PROGRAM DESCRIPTION

This program performs the following functions:

1. Collection of historical OHLCV data for the last years and calculation of technical patterns (momentums, volatility, Japanese candlesticks, statistics...), 1068 patterns.
2. Calculations of which of the 1068 are the most valuable, and most relevant for the detection of good trading points (buy-sell).
3. Training of several machine learning models using powerful libraries:Google Tensor Flow Sklearn and XGB
4. Evaluation of the multiple models, to discard the less reliable ones.
5. OHLCV data collection and making predictions from the models in real time, when any of the multiple predictions is considered valid, sending real-time alert to Telegram and Mail.

INTRODUCTION

The stock market is moved by technical indicators, there are several types of volatility, cycle volume, candlesticks, supports, resistances, moving averages...

An excellent site to see all the stock market technical indicators is webull https://app.webull.com/trade?source=seo-google-home.
Image: webull with Stochastic, MACD and RSI indicators

On the stock market graphs have been invented EVERY possible way to predict the stock market, with mixed results, making clear the difficulty of predicting human behavior.

These indicators indicate where to buy and sell, there are many beliefs about them (we mean in beliefs, because if they always worked we would all be rich).

Any technical indicator can be obtained by means of programmable mathematical operations.

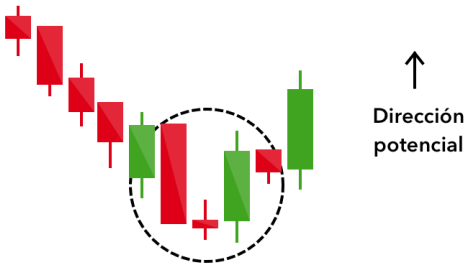
Three examples:
RSI or Relative Strength Index is an oscillator that reflects relative strength

Greater than 70 overbought, indicates that it will go down.
Less than 70 oversold, indicates that it will go higher

MACD is the acronym for Moving Average Convergence / Divergence. The MACD in the stock market is used to measure the robustness of the price movement. Through the crossing of the line of this indicator and the moving average

It operates on the basis of the crossovers between these two lines
Or it is operated when both exceed zero.

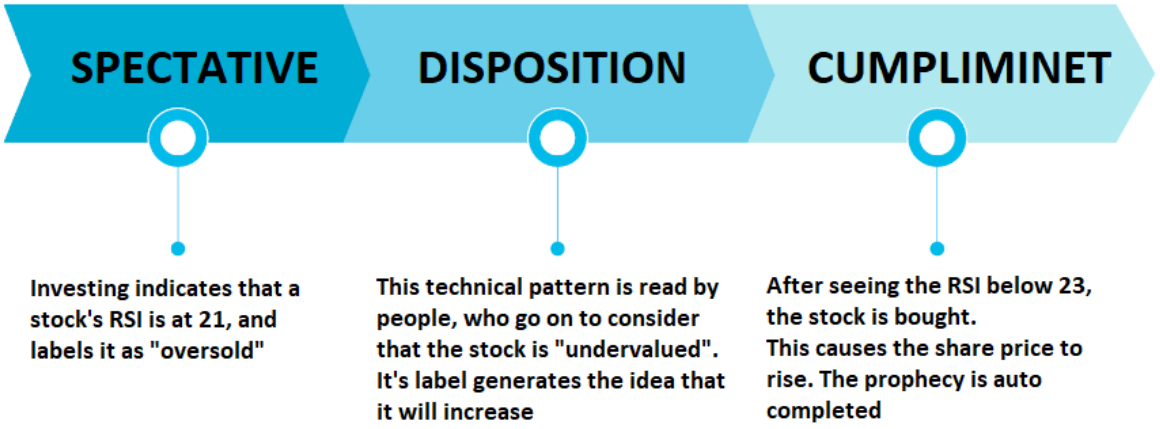
Candlestick: Morning Star The morning star pattern is considered a hopeful sign in a bearish market trend.



These indicators are present in refuted and popular websites like investing.com to be analyzed by the market https://es.investing.com/equities/apple-computer-inc-technical

It is extremely difficult to predict the price of any stock. Inflation, wars, populism, all this conditions affect the economy, and it becomes difficult, if not impossible to predict what Vladimir Putin will do tomorrow.

Here enters the self-fulfilling prophecy principle of explained is, at first, a "false" definition of the situation, which awakens a new behavior that makes the original false conception of the situation become "true". Example:



OBJECTIVE

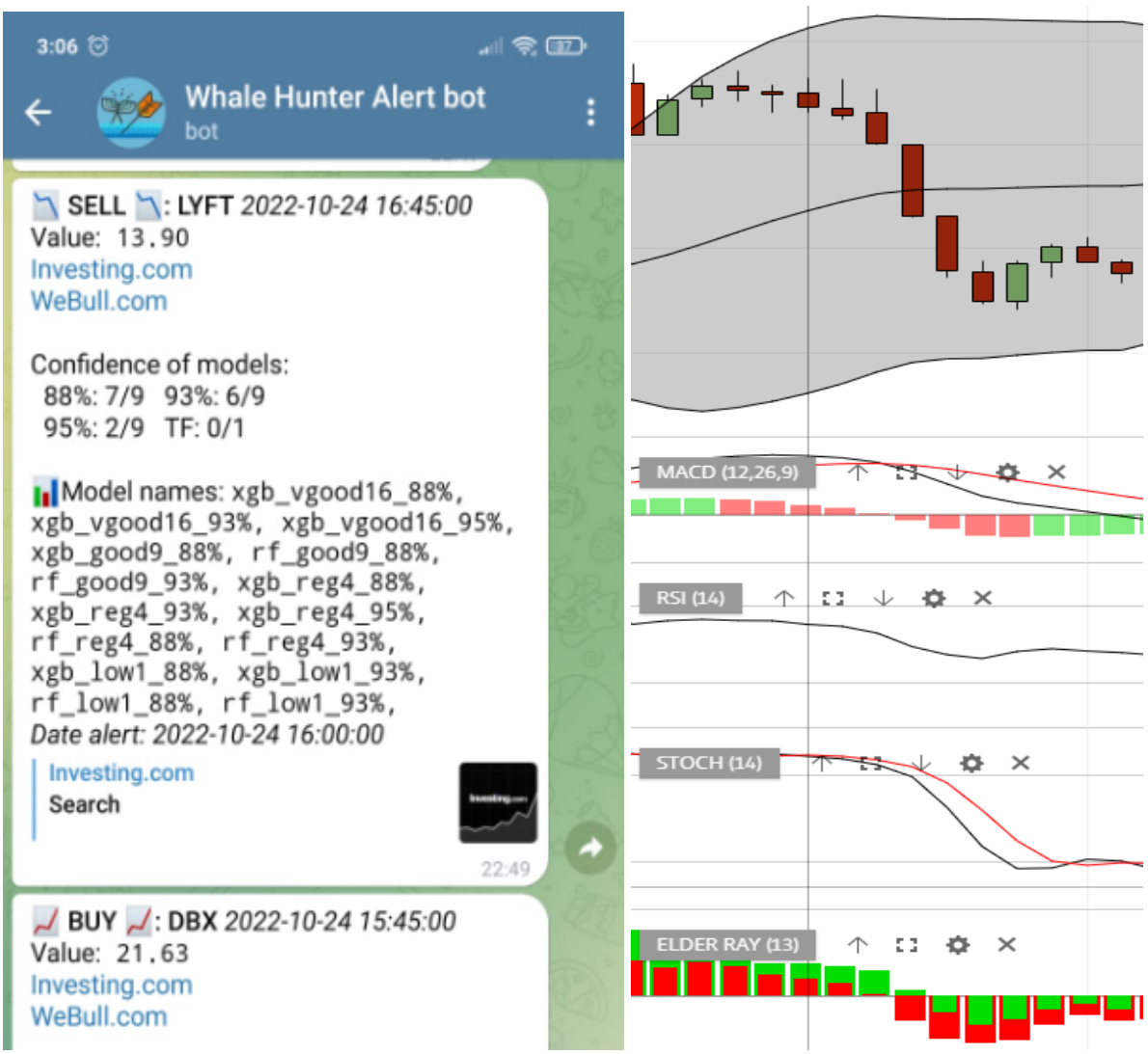
Understanding the principle of self-fulfilling prophecy, it is possible to obtain the pattern of the same, by means of the massive collection of technical patterns, their calculation and the study of their patterns.

