|  |  |
| --- | --- |
| **Strategy** | **Status** |
| **gl\_fcpo\_d\_000001\_v0\_Single** | **Y** |
| **gl\_fcpo\_d\_000003\_v0\_Outsample** | **Y** |
| **gl\_fcpo\_d\_000007\_v0\_Single\_Bracket** | **Y** |
| **gl\_fcpo\_d\_000014\_v0\_Single** | **Y** |
| **Gl\_fcpo\_d\_000006\_v0\_single\_stochastic** | **Y** |
| **gl\_fcpo\_d\_000006\_v0\_BracketOrderstochastic** | **Y** |
| **gl\_fcpo\_d\_000013\_v1\_Single** | **Y** |
| **gl\_fcpo\_d\_000001\_v0\_BracketOrder** | **Y** |
| **gl\_fcpo\_d\_000015\_v0\_Multiple** | **Y** |
| **gl\_fcpo\_d\_000011\_v0\_Single** | **Y** |
| **gl\_fcpo\_d\_000009\_v0\_Single** | **Y** |
| **Gl\_fcpo\_d\_000003\_v0\_single** | **Y** |
| **gl\_fcpo\_d\_000007\_v0\_Single** | **Y** |
| **gl\_fcpo\_d\_000003\_v0\_BracketOrde\_SG** | **Y** |
| **Gl\_fcpo\_d\_000003\_v0\_single\_outsample** | **Y** |
|  |  |

**Abbreviations:**

Long Profit target: lpt

Long Stop Loss: lsl

Long Trailing Target: ltt

Short Profit Target: spt

Short Stop Loss: ssl

Short Trailing Target: stt

**Data:** FCPO

**Format:** Open, High, Low, Close, Volume

**Dates:**1st Jan 2000 to 07th March 2019

**Total strategies:** 15

**Investment per strategy:** 20,000

**Total investment:** 300,000 (20,000 \* 15)

**Long Profit target:**ltp

**Long Stop Loss:**lsl

**Long Trailing target**: ltt

**Short Profit target:**spt

**Short Stop Loss:**ssl

**Short Trailing target:**stt

1. **GL\_FCPO\_D\_000001-V0-Single**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**1.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| he | Hurst exponent is calculated for last 20 bars | [2, +∞) |
|  |  |  |

* 1. **Long Entry and Exit Criteria**
     1. **Long Entry**

All conditions must be fulfilled:

1. Current bar Hurst Exponent greater than last bar Hurst Exponent, and
2. Last bar Hurst Exponent greater than two days prior Hurst Exponent, and
3. Current bar high less than last bar high, and
4. Current bar low greater than last bar low, and
5. Current bar Close higher than Current bar Open

.

* + 1. **Long exit:**

**Pattern**

Current Hurst exponent is greater than last bar hurst exponent, and

Last bar Hurst exponent is greater than two days prior hurst exponent, and

Current bar high should be less than previous bar high, and

Current bar low should be greater than last bar low, in combination with close has

to be less than open

**OR**

**profit target:** Price crosses above the profit target

OR

**stop loss:** Price crosses below the stop loss

**OR**

**trailing targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**
     1. **Short Entry:**

Current Hurst exponent is greater than last bar Hurst exponent, and

Last bar hurst exponent is greater than two days prior hurstexponent, and

Current bar high should be less than previous bar high,and

Current bar low should be greater than last bar low, in combination with close has to be less than open

* + 1. **Short pattern exit:**

Current Hurst exponent is greater than last bar Hurst exponent, and

Last bar Hurst exponent is greater than two days prior Hurst Exponent, and

Current bar high should be less than previous barhigh,and

Current bar low should be greater than last bar low, in combination with close has to be greater than open

OR

**Short profit target:**Price crosses below the profit target

**OR**

**Short stop loss:**Price crosses above the stop loss

**OR**

**Short trailing targets:**Price crosses above the trailing target

**1.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Hurst exponent | he | 20 bars |

**1.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator Hurst Exponent in range [6,49].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Hurst exponent | he | Grid search | [6, 49] |

1. **gl\_fcpo\_d\_000003\_v0\_Outsample**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

* 1. **Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| he | Hurst exponent is calculated for last 20 bars | [2,+∞) |
| di | Directional Movement | [2,+∞) |

* 1. **Long Entry and Exit Criteria**
     1. **Long Entry:**

Current Directional Movement +DI is greater than current Directional Movement +DI, and

