MT Pytrader_API.

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Date: 27-07-2020, version for Pytrader_MT4_EA_V1.02 and Pytrade_MT5_EA_V1.02

Introduction

The MT Pytrader_API consist of 2 pieces of software:

- An EA running on the MT4 terminal or MT5 terminal. This EA works as the socket server. The EA has to run all the time. The EA will react on requests from the “Pytrader_API”(python script). At the end of this document is explained how to install the EA on a MT4 or MT5 terminal.
- A python script, name “Pytrader_API”, which functions as the connection with the MT4 or MT5 EA

Functions.

General

1. The MT Pytrader_API is coded as a class.
2. After the execution of a function, the MT.command_OK property will be set to True or False.

Time out is set to 60 seconds as default. There is a separate function to change the ‘time out’ time.

MT4 has not the M2, M3, M4, M6, M10, M12, M20, H2, H3, H6, H8 and H12 time frames.

Input parameters/settings are in green, results are in blue.

1. Instantiation.

```
from utils.Pytrader_API import Pytrader_API

## instantiate
MT = Pytrader_API()
```

2. Connect to server

At connection time a broker instrument dictionary has to passed as a parameter. This dictionary is a lookup table for translating general instrument/symbol names into specific broker instrument/symbol names.

```
## Instrument lookup dictionary, key=general instrument/symbol name, value=broker
instrument/symbol name
brokerInstrumentsLookup = {'EURUSD':'EURUSD.ecn', 'GOLD':'XAUUSD', 'DAX':'GER30'}

## connect to server local or to computer in same local network
## of course MT4/MT5 EA's must use same port
Connected = MT.Connect(server='127.0.0.1', port=11111,
       instrument_lookup=brokerInstrumentsLookup)
# or
Connected = MT.Connect(server='192.168.0.103', port=22222,
       instrument_lookup=brokerInstrumentsLookup)
```

'127.0.0.1' = server. In this case is local host.

'192.168.0.103' = server. In this case other computer in same local network.

11111 = port (number). Server socket of the MT4 or MT5 EA must use same port.

brokerInstrumentLookup = dictionary

Connection is always with a MT terminal and a broker account. Brokers often use different names for their instruments/symbols. Another way is to use config files. Example at the end of this document.

Connected = bool will be True or False.

If connection is made the MT.connected property will be set to True. There is a timeout of 60 seconds. If no connection MT.connected property will be set to False.

3. Check connection.

```
## check connection
KeepAliveCheck= MT.Check_connection()
```

KeepAliveCheck= bool, with will be True or False.

4. Change time out value

```
## Change the time out
MT.Set_timeout(timeout_in_seconds=120)
```

120 = time out value in seconds

5. Retrieve broker server time.

```
## retrieve broker server time
ServerTime = MT.Get_broker_server_time()
```

ServerTime = broker server time.

6. Get static account information.

```
## get static account information
StaticInfo = MT.Get_static_account_info()
```

StaticInfo = dictionary with following information:

```
name=…..
login=11117869
currency=USD
type=demo
leverage=100
trade_allowed=True
limit_orders=200
margin_call=100.0
margin_close=50.0
```

7. Get dynamic account information

```
## get dynamic account information
DynamicInfo = MT.Get_dynamic_account_info()
```

DynamicInfo = dictionary with the following information:

```
balance=3436.16
equity=3413.56
profit=-22.6
margin=40.6
margin_level=8106.05
margin_free=3101.64
```

8. Get instrument information

```
## get instrument information
InstrumentInfo = MT.Get_instrument_info(instrument='EURUSD')
```

'EURUSD' = instrument.

InstrumentInfo = dictionary with the following information(if instrument not known, result is "none"):

```
instrument=EURUSD
digits=5
max_lotsize=200.0
min_lotsize=0.01
lot_step=0.01
point=1e-05
tick_size=1e-05
tick_value=1.0
```

9. Get last tick information

```
## get last tick information
LastTick = MT.Get_last_tick_info(instrument='EURUSD')
```

'EURUSD' = instrument.