For this, techniques such as big data will be used through Pandas Python libraries, machine learning through Sklearn, XGB and neural networks through the open google Tensor Flow library.

The result will be displayed in a simple and friendly way through alerts on mobile or computer.
Example of a real-time alert via telegram bot https://t.me/Whale_Hunter_Alertbot

The machine learnig models Sklearn, XGB and Tensor Flow , by means of the learning of the last months detect the point of sale. To detect this point of sale a series of indicators have been taken into account: `olap_VMAP, ma_SMA_50, ichi_senkou_a, olap_BBAND_dif ,mtum_MACD_ext, olap_BBAND_MIDDLE, mtum_MACD_ext_signal, fibo_s1, volu_PVI_1, ma_KAMA_5,` etcetera.

The image shows: MACD, RSI , Stochastic and Balance of power (Elder Ray)
The alert is sent on the vertical line, during the next 4 periods the stock decreases by 2.4%.
Each candlestick period in the image indicates 15 minutes.



OPERATION

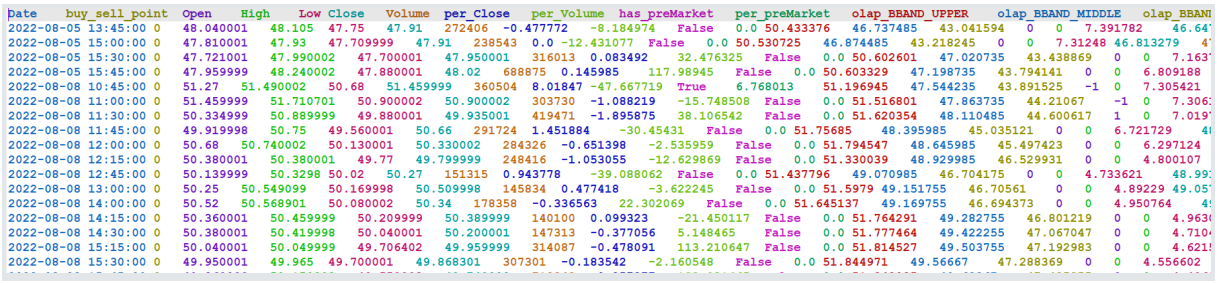
1.1 Data collection

Collect data to train the model
`yhoo_generate_big_all_csv.py`
The closing data is obtained through yahoo API finance, and hundreds of technical patterns are calculated using the pandas_ta and talib libraries.
`yhoo_history_stock.get_SCALA_csv_stocks_history_Download_list()`

The model to be able to train in detecting points of purchase and sale, creates the column `buy_seel_point` has value of: 0, -100, 100. These are detected according to the maximum

changes, (positive 100, negative -100) in the history of the last months, this point will be with which the training is trained, also called the *ground* true.
Value will be assigned in `buy_seel_point` if the increase or decrease of the stock is greater than 2.5% in a period of 3 hours, using the `get_buy_sell_points_Roll` function.

Once the historical data of the stock has been obtained and all the technical indicators have been calculated, a total of 1068, files of type `AAPL_stock_history_MONTH_3_AD.csv` are generated.
Example of the file with the first eight indicators:



Date	buy_sell_point	Open	High	Low	Close	Volume	per_Close	per_Volume	has_preMarket	per_preMarket	olap_BBAND_UPPER	olap_BBAND_MIDDLE	olap_BBAN
2022-08-05 13:45:00	0	48.040001	48.105	47.75	47.91	272406	-0.477772	-8.184974	False	0.0	50.433376	46.737485	43.041594
2022-08-05 15:00:00	0	47.810001	47.93	47.709999	47.91	238543	0.0	-12.431077	False	0.0	50.530725	46.874485	43.218245
2022-08-05 15:30:00	0	47.721001	47.990002	47.700001	47.950001	316013	0.083492	32.476325	False	0.0	50.602601	47.020735	43.438869
2022-08-05 15:45:00	0	47.959999	48.240002	47.880001	48.02	688875	0.145985	117.98945	False	0.0	50.603329	47.198735	43.794141
2022-08-08 10:45:00	0	51.27	51.490002	50.68	51.459999	360504	8.01847	-47.667719	True	6.768013	51.196945	47.544235	43.891525
2022-08-08 11:00:00	0	51.459999	51.710701	50.900002	50.900002	303730	-1.088219	-15.748508	False	0.0	51.516801	47.863735	44.21067
2022-08-08 11:30:00	0	50.334999	50.889999	49.880001	49.935001	419471	-1.895875	38.106542	False	0.0	51.620354	48.110485	44.600617
2022-08-08 11:45:00	0	49.919998	50.75	49.560001	50.66	291724	1.451884	-30.45431	False	0.0	51.75685	48.395985	45.035121
2022-08-08 12:00:00	0	50.68	50.740002	50.130001	50.330002	284326	-0.651398	-2.535959	False	0.0	51.794547	48.645985	45.497423
2022-08-08 12:15:00	0	50.380001	50.380001	49.77	49.799999	248416	-1.053055	-12.629869	False	0.0	51.330039	48.929985	46.529931
2022-08-08 12:45:00	0	50.139999	50.3298	50.02	50.27	151315	0.943778	-39.088062	False	0.0	51.437796	49.070985	46.704175
2022-08-08 13:00:00	0	50.25	50.549099	50.169998	50.509998	145834	0.477418	-3.622245	False	0.0	51.5979	49.151755	46.70561
2022-08-08 14:00:00	0	50.52	50.568901	50.080002	50.34	178358	-0.336563	22.302069	False	0.0	51.645137	49.169755	46.694373
2022-08-08 14:15:00	0	50.360001	50.459999	50.209999	50.389999	140100	0.099323	-21.450117	False	0.0	51.764291	49.282755	46.801219
2022-08-08 14:30:00	0	50.380001	50.419998	50.040001	50.200001	147313	-0.377056	5.148465	False	0.0	51.777464	49.422255	47.067047
2022-08-08 15:15:00	0	50.040001	50.049999	49.706402	49.959999	314087	-0.478091	113.210647	False	0.0	51.814527	49.503755	47.192983
2022-08-08 15:30:00	0	49.950001	49.965	49.700001	49.868301	307301	-0.183542	-2.160548	False	0.0	51.844971	49.56667	47.288369

This data collection is customizable, you can obtain and train models of any Nasdaq stock, for other indicators or crypto-assets, it is also possible by making small changes.

Through the Option_Historical class it is possible to create historical data files: annual, monthly and daily.

```
class Option_Historical(Enum): YEARS_3 = 1, MONTH_3 = 2,
MONTH_3_AD = 3, DAY_6 = 4, DAY_1 = 5
```

The files *\d_price_maxAAPL_min_max_stock_MONTH_3.csv* are generated, which store the max and min value of each column, to be read in `Model_predictions_Nrows.py` for a quick fit_scaler() (this is the "cleaning" process that the data requires before entering the AI training models) . This operation is of vital importance for a correct optimization in reading data in real time.

