generator or a third-party tools. The trade signals can be edited and saved in the .tpl templates. A detailed description of working with MT4 terminal graphic objects you can find in the corresponding help section https://www.metatrader4.com/en/trading-platform/help/chart_management/charts_control

Hlaiman EA Generator software package.

makeSignals EA.

The EA is designed for automatically creating trade signals (arrows) on the terminal chart. Expert analyzes the data in specified period “Start date time” – “End date time”. Creating a signal occurs when the difference between open price of the first bar and closing price of the last in "Signal bars count" set is greater or equal to the "Buy signal pips / Sell signal pips". Filter by one of the standard indicators can be applied (Indicator used type).

makeSignals parameters:

Signal bars count - the number of bars to search the difference
Buy signal pips / Sell signal pips - the difference between the open and closing price for BUY / SELL
Start date time / End date time - period for analysis
Arrow drawing type - type of generated arrows
Indicator used type - indicator type for the trade signals filter
Clear all on exit - clear arrows after removal of the expert

makeEA script.

The script is designed to generate EAs by training neural networks. The script is looking for trade signals (arrows) on the terminal chart, forms the training sets (patterns) and trains neural networks. The number of bars in each pattern is specified in "Input bars on pattern" parameter. Each input of the pattern is calculated by the formula "Feature calc formula". After launching the script the engine Hlaiman EA Generator is initiated, please wait for the Make Machine Learning window.

makeEA parameters:

EA Name or input csv file name - name prefix of generated EA (the default broker server name)
Input bars on pattern - the number of bars to form the training sets
Neural layers count - the number of layers of the neural network
Neurons / Intervals / Trees - neurons / intervals / neural network trees (depending on the network type)
Training epoch count - the number of training epochs (greatly affects the training time)
Begin training time / Stops training time – period of training time, to use with the Target signal source = All bar, is not used by default
Feature calc formula - formula for calculating the each input of the pattern (can be used open, close, high, low, volume bars parameters, mathematical and logical functions)
Target signal source - source of trade signals, All bar - a trade signal is each bar in the Begin training time - Stops training time period
Maximum pattern count (0 not used) - the maximum number of training sets

Make Machine Learning window settings:

Name – EA name, can be selected from a list of previously created
Model – type of neural network
Export model to DLL - integrate the trained neural network into the EAs DLL library (by default the neural networks are stored in a separate .nnb files)
Export into MQL - integrate the trained neural network into the source code of EA, such EAs may include the neural network for only one instrument/timeframe
Replace the neural network, if it exist - replace previously trained network of the selected instrument/timeframe, if it exists
Shell - display Hlaiman EA Generator GUI, for developer only

Some settings may be not active, depending on the Hlaiman EA Generator version and selected neural network type.

makeIndicator script.

The script is designed to generate indicators by training neural networks. The script works by analogy with makeSignals and makeEA.

The script parameters makeIndicator:

Signal Amount in pips - the difference between the open and closing price of ONE bar for BUY and SELL (see. makeSignals)
Input Bars on pattern - the number of bars to form the training sets (see. makeEA)
Neural Layers count - the number of layers of the neural network
Neurons / Intervals count - neurons / intervals / neural network trees (depending on the network type)
Learning Epoch count - the number of training epochs (greatly affects the training time)
Start time / Finish time – period of training time
Uses Indicator Mode - source of trade signals, Arrows – use previously created arrows as trade signals, All bar - each bar is a trade signal
Buy patterns count / Sell patterns count - the maximum number of training sets

Advisors and indicators created by Hlaiman EA Generator.

EAs and indicators files are located in the terminal data directory. To open the data directory – please select "File" - "Open data folder" menu item of the terminal. **EAs will work only on those instruments/timeframes, which they were trained on**. Each EA may be trained for trading on any number of instruments/timeframes. EAs with neural network integrated in the source code (parameter makeEA "Export into MQL" turned on) can only work on one instrument/timeframe. Indicators have the neural network in the source code by default, and can work on only one instrument/timeframe also. **Indicators will work on any instrument/timeframe, even if they were not trained on it.**

Advisors.