Current data close us greater than current data open

* + 1. **Long Exit :**

Current Directional Movement +DI less than current Directional Movement -DI

OR

**Long Profit Target:** Price crosses above the profit target

OR

**Long Stop Loss:** Price crosses below the stop loss

OR

**Long Trailing Targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**
     1. **Short Entry:**

Current Directional Movement +DI is less than current Directional Movement +DI, and

Current data close us less than current data open

* + 1. **Short pattern exit:**

Current Directional Movement +DI greater than current Directional Movement -DI

**Short Profit Target:**Price crosses below the profit target

OR

**Short Stop Loss:**Price crosses above the stop loss

OR

**Short Trailing Targets:**Price crosses above the trailing target

**2.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Hurst exponent | he | 20 bars |
| Directional Movement | di | 32 bars |

**2.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator Hurst Exponent in range [6,39] and Directional Movement in range [6,39].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Directional Movement | di | Grid search | [6, 39] |
| Hurst exponent | He | Grid search | [6, 39] |

1. **gl\_fcpo\_d\_000007\_v0\_Single\_Bracket**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

* 1. **Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| bb | Bollinger Bands for last 10 bars | [2, +­∞) |
| macdhist | MACD histogram for period\_me1=12,period\_me2 = 30,period\_signal=12) | [2, +­∞), [2, +­∞), [2, +­∞) |

* 1. **Long Entry and Exit Criteria**
     1. **Long Entry:**

Current day high is greater than current day BB top, and

Previous day high is greater than the previous day BB top , and

Current day close greater than current day open, and

Previous day close greater than previous day open

**3.2.2 Long Exit :**

Current day MACD histogram is greater than previous day MACD histogram,and

Previous day Histogram is greater than max MACD histogram

**Long profit target:** Price crosses above the profit target

OR

**Long stop loss:** Price crosses below the stop loss

OR

**Long trailing targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**

**3.3.1 Short Entry:**

Current day high is less than current day BB top, and

Previous day high is less than previous day BB top , and

Current day closeless than current day open, and

Previous day close less than previous day open

**3.3.2 Short pattern exit:**

Current day MACD Hist is greater than previous day MACD histogram, and

Previous day Histogram is less than min MACD histogram

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**3.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 %(Applicable only for pattern Entry) |
| Long Stop Loss | lsl | 3%(Applicable only for pattern Entry) |
| Long Trailing target: | ltt | 3%(Applicable only for pattern Entry) |
| Short Profit target: | spt | 10%(Applicable only for pattern Entry) |
| Short Stop Loss: | ssl | 3%(Applicable only for pattern Entry) |
| Short Trailing target | stt | 3%(Applicable only for pattern Entry) |
| Bollinger Band | bb | 3 |
| MACD Histogram | macdhist | macd=12,26,9 |

**3.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator Bollinger Band in range [3, 18] and MACD Histogram in range [6,18], [6,28], [6,18].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Bollinger Band | bb | Grid search | [ 3, 18] |
| MACD Histogram | macdhist | Grid search | Period\_me1 = 6, 18  Period\_me2 = 6, 28  Period\_sig = 6, 18 |

**Strategy 4:gl\_fcpo\_d\_000014\_v0\_Single**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**4.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| sma5 | 5 day simple moving average of daily close price for last five days | [2, +­∞) |
| sma20 | 20 days simple moving average of daily close price for last 20 days | [2, +­∞) |
| smaco | Cross over of faster moving average and slower moving average  -1: faster moving average crosses slower moving average upwards  0:  1: faster moving average crosses slower moving average downwards | {-1, 0, 1} |
| HeikinAsh | HeikinAshi |  |
| macdhist | MACD histogram for period\_me1=9,period\_me2 = 20,period\_signal=9) |  |
| bb | Bollinger Band |  |

* 1. **Long Entry and Exit Criteria**

**4.2.1 Long Entry:**

Current day HeikinAshi is greater than current day open , and

Previous day HeikinAshi is greater than previous day close , and

Current day difference of HeikinAshi high greater than current day open , and

Previous day close greater than previous day open

**4.2.2 Long Exit :**

Current day MACD Histogram is greater than previous day MACD histogram , and

Previous day Histogram is greater than max MACD histogram

**Long profit target:** Price crosses above the profit target

OR

**Long stop loss:** Price crosses below the stop loss

OR

**Long trailing targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**

**4.3.1 Short Entry:**

Current day high is less than current day BB top , and

Previous day high is less than previous day BB top , and

Current day closeless than current day open , and

Previous day close less than previous day open

**4.3.2 Short pattern exit:**

Current day MACD histogram is greater than previous day MACD histogram , and

Previous day Histogram is less than min MACD histogram

**Short Profit Target:**Price crosses below the profit target

OR

**Short Stop Loss:**Price crosses above the stop loss

OR

**Short trailing Targets:**Price crosses above the trailing target

**4.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| MACD Histogram | Macdhist | macd=3,20,5 |
| SMA5, SMA25 |  | 3, 12 |
|  |  |  |

**4.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Faster moving average for 5 and 25 days in range [3,18] & [6,18] respectively.