1.2 Types of indicators

During the generation of the data collection file of point 1 `AAPL_stock_history_MONTH_3_AD.csv` 1068 technical indicators are calculated, which are divided into subtypes, based on **prefixes** in the name.
List of prefixes and an example of the name of one of them.

- Overlap: **olap_**
  `olap_BBAND_UPPER, olap_BBAND_MIDDLE, olap_BBAND_LOWER,`
- Momentum: **mtum_**
  `mtum_MACD, mtum_MACD_signal, mtum_RSI, mtum_STOCH_k,`
- Volatility: **vola_**
  `vola_KCBe_20_2, vola_KCUe_20_2, vola_RVI_14`

- Cycle patterns: **cycl_**
  `cycl_DCPHASE, cycl_PHASOR_inph, cycl_PHASOR_quad`
- Candlestick patterns: **cdl_**
  `cdl_RICKSHAWMAN, cdl_RISEFALL3METHODS, cdl_SEPARATINGLINES`
- Statistics: **sti_**
  `sti_STDDEV, sti_TSF, sti_VAR`
- Moving averages: **ma_**
  `ma_SMA_100, ma_WMA_10, ma_DEMA_20, ma_EMA_100, ma_KAMA_10,`
- Trend: **tend_** and **ti_**
  `tend_renko_TR, tend_renko_brick, ti_acc_dist, ti_chaikin_10_3`
- Resistors and support suffixes: **_s3, _s2, _s1, _pp, _r1, _r2, _r3**
  `fibo_s3, fibo_s2, fibo_s1, fibo_pp, fibo_r1, fibo_r2, fibo_r3, fibo_r2, fibo_r3`
  `demark_s1, demark_pp, demark_r1`
- Intersection point with resistance or support: **pcrh_.**
  `pcrh_demark_s1, pcrh_demark_pp, pcrh_demark_r1`
- Intersection point with moving average or of moving averages between them: **mcrh_.**
  `mcrh_SMA_20_TRIMA_50, mcrh_SMA_20_WMA_50, mcrh_SMA_20_DEMA_100`
- Indicators of changes in the stock index, nasdaq: **NQ_.**
  `NQ_SMA_20, NQ_SMA_100`

Note: To see the 1068 indicators used go to the attached sheets at the end of the document.

2 Indicator filtering

Execute to find out which columns are relevant for the model output
`Feature_selection_create_json.py`
It is necessary to know which of the hundreds of columns of technical data, is valid to train the neural model, and which are just noise. This will be done through correlations and Random Forest models.
Answer the question:

Which columns are most relevant for buy or sell points?

Generate the *best_selection* files, which are a raking of the best technical data to train the model, it is intended to go from 1068 columns to about 120.
For example, for the Amazon stock, point-of-purchase detection, in the period June to October 2022, the most valuable indicators are:

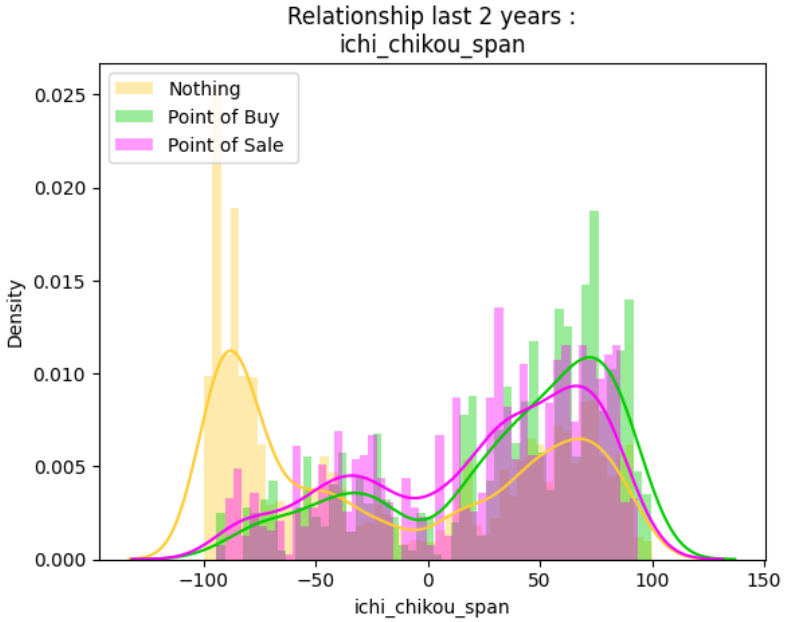
- Senkuo of the Ichimoku Cloud
- Chaikin Volatility
- On-balance volume

Example of *plots_relations/best_selection_AMNZ_pos.json* file

```
"index": {
```

```
"12": [
    "ichi_chilou_span"
],
"10": [
    "volu_Chaikin_AD"
],
"9": [
    "volu_OBV"
],
```

Plots with the 3 best technical data are printed in the folder *plots_relations/plot.*
Example name: *TWLO_neg_buy_sell_point__ichi_chikou_span.png*



3 Training TensorFlow, XGB and Sklearn models

`Model_creation_models_for_a_stock.py`
this requires the selection of better columns from point #2
There are four types of predictive algorithms, AI models:

- **Gradient Boosting** consists of a set of individual decision trees, trained sequentially, so that each new tree tries to improve on the errors of the previous trees. Sklearn Library
- **Random Forest** Random forests are an ensemble learning method for classification, regression, and other tasks that operates by constructing a multitude of decision trees at training time. Sklearn Library
- **XGBoost** is an optimized distributed gradient boosting library designed to be highly efficient, flexible and portable. It implements machine learning algorithms under the Gradient Boosting framework. XGBoost Library
- **TensorFlow TF** is an open source library for machine learning across a range of tasks, and developed by Google to meet their needs for systems capable of building and training neural networks to detect and decipher patterns and correlations, analogous to the learning and reasoning used by humans. TensorFlow Library

There are POS (buy) or NEG (sell) models and there is a BOTH model (BOTH is discarded, since prediction models are binary, they only accept 2 positions, true or false).
This point generates prediction models `.sav` for XGB and Sklearn. `.h5` for Tensor Flow.
Naming Examples: `XGboost_U_neg_vgood16_s28.sav` and `TF_AMZN_pos_low1_s128.h5`

Format of the names:

- Type of AI you train with can be:
  - `XGboost, TF, TF64, GradientBoost` and `RandomForest`
- Stock ticker `AMZN` for amazon , `AAPL` for Apple ...
- Detects points of purchase or sale `pos` or `neg`
- How many indicators have been used in the learning, can be of 4 types depending on the relevance given by point *#2 Indicator filtering*. This ranking is organized in the **`MODEL_TYPE_COLM`** class,
  - `vgood16` the best 16 indicators
  - `good9` the best 32 indicators
  - `reg4` the best 64 indicators
  - `low1` the best 128 indicators
- Only for TF models. Depending on the density of the neurons used, defined in the class a_manage_stocks_dict. **`MODEL_TF_DENSE_TYPE_ONE_DIMENSI`** can take value: `s28 s64` and `s128`

These combinations imply that for each stock 5 types of IA are created, each in `pos` and `neg`, plus for each combination the 4 technical indicator configurations are added. This generates 40 IA models, which will be selected in point: *#4 to evaluate the QUALITY of those models.*

Each time an AI template is generated, a log file is generated:
TF_balance_TF_AAPL_pos_reg4.h5_accuracy_87.6%__loss_2.74__epochs_10[160].csv
It contains the accuracy and loss data of the model, as well as the model training records.