Files of MyTestEA expert

MQL4\Experts\Hlaiman**MyTestEA.mq4** – EA source code

MQL4\Experts\Hlaiman**MyTestEA.mqh** – EA source code with neural network (created only with makeEA "Export into MQL" parameter)
MQL4\Experts\Hlaiman**MyTestEA.ex4** - compiled Advisor (required for copying EA to another terminal)
MQL4\Libraries**MyTestEA.dll** - advisor library (not created with the makeEA "Export into MQL" parameter, if exists then required for copying)
MQL4\Files\Hlaiman**MyTestEA_EURUSD240_0.nnb** - binary neural network file for EURUSD H4 (not created with makeEA "Export into MQL" or "Export model to DLL" parameter, if exists then required for copying)

Parameters of MyTestEA expert

Lots - the number of lots for trade
LotsPercentBalance - the percentage of the current balance, to dynamically increase the number of lots
LotsPercentEquity - a percentage of the current equity
LotsPercentFreeMargin - a percentage of the current margin
TakeProfit, StopLoss
• **use trailing stop points -** trailing stop function, 0 - disabled
• **use price channel bars -** the number of bars for the calculation of channel – channel trading strategy, 0 - disabled
• **martingale lot rate +/- -** multiplier to increase / decrease the lot of the Martingale strategy, 0 – disabled
DelayedStops - applying TakeProfit, StopLoss after the opening of the order (support «Market Execution» for ECN brokers)

• **names of indicators and Handles (+/-) -** neural networks trained on another instruments/timeframes, for filtering signal of the current neural network
Example:
"+ EURUSD60" - EURUSD H1 neural network filter
"+ EURUSD60-USDCHF240" - EURUSD H1 neural network filter and the inverse USDCHF H4 neural network filter
There may be more filter. To use the desired instrument/timeframe neural network filter the EA must be trained on it. The parameter can also specify the path and name of a text file that contains filter settings

SoftFilter - "False "- a condition for opening of the transaction: signal from the current neural network + the same signals from all filtering neural networks. "True" - signal from the current neural network + no opposing signals from all filtering neural networks.

• use trading time period, MondayOn, TuesdayOn, WednesdayOn, ThursdayOn, FridayOn, SaturdayOn, SundayOn, SunStartTime, FriStopTime - trade time filters

• buy open signal delta percent, • sell open signal delta percent - % of neural network signal allowed error, the transaction will be **opened** only if the neural network signal is within the allowed error
• buy close signal delta percent, • sell close signal delta percent - % of neural network signal allowed error, the transaction will be **closed** only if the neural network signal is within the allowed error, 0 - closing only the stops

• trigger points to open - the minimum points amount from the bar open price in the trade signal direction, to allow the opening of transaction

MaxClosePoint - the maximum profit points amount at which the closing is allowed (if exceeding - trailing stop applied)
MaxSpread, Slippage - allowable spread and slippage
ShellConnection - display Hlaiman EA Generator GUI, for developers only
MagicNumber - number to identify orders by EA (must be unique when same EAs is used on several charts)
OrderComment - order comment
RepeatOrderClose - the number of attempts to close order within the tick
RepeatOrderSend - the number of attempts to send order within the tick

Parameters of EA with neural network integrated in source code (created with makeEA "Export into MQL" parameter).

BuyOpenDelta - % of neural network signal allowed error for BUY, the transaction will be opened only if the neural network signal is within the allowed error
SellOpenDelta - % of neural network signal allowed error for SELL
Lots -the number of lots for trade.
Risk - a percentage of the deposit to calculate the number of lots for trade (with Lots = 0).
TakeProfit, StopLoss
TrailingStop – trailing stop function, 0 - disabled

Indicators.

Files of in_EURUSD indicator

MQL4\Indicators\Hlaiman**in_EURUSD.mq4** - indicator source code
MQL4\Indicators\Hlaiman**in_EURUSD.mqh** - indicator source code with neural network
MQL4\Indicators\Hlaiman**in_EURUSD.ex4** - compiled indicator (required for copying indicator to another terminal)

Parameters of in_EURUSD indicator

Threshold for BUY signal, Threshold for SELL signal - % of neural network signal allowed error, the arrow of indicator will be placed on the terminals chart if the neural network signal is within the allowed error