Using HeikinAshi with default parameters, MACD Histogram in range [6,18], [6,28] &[6,18] and

Bollinger Band in range [3,18].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Faster moving average | sma5 | Grid search | [3,17] |
| Faster moving average | Sma25 | Grid search | [6,17] |
| HeikinAshi | HeikinAshi | Grid search |  |
| MACD Histogram | macdhist | Grid search | Period\_me1 = [3, 17]  Period\_me2 = [6, 28]  Period\_sig = [3, 19] |
|  |  |  |  |

1. **Gl\_fcpo\_d\_000006\_v0\_single\_stochastic**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**5.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| stoc | Stochastic Full | [2, +­∞) |

* 1. **Long Entry and Exit Criteria**

**5.2.1 Long Entry:**

Current Stochastic %K line is less than Stochastic %D line , and

Current day close is greater than the previous day close, and

Current day high is greater than the previous day high , and

Current day low is greater than previous day low

**5.2.2 Long Exit :**

Current dayStochastic %K line is greater than current day Stochastic %D line , and

Current day close is less that current day open

**Long profit target:** Price crosses above the profit target

OR

**Long stop loss:** Price crosses below the stop loss

OR

**Long trailing targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**

**5.3.1 Short Entry:**

Current Stochastic %K line is greater than Stochastic %D line, and

Current day close is less than the previous day close , and

Current day high is less than the previous day high and current day low is less than previous day low

**5.3.2 Short pattern exit:**

Current day Stochastic %K line is less than current day Stochastic %D line , and

Current day close is greater than current day open

**Short Profit Target:**Price crosses below the profit target

OR

**Short Stop Loss:**Price crosses above the stop loss

OR

**Short Trailing Targets:** Price crosses above the trailing target

**5.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Stochastic Full | stoc | Default |

**5.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Stochastic Full and Directional Movement with default values.

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Stochastic Full | stoc |  |  |

1. **gl\_fcpo\_d\_000006\_v0\_BracketOrderstochastic**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**6.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| stoc | Stochastic Full | [2,+∞) |

**6.2 Long Entry and Exit Criteria**

**6.2.1 Long Entry:**

Current Stochastic %K line is less than Stochastic %D line, and

Current day close is greater than the previous day close, current day high is greater than the previous day high, and

Current day low is greater than previous day low

**6.2.2 Long Exit :**

Current dayStochastic %K line is greater than current day Stochastic %D line

**Long Profit Target:** Price crosses above the profit target

OR

**Long Stop Loss:** Price crosses below the stop loss

OR

**Long Trailing Targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**

**6.3.1 Short Entry:**

Current Stochastic %K line is greater than Stochastic %D line , and

Current day close is less than the previous day close, and

Current day high is less than the previous day high , and

Current day low is less than previous day low

**6.3.2 Short pattern exit:**

Current dayStochastic %K line is less than current day Stochastic %D line, and

Current day close is greater than current day open

**Short Profit Target:**Price crosses below the profit target

OR

**Short Stop Loss:**Price crosses above the stop loss

OR

**Short Trailing Targets:**Price crosses above the trailing target

**6.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % (Applicable only for pattern Entry) |
| Long Stop Loss | lsl | 3%(Applicable only for pattern Entry) |
| Long Trailing target: | ltt | 3%(Applicable only for pattern Entry) |
| Short Profit target: | spt | 10%(Applicable only for pattern Entry) |
| Short Stop Loss: | ssl | 3%(Applicable only for pattern Entry) |
| Short Trailing target | stt | 3%(Applicable only for pattern Entry) |
| Stochastic | stoc | default |

**6.5 Parameter Optimization**

No parameter optimized in this algorithm

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Stochastic | stoc |  |  |

1. **gl\_fcpo\_d\_000013\_v1\_Single**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**7.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| macdhist | MACD Histogram for period\_me1=3,period\_me2=12,period\_signal=7 | [2,+∞) |
| Highest  Lowest | Highest  Lowest | [2,+∞)  [2,+∞) |

**7.2 Long Entry and Exit Criteria**

**7.2.1 Long Entry:**

Difference of 38 crossover equal to 1 and current high greater than previous high Previous high is greater than previous to previous day high , and

Current day MACD histogram greater than current day MACD histogram signal line.