4.1 Assessing the QUALITY of these models

`Model_creation_scoring.py`
To make a prediction with the AIs, new data is collected and the technical indicators with which it has been trained are calculated according to the *best_selection* files.
When the `.h5` and `.sav` models are queried:

Is this a point of sale?

These answer a number that can vary between 0.1 and 4
The higher the number the more likely it is to be a correct buy/sell point.

Each model has a rating scale on which it is considered point of sale. For some models with a rating of more than 0.4 will be enough (usually the `XGboost`), while for others require more than 1.5 (usually the `TF`).

How do you know what the threshold score is for each model?
The `Model_creation_scoring.py` class generates the threshold score *threshold* files, which tell which threshold point is considered the buy-sell point.
Each AI model will have its own type file:

Models/Scoring/AAPL_neg__when_model_ok_threshold.csv

For each action in *#3 train the TF, XGB and Sklearn models*, 40 AI models are generated. This class evaluates and selects the most accurate models so that only the most accurate ones will be executed in real time (usually between 4 and 8 are selected).

Models/Scoring/AAPL_neg__groupby_buy_sell_point_000.json

```
"list_good_params": [
  "r_rf_AFRM_pos_low1_",
  "r_TF64_AFRM_pos_vgood16_",
  "r_TF64_AFRM_pos_good9_",
  "r_TF_AFRM_pos_reg4_"
],
```

4.2 Evaluating those real BENEFITS of models

`Model_predictions_N_eval_profits.py`

Answer the question:

If you leave it running for N days, how much hypothetical money do you make?

Note: this should be run on data that has not been used in the training model, preferably

Models/eval_Profits/_AAPL_neg_ALL_stock_20221021__20221014.csv

5.1 Making predictions for the past week

`Model_predictions_Nrows.py`

You can make predictions with the real-time data of the stock.
Through the function call every 10-12min, download the real-time stock data through the yahoo financial API.

```
df_compare, df_sell = get_RealTime_buy_seel_points()
```

This run generates the log file *d_result/prediction_results_N_rows.csv*
This file and the notifications (telegram and mail) contain information about each prediction that has been made. It contains the following columns:

- Date: date of the prediction
- Stock: stock
- buy_sell: can be either NEG or POS, depending on whether it is a buy or sell transaction.
- Close: This is the scaled value of the close value (not the actual value).

- Volume: This is the scaled value of the Volume (not the actual value).
- 88%: Fractional format (`5/6`) How many models have predicted a valid operating point above 88%? Five of the six analyzed
- 93%: Fractional format (`5/6`), number of models above 93%.
- 95%: Fractional format (`5/6`), number of models above 95%.
- TF: Fractional format (`5/6`), number of models above 93%, whose prediction has been made with Tensor Flow models.
- Models_names: name of the models that have tested positive, with the hit % (88%, 93%, 95%) as suffix

Registration example

```
 2022-11-07 16:00:00 MELI NEG -51.8 -85.80 5/6 0/6 0/6 0/6 1/2
TF_reg4_s128_88%, rf_good9_88%, rf_low1_88%, rf_reg4_88%,
rf_vgood16_88%,
```

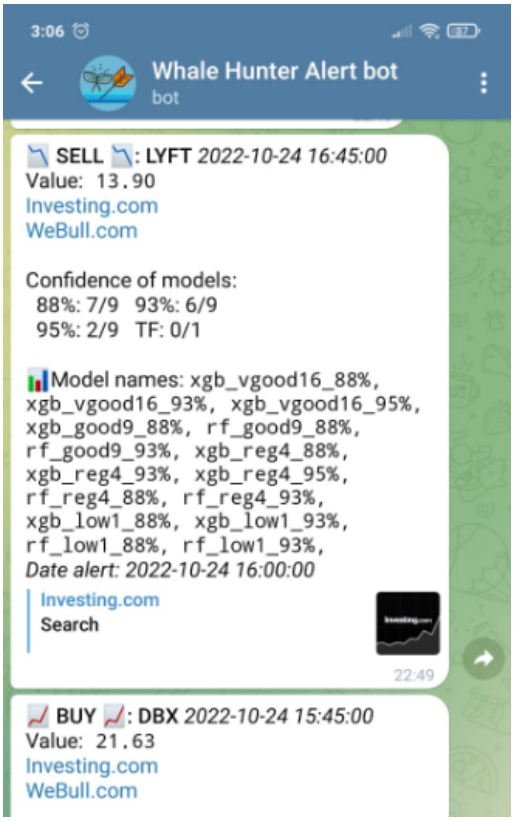
To be considered a valid prediction to trade, it must have at least half of the fraction score in the 93% and TF columns.
More than half of the models have predicted with a score above 93% which is a good point for trading

5.2 Sending real-time alerts

`predict_POOL_enque_Thread.py` *multithreading glued 2s per action*
It is possible to run it without configuring telegram point 5.2, in that case no alerts will be sent in telegram, but if the results were recorded in real time in: *d_result/prediction_real_time.csv*

There is the possibility to send alerts of purchase and sale of the share, to telegram or mail. the multiple AI trained models are evaluated, and only those greater than 96% probability (as previously trained) are reported.
Every 15 minutes, **all** necessary indicators are calculated in real time for each action and evaluated in the AI models.
The alert indicates which models are detecting the correct buy and sell points at which to execute the transaction.
These buy and sell alerts expire in, plus or minus 7 minutes, given the volatility of the market.
Also attached is the price at which it was detected, the time, and links to news websites.
Note: financial news should always prevail over technical indicators.
What is displayed in DEBUG alert, is the information from *d_result/prediction_results_N_rows.csv* of the Item: 5 make predictions of the last week Test

To understand the complete information of the alert see Point 5.1 Making predictions of the last week.



Quick start-up

Install requirements

```
pip install -r requirements.txt
```

Run `Utils/API_alphavantage_get_old_history.py`
Run `yhoo_generate_big_all_csv.py`
Run `Model_creation_models_for_a_stock.py`
Run `Model_creation_scoring.py`
Run `Model_predictions_Nrows.py` Optional, last week predictions

Real time forecasts:
Run `Utils/Volume_WeBull_get_tikcers.py` Ignore in case of using default configuration
Configure bot token see point 5.2 Configuring chatID and tokens in Telegram
Run `predict_POOL_inque_Thread.py`

It is possible to run it without configuring telegram point **5.2**, in that case no alerts will be sent in telegram, but if the results were recorded in real time in: *d_result/prediction_real_time.csv*

Completed start-up

(Running times are estimated for an intel i3 and 8GB of RAM)

0.0 The interpreter with which the tutorial has been made is python 3.8 , IDE Pycharm, caution with the compatibility between versions of the library pandas and python
For example: today do not use python 3.10 , as it is incompatible with pandashttps://stackoverflow.com/questions/69586701/unable-to-install-pandas-for-python

0.1 Download and install requirements, the project is powerful and demanding in terms of libraries.

```
pip install -r requirements.txt
```

0.2 Search all files for the string `**DOCU**.`
this allows to watch all files that are executable from the startup tutorial easily

0.3 In the file `a_manage_stocks_dict.py` all the configurations are stored, look at the document and know where it is.
In it there is the dictionary `DICT_COMPANYS`
It contains the IDs (GameStops quotes with the ID: `GME`) of the companies to analyze. You can customize and create a class from the **nasdaq** tikers, by default the key `@FOLO3` will be used which will analyze these 39 companies.

```
"@FOLO3:
   ["UPST", "MELI", "TWLO", "RIVN", "SNOW", "LYFT", "ADBE", "UBER",
"ZI", "QCOM", "PYPL", "SPOT", "RUN", "GTLB", "MDB", "NVDA", "AMD"
ADSK", "ADSK", "AMZN", "CRWD", "NVST", "HUBS", "EPAM", "PINS",
"TTD", "SNAP", "APPS", "ASAN", "AFRM", "DOCN", "ETSY", "DDOG",
"SHOP", "NIO", "U", "GME", "RBLX", "CRSR"],
```

If a faster execution is desired, it is recommended to delete items from the list and leave three

1 Historical data collection

1.0 (Recommended) alphavantage API

The API yfinance , if you want price to price intervals in 15min intervals is limited to 2 months, to get more time data up to 2 years back (more data better predictive models) use the free version of the API https://www.alphavantage.co/documentation/

Run `Utils/API_alphavantage_get_old_history.py`
The class is customizable: action intervals, months to ask, and ID action.