LastTick = dictionary with the following information:

```
instrument=EURUSD
date=1591401419
ask=1.12907
bid=1.129
last=0.0
volume=0
```

This function can be used for live streaming of tick data.

10. Get actual bar information

```
## get actual bar information
ActualBar = MT.Get_actual_bar_info(instrument='EURUSD',
       timeframe=MT.get_timeframe_value('H4'))
```

'EURUSD' = instrument.

MT.get_timeframe_value('H4') = timeframe/period. To keep analogy to the MT5 this function is kept.

ActualBar = dictionary with the following information:

```
instrument=EURUSD
date=1591315200
open=1.13369
high=1.13838
low=1.12784
close=1.129
volume=98291
```

This function can be used for live streaming of actual bar data.

11. Get last x ticks from now

```
## get last x ticks from now
## if MT terminal does not have this as history it can take some time
##      MT terminal needs first to retrieve from broker
##      the max amount of ticks is broker dependend
##      socket time out is set to 60 seconds
LastTicks = MT.Get_last_x_ticks_from_now(instrument='EURUSD', nbrofticks=500)
```

'EURUSD' = instrument.

500 = number of ticks.

LastTicks = array with the following tick info(converted to data frame):

```
         date      ask      bid  last  volume
0  1591401298  1.12882  1.12879   0.0       0
1  1591401298  1.12881  1.12879   0.0       0
2  1591401299  1.12882  1.12879   0.0       0
3  1591401299  1.12881  1.12879   0.0       0
4  1591401299  1.12882  1.12879   0.0       0
```

This function doesn't work for MT4 terminal.

12. Get last x bars from now

```
## get last x bars from MT terminal
## if MT terminal does not have this as history it can take some time
##      MT terminal needs first to retrieve from broker
##      the max amount of bars is broker depending
##      socket time out is set to 60 seconds
LastBars = MT.Get_last_x_bars_from_now(instrument='EURUSD',
       timeframe=MT.get_timeframe_value('M1'), nbrofbars=1000)
```

'EURUSD' = instrument.

MT.get_timeframe_value ('M1') = timeframe/period.

1000 = number of bars to retrieve.

LastBars = array with the following bar info(converted to data frame):

```
                  date     open     high      low    close  volume
0   2020-06-05 07:17:00  1.13396  1.13400  1.13396  1.13397      12
1   2020-06-05 07:18:00  1.13397  1.13398  1.13393  1.13396      40
2   2020-06-05 07:19:00  1.13396  1.13405  1.13393  1.13394      32
3   2020-06-05 07:20:00  1.13394  1.13411  1.13392  1.13411      66
4   2020-06-05 07:21:00  1.13411  1.13420  1.13411  1.13418      24
```

13. Open order

```
## open order
NewOrder = MT.Open_order(instrument='EURUSD', ordertype='buy', volume=0.01, openprice=0.0,
                slippage=10, magicnumber=2000, stoploss=0.0, takeprofit=0.0, comment='Test')

## open pending order
NewOrder = MT.Open_order(instrument='EURUSD', ordertype='buy_stop', volume=0.04, openprice=1.0870,
                slippage=10, magicnumber=2000, stoploss=1.0830, takeprofit=1.0950, comment='Test')
```

'EURUSD' = instrument.

'buy' = ordertype ('buy', 'sell', 'buy_stop', 'sell_stop', 'buy_limit', 'sell_limit').

0.02 = volume/lot size.

0.0 = open price. For market orders price will be zero (0.0), for pending orders price must have an appropriate value.

10 = slippage.

1000 = magicnumber.

1.0830 = stoploss. The stop loss value is a market price (no delta pips), of 0.0 then no stop loss set.