**7.2.2 Long Exit:**

Current day close greater than previous day highest

**Long Profit Target:** Price crosses above the profit target

OR

**Long Stop Loss:** Price crosses below the stop loss

OR

**Long Trailing Targets:** Price crosses below the trailing target

**7.3 Short Entry and Exit Criteria**

**7.3.1 Short Entry:**

Difference of 61 crossover equal to 1 and current high less than previous high, and

Previous high is less than previous to previous day high , and

Current day MACD histogram less than current day MACD histogram signal line.

**7.3.2 Short Entry:**

Current close is less than the previous lowest

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**7.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Simple moving average | sma5 | 5 bars |
|  |  |  |
| Simple moving average crossover | smaco |  |
| MACD Histogram | macdhist | period\_me1=3,period\_me2=12,period\_signal=7 |
| Highest  Lowest | Highest  Lowest | Period\_high = 7  Period\_low = 4 |

**7.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

MACD Histogram in range [3,18], [5,20] & [5,16] and differences of Highest and lowest for 38 days in range [5,18], [4,18].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Highest Period  Lowest Period | period\_high  period\_low | Grid search | Period\_high = [5, 18]  Period\_low = [4, 18] |
| MACD Histogram | macdhist | Grid search | Period\_me1 = [3, 18]  Period\_me2 = [5, 20]  Period\_sig = [5, 16] |

1. **gl\_fcpo\_d\_000001\_v0\_BracketOrder**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**8.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| sma5 | 5 day simple moving average of daily close price for last five days | [2, +­∞) |
| sma20 | 20 days simple moving average of daily close price for last 20 days | [2, +­∞) |
| smaco | Cross over of faster moving average and slower moving average  -1: faster moving average crosses slower moving average upwards  0:  1: faster moving average crosses slower moving average downwards | {-1, 0, 1} |
| he | Hurst exponent is calculated for last 20 bars | [2, +­∞) |
|  |  |  |

* 1. **Long Entry and Exit Criteria**
     1. **Long Entry :**

Current day Hurst Exponent is greater than 0.4 , and

Day close is greater than day open.

* + 1. **Long Exit :**

SMA crossover less than 0

**Long Profit Target:** Price crosses above the profit target

OR

**Long Stop Loss:** Price crosses below the stop loss

OR

**Long Trailing Targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**
     1. **Short Entry**

Current day Hurst Exponent is greater than 0.4 , and

Day close is less than day open.

* + 1. **Short pattern exit:**

Then SMA crossover greater than 0

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**8.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 %(Applicable only for pattern Entry) |
| Long Stop Loss | lsl | 3%(Applicable only for pattern Entry) |
| Long Trailing target: | ltt | 3%(Applicable only for pattern Entry) |
| Short Profit target: | spt | 10%(Applicable only for pattern Entry) |
| Short Stop Loss: | ssl | 3%(Applicable only for pattern Entry) |
| Short Trailing target | stt | 3%(Applicable only for pattern Entry) |
| Simple moving average | sma5 | 15 bars |
| Simple moving average | Sma25 | 20 bars |
| Simple moving average crossover | smaco |  |
| Hurst exponent | he | 32 bars |

**8.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Hurst Exponent in range [6,38] and Faster moving average range [6,18].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Faster moving average | sma5 | Grid search | [6,18] |
| Faster moving average | Sma25 | Grid search | [6,28] |
| Hurst exponent | he | Grid Search | [6, 38] |

**Strategy 9:gl\_fcpo\_d\_000015\_v0\_Multiple**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**9.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| sma5 | 5 day simple moving average of daily close price for last five days | [2, +­∞) |
| sma20 | 20 days simple moving average of daily close price for last 20 days | [2, +­∞) |
| he | Hurst exponent is calculated for last 20 bars | [2, +­∞) |
|  |  |  |

* 1. **Long Entry and Exit Criteria**
     1. **Long Entry**

Current day Hurst Exponent is greater than 0.5 , and

Current day simple moving average of period 5 is greater than current day simple moving average of period 25.

**9.2.2 Long pattern Exit :**

Current day Hurst Exponent less than previous day Hurst Exponent, and

Previous day Hurst Exponent is less than maximum Hurst Exponent, and

Current day close is greater than current day open.