Note: being the free version, there is a portrait between request and request, to get a single 2 years history it takes 2-3 minutes per action.
Once executed, the folder: *d_price/RAW_alpha* will be filled with historical OHLCV .csv of share prices. These files will be read in the next step. Example name: `alpha_GOOG_15min_20221031__20201112.csv`
Check that one has been generated for each action in *d_price/RAW_alpha*.

1.1 The OHLCV history of the stock must be generated.

As well as the history of technical patterns. It takes +-1 minute per share to calculate all technical patterns.
Run `yhoo_generate_big_all_csv.py`
Once executed the folder: *d_price* will be filled with historical OHLCV .csv of share prices.
Three types of files are generated (Example of name type for action: AMD):

- *AMD_SCALA_stock_stock_history_MONTH_3_AD.csv* with all technical patterns calculated and applied a fit scaler(-100, 100), i.e. the stock prices are scaled (size: 30-90mb)
- *d_price/min_max/AMD_min_max_stock_MONTH_3_AD.csv* with scaling keys (size: 2-7kb)
- *AMD_stock_history_MONTH_3_AD.csv* the pure history of the OHLCVs (size: 2-7mb)

Note: *MONTH_3_AD* means 3 months of *API* yfinance plus the history collected from alphavantage. Point 1.0
Check that one has been generated for each action.

2 Filtering technical indicators

It is necessary to separate the technical indicators which are related to buy or sell points and which are noise. 20 seconds per share
Run `Model_creation_scoring.py`
Three files are generated for each action in the folder: *plots_relations* , relations for purchase "pos", relations for sale "neg" and relations for both "both".

- *plots_relations/best_selection_AMD_both.json*

These files contain a ranking of which technical indicator is best for each stock.
Check that three .json have been generated for each action in *plots_relations* .

3 Generate TensorFlow, XGB and Sklearn model training

Train the models, for each action 36 different models are trained.
15 minutes per share.
Run `Model_creation_models_for_a_stock.py`

The following files are generated for each action:
Models/Sklearn_smote folder:

- XGboost_AMD_yyy_xxx_.sav

- RandomForest_AMD_yyy_xxx_.sav
- XGboost_AMD_yyy_xxx_.sav

Models/TF_balance folder:

- TF_AMD_yyy_xxx_zzz.h5
- TF_AMD_yyy_xxx_zzz.h5_accuracy_71.08%__loss_0.59__epochs_10[160].csv

xxx can take value `vgood16 good9 reg4` and `low1`

yyy can take value "pos" and "neg".

zzz can take value s28 s64 and s128

Check that all combinations of files exposed by each action have been generated in the /Models subfolders.

4 Evaluate quality of predictive models

From the 36 models created for each OHLCV history of each stock, only the best ones will be run in real time, in order to select and evaluate those best ones.

Run `Model_creation_scoring.py`

In the *Models/Scoring* folder

AMD_yyy__groupby_buy_sell_point_000.json

AMD_yyy__when_model_ok_threshold.csv

Check that two have been generated for each action.

5 Predictions

5.0 make predictions of the last week Optional Test

Run `Model_predictions_Nrows.py`

This run generates the log file *d_result/prediction_results_N_rows.csv*

Generates a sample file with predictions for the last week, data obtained with yfinance.

Check that records exist

5.1 Getting OHLCV data in real time

In case you want to predict actions in the @FOLO3 list, ignore this point.

It is difficult to get real time OHLCV, especially volume (yfinance gives real time volume, but this is not a correct value and after 1-2 hours it changes, making it unfeasible to use yfinance for real time predictions).

To get correct volumes in real time, queries are made to webull, for each stock every 2.5 minutes, a webull ID is required, the default ones @FOLO3 are cached and downloaded in *a_manage_stocks_dict.py. DICT_WEBULL_ID*

But if you want to use actions outside the list @FOLO3

In `Utils/Volume_WeBull_get_tikcers.py`

Change the example list:

```
list_stocks = ["NEWS", "STOCKS", "WEBULL", "IDs"]
```

By the nasdaq ticker, of the webull ID you want to get.
Run `Utils/Volume_WeBull_get_tikcers.py`
Once executed it will show a list on screen, that must be added in *a_manage_stocks_dict.py.DICT_WEBULL_ID*

```
"MELI" : 913323000,
"TWLO" : 913254000,
```

5.2 Setting up chatIDs and tokens in Telegram

You have to get the telegram token and create a channel.
You can get the token by following the tutorial:
https://www.siteguarding.com/en/how-to-get-telegram-bot-api-token
With the token update the variable of `ztelegram_send_message_handle.py`

```
#Get from telegram
TOKEN = "00000000xxxxxxx"
```

Once the token has been obtained, the chatId of the users and administrator must be obtained.
Users only receive purchase and startup sale alerts, while the administrator receives alerts from users as well as possible problems.
To get the chatId of each user run `ztelegram_send_message_UptateUser.py` and then write any message to the bot, the chadID appears both in the console and in the user's chadID

```
[>>> BOT] Message Send on 2022-11-08 22:30:31:31
     Text: You "User nickname " send me:
"Hello world"
 ChatId: "5058733760".
     From: Bot name
     Message ID: 915
     CHAT ID: 500000760
-----------------------------------------------
```

Pick up *CHAT ID: 500000760*
With the chatId of the desired users, add them to the `LIST_PEOPLE_IDS_CHAT` list.
in `ztelegram_send_message_handle.py`

5.3 Sending real-time alerts Telegram

It is possible to run it without configuring telegram, in that case no alerts will be sent in telegram, but the results will be recorded in real time in: *d_result/prediction_real_time.csv*
It will be reported in console via:

```
is_token_telegram_configurated() - Results will be recorded in real
time, but no alert will be sent on telegram. File:
d_result/prediction_real_time.csv
```

is_token_telegram_configurated() - There is no value for the telegram TOKEN, telegram is required to telegram one

The criteria to send alert or not is defined in the method `ztelegram_send_message.will_send_alert()`. If more than half of the models have a score greater than 93% or the TF models have a score greater than 93%, an alert is sent to the consumer users.

Run `predict_POOL_inque_Thread.py`
In this class there are 2 types of threads

- Producer , constantly asks for OHLCV data, once it is obtained, it enters it into a queue.
- Consumer (2 threads running simultaneously) are pulling OHLCV data from the queue, calculating technical parameters, making model predictions, registering them in `zTelegram_Registers.csv`, and if they meet the requirements they are sent by telegram.