1.0950 = takeprofit. The take profit is a market price (no delta pips), if 0.0 then no take profit set.

Test = comment. The comment may not contain the characters !#$, these are used internally

NewOrder = ticket, if ticket has the value -1, the order failed.

Remark:

- If a ticket has the value -1, the following properties can be checked:
  - MT.order_return_message. It is a string with the reason for fail.
  - MT.order_error. It is an integer with MT4/MT5 error code.

14. Set SL and TP for position

```
## set stoppLoss and takeprofit for position
ChangePosition = MT.Set_sl_and_tp_for_position(ticket=53136604, stoploss=0.0,
                    takeprofit=1.11001)
```

53136604 = ticker for position to change settings

0.0 = stop loss value. If 0.0 then SL will not be changed

1.11001 = new take profit value.

ChangePosition = bool, True or False, MT.order_return_message and MT.order_error give more information

15. Set SL and TP for order (pendings)

```
## set stoppLoss and takeprofit for order (pendings)
ChangeOrder = MT.Set_sl_and_tp_for_order(ticket=53136804, stoploss=0.0,
takeprofit=1.12001)
```

53136804 = ticker for order to change settings

0.0 = stop loss value. If 0.0 then SL will not be changed

1.12001 = new take profit value.

ChangeOrder = bool, True or False, MT.order_return_message and MT.order_error give more information

16. Get all orders

```
## get all orders(pendings)
AllOrders = MT.Get_all_orders()
```

AllOrders = data frame with the following info(only pending orders):

ticket, instrument, order_type, magic_number, volume, open_price, stop_loss, take_profit, comment;

```
     ticket instrument  order_type  ...  stop_loss  take_profit       comment
0  54192423     EURCHF   buy_limit  ...       1.07         1.09  Test comment
1  54191631     USDSEK    buy_stop  ...       9.30         9.35
2  54191423     CHFSGD  sell_limit  ...       1.47         1.43
```

17. Get all (open) positions

```
## get all open positions
AllPositions = MT.Get_all_open_positions()
```

AllPositions = data frame with the following info:

ticket, instrument, position_type, magic_number, volume, open_price, open_time, stop_loss, comment, take_profit, profit, swap, commission;

```
     ticket instrument position_type  ...        comment  profit  swap
0  54096625     EURUSD           buy  ...   H2 wave 4 ST   -5.52 -0.23
1  54095945     USDSEK          sell  ...   H2 Wave 4 ST  -13.95 -0.09
2  53939125     AUDCAD           buy  ...   H4 wave 4 IT   -8.40 -0.12
3  53782856     EURAUD          sell  ...   H2 wave 4 LT   23.16 -0.12
4  53748502     GBPAUD          sell  ...   H2 wave 4 IT  -16.89 -0.44
```

18. Get all closed positions

```
## get all closed position in a specified period
timezone = pytz.timezone("Etc/UTC")
AllClosedPositions = MT.Get_all_closed_positions(date_from=datetime(2020, 6, 3,
                          tzinfo=timezone), date_to=datetime.now())
```

date_from = datetime(2020, 6, 3, tzinfo=timezone

date_to = datetime.now()

AllClosedPositions = data frame with the following info:

position_ticket, instrument, order_ticket, position_type, magic_number, volume, open_price, open_time, close_price, close_time, comment, profit, swap, commission

```
   position_ticket instrument  order_ticket  ... profit  swap  commission
0         52276947     GBPAUD      53493455  ... -76.40 -0.91       -0.22
1         53024510     GBPNZD      53493462  ...  96.19 -0.48       -0.42
2         53521115     GBPNZD      53622957  ...   6.03  0.00       -0.42
3         53682283       GOLD      53682381  ...  -1.08  0.00       -0.42
4         53782204     AUDCAD      53782212  ...  -0.22  0.00       -0.42
5         53569405     EURSGD      53784182  ...  12.45 -0.30       -0.42
6         53623751     CHFJPY      53877649  ...  57.52 -0.61       -0.42
7         53782247     AUDCAD      54048783  ...  36.67 -0.11       -0.42
8         53796568     EURCHF      54068367  ...  79.04 -0.08       -0.42
```

Be aware that for MT4 terminal the result of closed positions is based on your terminal settings.

