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## **PYTHON FOR FINANCE** **INDIVIDUAL PROJECT**

The model that I have chosen is a simple trading concept based on a combination of trend detection using Exponential Moving Average (EMA) and point pivot identification. In this project, we will code the change of character indicator (the change of pattern) and automate this detection (indicator) in Python.

The data used is historical EUR/USD hourly candlestick data between 2003 up to 2023, loaded from a CSV file. It includes 6 columns : the gmt time, the opening price, the highest price, the lowest price, the close price and the volume. I also used the pandas technical analysis package to compute the RSI and the EMA.

- **Trend Detection (EMASignal):** The model identifies trends in the market by analyzing whether the current price is above or below a 150-period Exponential Moving Average (EMA).
- **Relative Strength Index (RSI):** The model calculates the RSI to measures the speed and change of price movements. RSI values above 70 may indicate overbought conditions, while values below 30 may suggest oversold conditions.

Then with the model, we will look for points (**Point Pivot Identification 'isPivot'**) where the price forms pivot highs or lows within a specified window. To have a simpler and clearer document, I cut part of the data frame using only 5000 candles (to take less time for the calculation part). The interpretation of the model results can be summarized as follows:

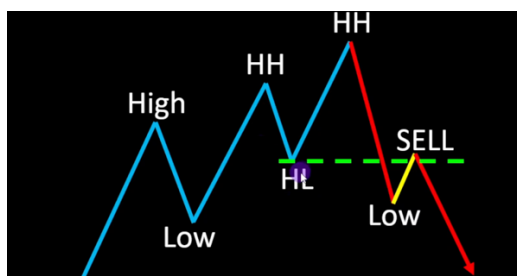
- The first thing is that we will try to detect a trend using the moving average (EMA signal). I use 15 backcandles to predict a trend:
  - If the 15 consecutive candles before the current candle are above the moving average curve, it is an uptrend (EMA signal equals to 2)
  - If the 15 consecutive candles before the current candle are below the moving average curve, it is a downtrend (EMA signal equals to 1)
  - None of these two trends (EMA signal equals to 3)
- The second function I am using is the function called **'isPivot'** (purple points) to detect if a current candle is a pivot point (high or low):
  - If it is a pivot point high, the function will return 1
  - If it is a pivot point low, the function will return 2
  - In any other case, the function will return 0

To subsequently display the trade graph with candles between [4700:4850] :



- Then, thanks to these two functions we will try to detect two different trends (patterns). The model includes a function for detecting specific price patterns or structures within the data. The patterns are identified based on the arrangement of pivot highs and lows, as well as the magnitude of price movements :

**Pattern 1:** High -> Low -> Higher high -> Higher low -> Higher high -> Sudden low



**Pattern 2:** High -> Low -> Higher high -> Higher low -> Lower high -> Low



Thanks to this function, we can print the rows (candles) where the signal is detected:

	Gmt time		volume	RSI	EMA
376	26.05.2003	13:00:00.000	2.681580e+07	60.322705	1.168325
377	26.05.2003	14:00:00.000	2.690430e+07	73.569795	1.168536
532	04.06.2003	02:00:00.000	2.971090e+07	46.771502	1.175323
533	04.06.2003	03:00:00.000	2.704670e+07	46.578694	1.175282
534	04.06.2003	04:00:00.000	2.887820e+07	47.615243	1.175244
535	04.06.2003	05:00:00.000	2.654940e+07	43.284098	1.175193
536	04.06.2003	06:00:00.000	3.082760e+07	41.616369	1.175137
{...}					
4459	19.01.2004	23:00:00.000	3.279120e+07	37.633569	1.255741
4460	20.01.2004	00:00:00.000	3.167560e+07	45.023142	1.255483
4461	20.01.2004	01:00:00.000	3.622670e+07	49.263696	1.255239
4779	06.02.2004	07:00:00.000	3.242360e+07	50.153622	1.252532
4780	06.02.2004	08:00:00.000	3.099260e+07	45.758914	1.252557
4781	06.02.2004	09:00:00.000	3.078080e+07	34.951622	1.252539
4782	06.02.2004	10:00:00.000	3.223150e+07	42.437307	1.252543
4783	06.02.2004	11:00:00.000	3.270460e+07	39.178786	1.252533

We can take the first signal detected (considering that I am plotting the values between 4700 and 4850) which is the candle 4779 and we can see that it represents the **second pattern**:



➔ Here it was a false signal because after this signal there is a green long candle but the code is working properly.

To conclude, this comprehensive model incorporates trend analysis and pivot point identification to have a deeper understanding of market dynamics. Further adjustments and optimizations can be made based on the specific requirements of a trading strategy.