Possible improvements

Improvements in predictive models, using multi-dimensional

Improvements in TF predictive models using tensors (multiple matrices over time) and non-matrices (mono temporal, current design).
In the class `Model_TF_definitions.ModelDefinition.py`
Through it, the model configurations, density, number of neurons, etc. are obtained.
There are two methods:

- get_dicts_models_One_dimension() is currently used and generates TF model configurations for arrays.
- get_dicts_models_multi_dimension() is not in use, it is set to give multiple model configurations using tensors.

There is the Utils.Utils_model_predict.df_to_df_multidimension_array`(dataframe, BACHT_SIZE_LOOKBACK)` method, which transforms 2-dimensional df [columns , rows] to 3-dimensional df [columns , files, `BACHT_SIZE_LOOKBACK`].
`BACHT_SIZE_LOOKBACK` means how many records in the past tense are added to the df, the number is configurable and default value is eight.
To start the development must be to call the method with `BACHT_SIZE_LOOKBACK` with an integer value, the method will return a multidimensional df [columns, files, `BACHT_SIZE_LOOKBACK`], with which to feed the TF models.

```
Utils_model_predict.scaler_split_TF_onbalance(df, label_name=Y_TARGET, BACHT_SIZE_LOOKBACK=8)
```

Improvement: Once these multidimensional arrays are returned, models are obtained with get_dicts_models_multi_dimension(), it is not possible to train a model and make a prediction with multidimensional arrays.

Review the way ground true is obtained

Before training the models the intervals (of 15min) are classified as buy point 100 or 101, sell point -100 or .-101 or no trade point 0, these values are entered in the column `Y_TARGET =`

`'buy_sell_point'` through the method Utils.Utils_buy_sell_points.get_buy_sell_points_Roll().
The variation is calculated with respect to the following 12 windows (15min * 12 = 3 hours), and from there the 8% points of greatest rise and greatest fall are obtained, and these points are assigned values other than 0.
To obtain the `Y_TARGET` there are 2 methods that are responsible for the strategy to follow once you buy and sell, in case of loss will opt for Stop Loss.
`rolling_get_sell_price_POS() and rolling_get_sell_price_NEG()`
Optional improvement: the current system decides by percentages, i.e. the 16% highest rises and falls (8% each) are ground true. I.e. there are rises or falls greater than 3% that can be left out if the stock is very volatile.

Add news sentiment indicator

You get the news for each stock with `news_get_data_NUTS.get_news_sentiment_data()` this method gets all the associated news from: INVESTING.com, YAHOO.com and FINVIZ.COM.
(it uses investpy API , which recently october 2022 has started to fail , probably due to investing.com blocking https://github.com/alvarobartt/investpy)
Once these news items are obtained, the method `news_sentiment_va_and_txtBlod.get_sentiment_predictorS()` proceeds to evaluate and score from -100 negative to 100 positive, using 4 models. It is convenient to introduce more news pages
The models are downloaded from the internet, either via AI models or libraries, you can find the references in:

```
news_sentiment_flair.get_sentiment_flair
news_sentiment_t5.get_sentiment_t5
news_sentiment_t5.get_sentiment_t5Be
get_sentiment_textBlod
```

Run `news_get_data_NUTS.get_json_news_sentimet()`
A .csv and .json file is generated, with action date the four models, the score and the news collected Example: *d_sentiment/stock_news_DATE_MELI.csv*

```
Date Ticker news_va news_fl news_t5 news_t5Be news_txtBlod Headline
2021-03-01 MELI 95.312 77.039 100.0 92.15 6.733 S&P 500 Earnings Increase As Yields Soar
The earnings per share (EPS) for all S&P 500 companies combined increased to $174.19 last week. The forward EPS
2019-09-05 MELI -82.026 -99.99 -100.0 -96.232 -12.56 MercadoLibre (MELI) Down 12% Since Last Earnings Report:
Can It Rebound?     It has been about a month since the last earnings report for MercadoLibre (NASDAQ:MELI). Sha
```

Improvement: Once the sentiment-news score file is obtained, introduce it in the predictive models together with the technical indicators, it must be done in real time.

Add balance sheets

Economic balances can be added easily using the yahoo API
https://github.com/ranaroussi/yfinance

```
# show financials
```

```
msft.financials
msft.quarterly_financials
```

These balances are updated every quarter.

You can get the dates of publication of results in yahoo API

```
# show next event (earnings, etc)
msft.calendar
# show all earnings dates
msft.earnings_dates
```

List of suggested improvements:

Allow to analyze stocks outside the nasdaq, change in :
`yhoo_history_stock.__select_dowload_time_config()`
`Utils/API_alphavantage_get_old_history.py`

Redirect remaining print() to Logger.logr.debug()

Translate through https://www.deepl.com/ the possible remaining messages in Spanish to English.

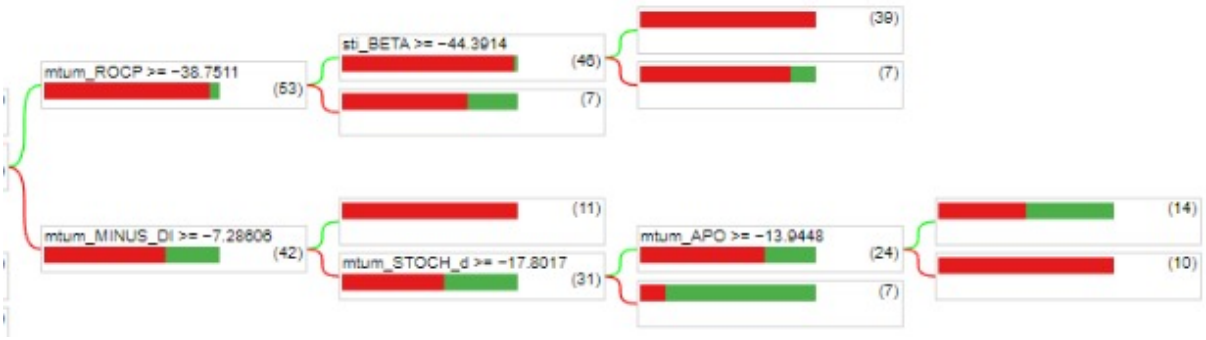
The plots generated in the *plots_relations/plot* folder by

Change the operation of the bot, that is enough to send the command \start, and remove the case of execution of `ztelegram_send_message_UptateUser.py` described in point: 5.2

Send real time email alert

Revise Stock prediction fail LSTM
LSTM time series + stock price prediction = FAI
https://www.kaggle.com/code/carlmcbrideellis/lstm-time-series-stock-price-prediction-fail

Find the explanation of what indicators and values the AI model takes, to predict what it predicts and give a small explanation-schema, for example random forest models if you can print the sequence that makes the prediction.
(green buy, red do not trade)
https://stackoverflow.com/questions/40155128/plot-trees-for-a-random-forest-in-python-with-scikit-learn