19. Close_position_by_ticket

```
## close position by ticket
ClosePosition = MT.Close_position_by_ticket(ticket=597318718)
```

597318718= ticket. Ticket of position to close.

ClosePosition = bool, True or False.

If ok = False, the properties MT4.order_return_message and MT5.order_error can be checked for the reason.

20. Close_position_partial_by_ticket

```
## close position partly
## documentation reference 19
PartialClose = MT.Close_position_partial_by_ticket(ticket=367014000,
                          volume_to_close=0.01)
if (PartialClose == False):
    print(MT.order_return_message)
```

367014000= ticket. Ticket of position to close partly.

0.01 = volume to close

PartialClose = bool, True or False.

If ok = False, the properties MT4.order_return_message and MT5.order_error can be checked for the reason.

Remarks:

- If volume_to_close is smaller than minimum volume, the volume_to_close will be changed into minimum volume.
- After successful partial close the position ticket number for MT4 terminal will change

21. Delete order by ticket

```
## delete order by ticket(pending)
DeleteOrder = MT.Delete_order_by_ticket(ticket=49988037)
```

49988037= ticket. Ticket of order to delete(pendings).

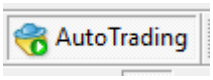
DeleteOrder = bool, True or False.

If ok = False, the properties. MT.order_return_message and MT.order_error can be checked for the reason.

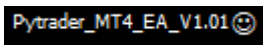
Installation of EA on MT terminal

1. MT4

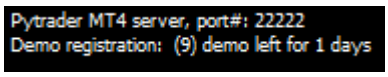
- Move the EA into the ..\Experts folder
- Move the dll Mt4GuiController.dll into the ..\Libraries folder
- Move the EA into an arbitrary chart.
- In the settings set the port number and the license key(Gumroad license key).
- Check if dll's are allowed.
- Trading must be allowed



- In the right upper corner the EA must show a smiley



- In the left upper corner the EA must show

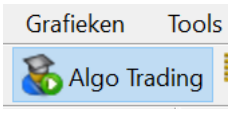


The MT4 Pytrader_API can be used for 7 days with full functionality without registration/fee. If this period is expired a formal registration/fee has to be done at https://gum.co/mt4python.

- After payment you will receive a key(gumroad license key).
- Use this key in the EA settings.
- The EA will now do a registration and supply you with a registration key (second key).
- Use this key in the EA settings.
- You can run the MT4 Pytrader_API on 3 different machines(pc's, laptops, servers).

2. MT5

- Move the EA into the ..\Experts folder
- Move the dll Mt5GuiController.dll into the ..\Libraries folder
- Move the EA into an arbitrary chart.
- In the settings set the port number and the license key(Gumroad license key).
- Check if dll's are allowed.
- Trading must be allowed



- In the right upper corner the EA must be green.

- In the left upper corner the EA must show

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The MT5 API can be used for 7 days with full functionality without registration/fee. If this period is expired a formal registration/fee has to be done at https://gum.co/mt5python.

- After payment you will receive a key(gumroad license key).
- Use this key in the EA settings.
- The EA will now do a registration and supply you with a registration key (second key).
- Use this key in the EA settings.
- You can run the MT5 API on 3 different machines(pc's, laptops, servers).