Indicator names:

```
Date        buy_sell_point      Open        High        Low         Close       Volume      per_Close   per_Volume          has_preMarket
            per_preMarket       olap_BBAND_UPPER        olap_BBAND_MIDDLE       olap_BBAND_LOWER        olap_BBAND_UPPER_crash
olap_BBAND_LOWER_crash          olap_BBAND_dif          olap_HT_TRENDLINE       olap_MIDPOINT           olap_MIDPRICE       olap_SAR
olap_SAREXT         mtum_ADX    mtum_ADXR   mtum_APO    mtum_AROON_down         mtum_AROON_up           mtum_AROONOSC       mtum_BOP
mtum_CCI    mtum_CMO    mtum_DX     mtum_MACD   mtum_MACD_signal        mtum_MACD_list          mtum_MACD_crash         mtum_MACD_ext
mtum_MACD_ext_signal            mtum_MACD_ext_list      mtum_MACD_ext_crash     mtum_MACD_fix           mtum_MACD_fix_signal
mtum_MACD_fix_list  mtum_MACD_fix_crash     mtum_MFI    mtum_MINUS_DI           mtum_MINUS_DM           mtum_MOM    mtum_PLUS_DI
mtum_PLUS_DM        mtum_PPO    mtum_ROC    mtum_ROCP   mtum_ROCR   mtum_ROCR100        mtum_RSI    mtum_STOCH_k        mtum_STOCH_d
            mtum_STOCH_kd       mtum_STOCH_crash        mtum_STOCH_Fa_k         mtum_STOCH_Fa_d         mtum_STOCH_Fa_kd
mtum_STOCH_Fa_crash mtum_STOCH_RSI_k    mtum_STOCH_RSI_d        mtum_STOCH_RSI_kd       mtum_STOCH_RSI_crash        mtum_TRIX
mtum_ULTOSC         mtum_WILLIAMS_R     volu_Chaikin_AD         volu_Chaikin_ADOSC      volu_OBV    vola_ATR    vola_NATR   vola_TRANGE
            cycl_DCPERIOD       cycl_DCPHASE        cycl_PHASOR_inph        cycl_PHASOR_quad        cycl_SINE_sine      cycl_SINE_lead
            cycl_HT_TRENDMODE   cdl_2CROWS          cdl_3BLACKCROWS         cdl_3INSIDE         cdl_3LINESTRIKE     cdl_3OUTSIDE
            cdl_3STARSINSOUTH   cdl_3WHITESOLDIERS  cdl_ABANDONEDBABY        cdl_ADVANCEBLOCK        cdl_BELTHOLD        cdl_BREAKAWAY
            cdl_CLOSINGMARUBOZU cdl_CONCEALBABYSWALL        cdl_COUNTERATTACK       cdl_DARKCLOUDCOVER  cdl_DOJI    cdl_DOJISTAR
            cdl_DRAGONFLYDOJI   cdl_ENGULFING       cdl_EVENINGDOJISTAR cdl_EVENINGSTAR     cdl_GAPSIDESIDEWHITE
cdl_GRAVESTONEDOJI  cdl_HAMMER          cdl_HANGINGMAN      cdl_HARAMI          cdl_HARAMICROSS     cdl_HIGHWAVE
cdl_HIKKAKE         cdl_HIKKAKEMOD      cdl_HOMINGPIGEON    cdl_IDENTICAL3CROWS cdl_INNECK          cdl_INVERTEDHAMMER
cdl_KICKING         cdl_KICKINGBYLENGTH cdl_LADDERBOTTOM    cdl_LONGLEGGEDDOJI  cdl_LONGLINE        cdl_MARUBOZU
cdl_MATCHINGLOW     cdl_MATHOLD         cdl_MORNINGDOJISTAR cdl_MORNINGSTAR     cdl_ONNECK          cdl_PIERCING
cdl_RICKSHAWMAN     cdl_RISEFALL3METHODS        cdl_SEPARATINGLINES cdl_SHOOTINGSTAR    cdl_SHORTLINE       cdl_SPINNINGTOP
            cdl_STALLEDPATTERN  cdl_STICKSANDWICH   cdl_TAKURI         cdl_TASUKIGAP       cdl_THRUSTING       cdl_TRISTAR
            cdl_UNIQUE3RIVER    cdl_UPSIDEGAP2CROWS cdl_XSIDEGAP3METHODS        sti_BETA    sti_CORREL          sti_LINEARREG
            sti_LINEARREG_ANGLE sti_LINEARREG_INTERCEPT         sti_LINEARREG_SLOPE sti_STDDEV          sti_TSF     sti_VAR
ma_DEMA_5 ma_EMA_5  ma_KAMA_5 ma_SMA_5  ma_T3_5   ma_TEMA_5 ma_TRIMA_5          ma_WMA_5    ma_DEMA_10          ma_EMA_10
ma_KAMA_10          ma_SMA_10 ma_T3_10  ma_TEMA_10          ma_TRIMA_10         ma_WMA_10 ma_DEMA_20          ma_EMA_20
ma_KAMA_20          ma_SMA_20 ma_T3_20  ma_TEMA_20          ma_TRIMA_20         ma_WMA_20 ma_DEMA_50          ma_EMA_50
ma_KAMA_50          ma_SMA_50 ma_T3_50  ma_TEMA_50          ma_TRIMA_50         ma_WMA_50 ma_DEMA_100         ma_EMA_100
            ma_KAMA_100         ma_SMA_100          ma_T3_100 ma_TEMA_100         ma_TRIMA_100        ma_WMA_100
trad_s3   trad_s2   trad_s1   trad_pp   trad_r1   trad_r2   trad_r3   clas_s3   clas_s2   clas_s1   clas_pp   clas_r1
clas_r2   clas_r3   fibo_s3   fibo_s2   fibo_s1   fibo_pp   fibo_r1   fibo_r2   fibo_r3   wood_s3   wood_s2   wood_s1
wood_pp   wood_r1   wood_r2   wood_r3   demark_s1 demark_pp demark_r1 cama_s3   cama_s2   cama_s1   cama_pp   cama_r1
cama_r2   cama_r3   ti_acc_dist         ti_chaikin_10_3     ti_choppiness_14    ti_coppock_14_11_10 ti_donchian_lower_20
            ti_donchian_center_20       ti_donchian_upper_20        ti_ease_of_movement_14      ti_force_index_13
ti_hma_20 ti_kelt_20_lower  ti_kelt_20_upper    ti_mass_index_9_25  ti_supertrend_20    ti_vortex_pos_5     ti_vortex_neg_5
            ti_vortex_pos_14    ti_vortex_neg_14    cycl_EBSW_40_10     mtum_AO_5_34        mtum_BIAS_SMA_26    mtum_AR_26
            mtum_BR_26          mtum_CFO_9          mtum_CG_10          mtum_CTI_12         mtum_DMP_14         mtum_DMN_14
            mtum_ER_10          mtum_BULLP_13       mtum_BEARP_13       mtum_FISHERT_9_1    mtum_FISHERTs_9_1
mtum_INERTIA_20_14  mtum_K_9_3          mtum_D_9_3          mtum_J_9_3          mtum_PGO_14         mtum_PSL_12
mtum_PVO_12_26_9    mtum_PVOh_12_26_9   mtum_PVOs_12_26_9   mtum_QQE_14_5_4236_RSIMA    mtum_QQEl_14_5_4236
mtum_QQEs_14_5_4236 mtum_RSX_14         mtum_STC_10_12_26_05        mtum_STCmacd_10_12_26_05    mtum_STCstoch_10_12_26_05
            mtum_SMI_5_20_5     mtum_SMIs_5_20_5    mtum_SMIo_5_20_5    olap_ALMA_10_60_085 olap_HWMA_02_01_01  olap_JMA_7_0
            olap_MCGD_10        olap_PWMA_10        olap_SINWMA_14      olap_SSF_10_2       olap_SWMA_10        olap_VMAP
olap_VWMA_10        perf_CUMLOGRET_1    perf_CUMPCTRET_1    perf_z_30_1         perf_ha     sti_ENTP_10         sti_KURT_30
            sti_TOS_STDEVALL_LR sti_TOS_STDEVALL_L_1        sti_TOS_STDEVALL_U_1        sti_TOS_STDEVALL_L_2
sti_TOS_STDEVALL_U_2        sti_TOS_STDEVALL_L_3        sti_TOS_STDEVALL_U_3        sti_ZS_30 tend_LDECAY_5
tend_PSARl_002_02   tend_PSARs_002_02   tend_PSARaf_002_02   tend_PSARr_002_02   tend_VHF_28         vola_HWM    vola_HWU
vola_HWL    vola_KCLe_20_2      vola_KCBe_20_2      vola_KCUe_20_2      vola_RVI_14         vola_THERMO_20_2_05
vola_THERMOma_20_2_05       vola_THERMOl_20_2_05        vola_THERMOs_20_2_05        vola_TRUERANGE_1    vola_UI_14
            volu_EFI_13         volu_NVI_1          volu_PVI_1          volu_PVOL volu_PVR  volu_PVT    mtum_murrey_math
mtum_td_seq         mtum_td_seq_sig     tend_hh     tend_hl     tend_ll     tend_lh     tend_hh_crash       tend_hl_crash
tend_ll_crash       tend_lh_crash       ichi_tenkan_sen     ichi_kijun_sen      ichi_senkou_a       ichi_senkou_b
ichi_isin_cloud     ichi_crash          ichi_chikou_span    tend_renko_TR       tend_renko_ATR      tend_renko_brick
tend_renko_change   pcrh_trad_s3        pcrh_trad_s2        pcrh_trad_s1        pcrh_trad_pp        pcrh_trad_r1
pcrh_trad_r2        pcrh_trad_r3        pcrh_clas_s3        pcrh_clas_s2        pcrh_clas_s1        pcrh_clas_pp
pcrh_clas_r1        pcrh_clas_r2        pcrh_clas_r3        pcrh_fibo_s3        pcrh_fibo_s2        pcrh_fibo_s1
pcrh_fibo_pp        pcrh_fibo_r1        pcrh_fibo_r2        pcrh_fibo_r3        pcrh_wood_s3        pcrh_wood_s2
pcrh_wood_s1        pcrh_wood_pp        pcrh_wood_r1        pcrh_wood_r2        pcrh_wood_r3        pcrh_demark_s1
pcrh_demark_pp      pcrh_demark_r1      pcrh_cama_s3        pcrh_cama_s2        pcrh_cama_s1        pcrh_cama_pp
pcrh_cama_r1        pcrh_cama_r2        pcrh_cama_r3        mcrh_DEMA_5_DEMA_10 mcrh_DEMA_5_EMA_10  mcrh_DEMA_5_KAMA_10
mcrh_DEMA_5_SMA_10  mcrh_DEMA_5_T3_10   mcrh_DEMA_5_TEMA_10  mcrh_DEMA_5_TRIMA_10        mcrh_DEMA_5_WMA_10
```

```
mcrh_DEMA_5_DEMA_20 mcrh_DEMA_5_EMA_20  mcrh_DEMA_5_KAMA_20 mcrh_DEMA_5_SMA_20  mcrh_DEMA_5_T3_20   mcrh_DEMA_5_TEMA_20
mcrh_DEMA_5_TRIMA_20          mcrh_DEMA_5_WMA_20  mcrh_DEMA_5_DEMA_50 mcrh_DEMA_5_EMA_50  mcrh_DEMA_5_KAMA_50
mcrh_DEMA_5_SMA_50  mcrh_DEMA_5_T3_50   mcrh_DEMA_5_TEMA_50 mcrh_DEMA_5_TRIMA_50          mcrh_DEMA_5_WMA_50
mcrh_DEMA_5_DEMA_100          mcrh_DEMA_5_EMA_100 mcrh_DEMA_5_KAMA_100          mcrh_DEMA_5_SMA_100 mcrh_DEMA_5_T3_100
mcrh_DEMA_5_TEMA_100          mcrh_DEMA_5_TRIMA_100         mcrh_DEMA_5_WMA_100 mcrh_DEMA_5_ti_h20  mcrh_EMA_5_DEMA_10
mcrh_EMA_5_EMA_10   mcrh_EMA_5_KAMA_10  mcrh_EMA_5_SMA_10   mcrh_EMA_5_T3_10    mcrh_EMA_5_TEMA_10  mcrh_EMA_5_TRIMA_10
mcrh_EMA_5_WMA_10   mcrh_EMA_5_DEMA_20  mcrh_EMA_5_EMA_20   mcrh_EMA_5_KAMA_20  mcrh_EMA_5_SMA_20   mcrh_EMA_5_T3_20
mcrh_EMA_5_TEMA_20  mcrh_EMA_5_TRIMA_20 mcrh_EMA_5_WMA_20   mcrh_EMA_5_DEMA_50  mcrh_EMA_5_EMA_50   mcrh_EMA_5_KAMA_50
mcrh_EMA_5_SMA_50   mcrh_EMA_5_T3_50    mcrh_EMA_5_TEMA_50  mcrh_EMA_5_TRIMA_50 mcrh_EMA_5_WMA_50   mcrh_EMA_5_DEMA_100
mcrh_EMA_5_EMA_100  mcrh_EMA_5_KAMA_100 mcrh_EMA_5_SMA_100  mcrh_EMA_5_T3_100   mcrh_EMA_5_TEMA_100 mcrh_EMA_5_TRIMA_100
          mcrh_EMA_5_WMA_100  mcrh_EMA_5_ti_h20   mcrh_KAMA_5_DEMA_10 mcrh_KAMA_5_EMA_10  mcrh_KAMA_5_KAMA_10
mcrh_KAMA_5_SMA_10  mcrh_KAMA_5_T3_10   mcrh_KAMA_5_TEMA_10 mcrh_KAMA_5_TRIMA_10          mcrh_KAMA_5_WMA_10
mcrh_KAMA_5_DEMA_20 mcrh_KAMA_5_EMA_20  mcrh_KAMA_5_KAMA_20 mcrh_KAMA_5_SMA_20  mcrh_KAMA_5_T3_20   mcrh_KAMA_5_TEMA_20
mcrh_KAMA_5_TRIMA_20          mcrh_KAMA_5_WMA_20  mcrh_KAMA_5_DEMA_50 mcrh_KAMA_5_EMA_50  mcrh_KAMA_5_KAMA_50
mcrh_KAMA_5_SMA_50  mcrh_KAMA_5_T3_50   mcrh_KAMA_5_TEMA_50 mcrh_KAMA_5_TRIMA_50          mcrh_KAMA_5_WMA_50
mcrh_KAMA_5_DEMA_100          mcrh_KAMA_5_EMA_100 mcrh_KAMA_5_KAMA_100          mcrh_KAMA_5_SMA_100 mcrh_KAMA_5_T3_100
mcrh_KAMA_5_TEMA_100          mcrh_KAMA_5_TRIMA_100         mcrh_KAMA_5_WMA_100 mcrh_KAMA_5_ti_h20  mcrh_SMA_5_DEMA_10
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mcrh_WMA_50_TEMA_100           mcrh_WMA_50_TRIMA_100         mcrh_WMA_50_WMA_100 mcrh_WMA_50_ti_h20  mcrh_DEMA_100_ti_h20
          mcrh_EMA_100_ti_h20 mcrh_KAMA_100_ti_h20          mcrh_SMA_100_ti_h20 mcrh_T3_100_ti_h20  mcrh_TEMA_100_ti_h20
          mcrh_TRIMA_100_ti_h20         mcrh_WMA_100_ti_h20 NQ_Close  NQ_Volume NQ_per_Close        NQ_per_Volume
NQ_SMA_20 NQ_SMA_100
```