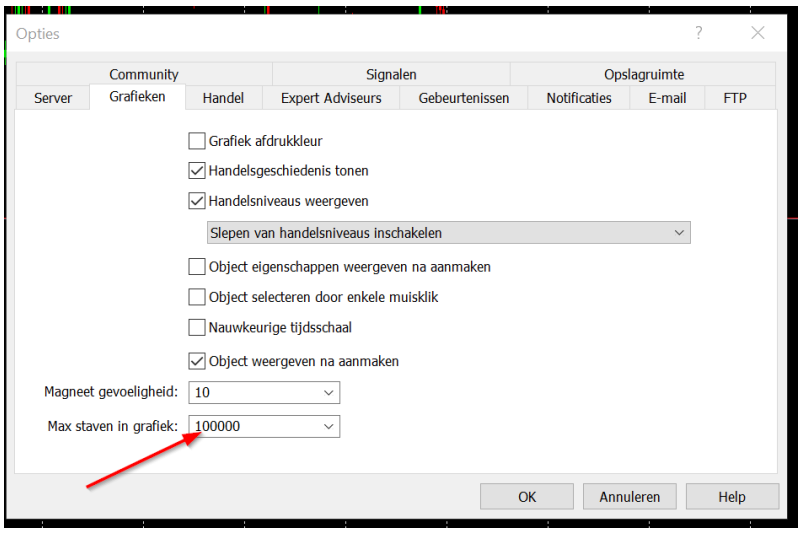
Remark:

Depending on version of MT version (MT4 and MT5) when changing/filling in the gumroad license key and registration key it can happen that the EA gets an **unexpected interrupt**. This will **kill/abort** the EA.

If this is the case move the EA again in chart and fill in both gumroad license key and registration key.

Historical data

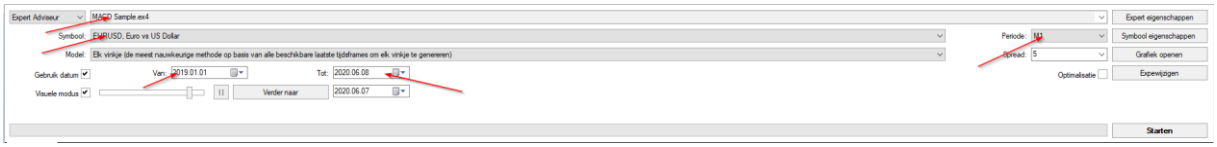
- The amount of historical data to retrieve depends on the history available on the MT4 or MT5 terminal.
- This is also time frame and broker dependent.
- If many data are needed first set the max number of bars per chart to a higher value under tools, options, graphs



1. MT4

Next you can scroll back in a chart for the instrument you need the M1 bars for. There are also scripts on the internet for downloading historical data. Google is your friend.

A more elaborated way is to start the EA back tester; Cntrl+R



- Select a basic EA supplied by MT4, in principle any EA is OK
- Select the instrument
- Select time frame, in this example M1
- Select begin and end time
- Push the start button. Now the MT4 terminal will down load the bars in the defined time period. The maximum to download is broker depending. F.i. with IC Markets you can download 1 million bars. Maybe even more.
- When the back testing starts you can abort.

2. MT5

Next you can scroll back in a chart for the instrument you need the M1 bars for. There are also scripts on the internet for downloading historical data. Google is your friend. A more elaborated way is to start the EA back tester; Cntrl+R. Select visual mode.

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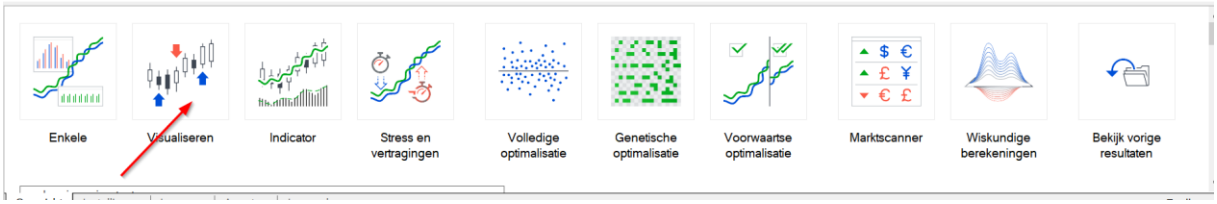
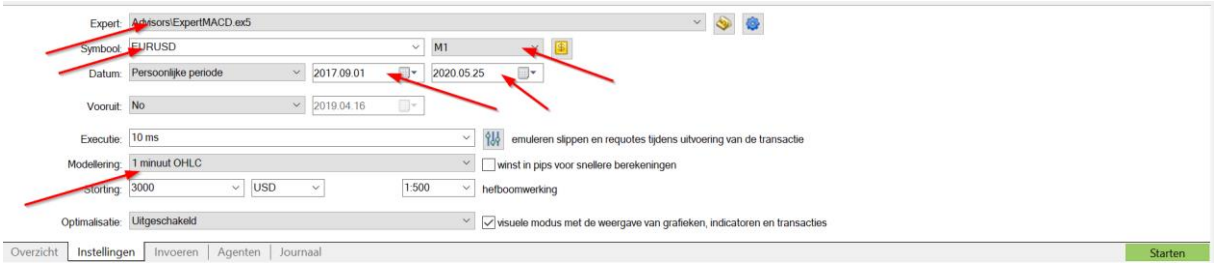


Next you will see this.



- Select a basic EA supplied by MT5
- Select the instrument
- Select time frame, in this example M1
- Select begin and end time
- Select bar OHLC, in this case M1
- Push the start button. Now the MT5 terminal will down load the Bars in the defined time period. The maximum to download is broker depending. F.i. with IC Markets you can download 1 million bars. Maybe even more.
- When the back testing starts you can abort.

Instrument lookup table.

Brokers use different names for instruments, especially indexes. To make it more general at connection time a lookup dictionary is passed as parameter. In here the python scripts find the translation between general instrument names and typical broker instrument names. This will make the application more general. A nice way is to do by a config file. In the config file you can define the lookups for different brokers. See below

```
[ICM]
AUDCAD: AUDCAD
AUDCHF: AUDCHF
AUDJPY: AUDJPY
AUDNZD: AUDNZD
AUDUSD: AUDUSD
BTCUSD: BTCUSD
CADCHF: CADCHF
CADJPY: CADJPY
CHFJPY: CHFJPY
CHFSGD: CHFSGD
EURAUD: EURAUD
[FXPIG]
AUDCAD: AUDCAD.spa
AUDCHF: AUDCHF.spa
AUDUSD: AUDUSD.spa
AUDNZD: AUDNZD.spa
```

```
AUDJPY: AUDJPY.spa
```

With the next code you can easy select the lookup table for a typical broker

The python script only recognizes the instruments defined in the lookup dictionary.

```
def config_instruments(config, section):
        dict1 = {}
        options = config.options(section)
        for option in options:
            try:
                option = option.upper()
                dict1[option] = config.get(section, option)
                if dict1[option] == -1:
                    print("skip: %s" % option)
            except:
                print("exception on %s!" % option)
                dict1[option] = None
        return dict1

#Read in config
CONFIG_FILE= "Instrument.conf"
config = configparser.ConfigParser()
config.read(CONFIG_FILE)

brokerInstrumentsLookup = config_instruments(config,'ICM')
```

Orders, deals and positions.

In MT4 all trades are called orders. The only difference is by market/actual orders and pending orders. In MT5 you have orders, positions and deals. In MT5 you start with an order, market or pending, it does not matter. Market orders are directly transferred into a position by a deal, so market order -> deal -> position. Only at very big lots it can be that the order needs more deals to become a position. The order and the deal are directly closed and only the positions is left. But for instance commission is part of the deal and you will not find back in the position. Pending orders stay orders until the execution price is reached, then a deal and a position is left. Again order and deal are closed. For more details see the MQL5 definitions on the internet. In MT5 orders, deals and positions have different ticket values.