**Long profit target:** Price crosses above the profit target

OR

**Long stop loss:** Price crosses below the stop loss

OR

**Long trailing targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**
     1. **Short Entry**
     2. Current day Hurst Exponent is greater than 0.4 , and

Current day simple moving average of period 5 is less than current day simple moving average of period 25.

* + 1. **Short Exit**

Current day Hurst Exponent greater than previous day Hurst Exponent , and

Previous day Hurst Exponent is greater than maximum Hurst Exponent , and

Current day close is less than current day open.

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**9.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Simple moving average | sma5 | 5 bars |
| Simple moving average | Sma25 | 20 bars |
| Hurst exponent | he | 20bars |

**9.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Hurst Exponent in range [6,38] and Faster moving average range [5,20].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Faster moving average | sma5 | Grid search | [5,17] |
| Faster moving average | Sma25 | Grid search | [8,20] |
| Hurst exponent | he | Grid search | [6, 20] |

**Strategy 10:gl\_fcpo\_d\_000011\_v0\_Single**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**10.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| Highest | Indicator highest | [2,+∞) |
| Lowest | Lowest Indicator | [2,+∞) |
|  | self.diff = self.highest - self.lowest  self.diff236 = self.diff\*0.236  self.diff382 = self.diff\*0.382  self.diff50 = self.diff\*0.50  self.diff618 = self.diff\*0.618  self.diff764 = self.diff\*0.764  self.diff50co=btind.CrossOver(self.dataclose,self.highestself.diff50)  self.diff38co = btind.CrossOver(self.dataclose,self.highestself.diff382)  self.diff61co = btind.CrossOver(self.dataclose,self.highestself.diff618)  self.diff76co = btind.CrossOver(self.dataclose,self.highest-self.diff764) |  |
| Fibonacci Pivot Point | Fibonaci Pivot Point |  |
|  |  |  |
|  |  |  |

* 1. **Long Entry and Exit Criteria**

**10.2.1 Long Entry**

Variable number is zero, and

Difference of 38 crossover is equal to one then number will set to one.

Variable number is one and difference of current day high and low is less than the difference of previous day high and low and difference of current day high minus difference of current day highest and current day difference 382 is greater than difference of current day highest and current day difference of 382 minus current data low and current day close is greater than the previous day first resistance of Fibonacci pivot point.

**10.2.2 Long pattern Exit :**

Current data close is greater than the previous day highest

**Long profit target:** Price crosses above the profit target

OR

**Long stop loss:** Price crosses below the stop loss

OR

**Long trailing targets:** Price crosses below the trailing target

**10.3.1 Short Entry:**

Variable number is zero and difference of 61 crossover is equal to -1 then number will set to -1.

Variable number is -1 and difference of current day high and low is less than the difference of previous day high and low and difference of current day high minus difference of current day highest and current difference 618 is less than the difference of current day highest and current day difference of 618 minus current data low and current day close is less than the previous day first resistance of Fibonacci pivot point.

**10.3.2 Short pattern exit:**

Current data close is less than the previous day lowest

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**10.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Fibonaci Pivot Point |  | Default |
| Highest  Lowest | Highest  Lowest | 4,4 |  |

**10.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

differences of Highest and lowest for 38 days in range [6,18], [6,18] and Faster Moving Average in range [5,20].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
|  |  |  |  |
| Highest  Lowest | Highest  Lowest | Grid search | Period\_high = 4, 18  Period\_low = 4, 18 |

**Strategy 11:gl\_fcpo\_d\_000009\_v0\_Single**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**11.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| Highest | Indicator highest | [2,+∞) |
| Lowest | Lowest Indicator | [2,+∞) |
|  | self.diff = self.highest - self.lowest  self.diff236 = self.diff\*0.236  self.diff382 = self.diff\*0.382  self.diff50 = self.diff\*0.50  self.diff618 = self.diff\*0.618  self.diff764 = self.diff\*0.764 self.diff50co=btind.CrossOver(self.dataclose,self.highestself.diff50)  self.diff38co = btind.CrossOver(self.dataclose,self.highestself.diff382)  self.diff61co = btind.CrossOver(self.dataclose,self.highestself.diff618)  self.diff76co = btind.CrossOver(self.dataclose,self.highest-self.diff764) |  |
| RSI | RSI |  |
|  |  |  |

* 1. **Long Entry and Exit Criteria**

**11.2.1 Long Entry**

Variable number is zero , and

Difference of 38 crossover is equal to one then number will set to one.

Variable number is one and difference of current day high and low is less than the difference of previous day high and low and difference of current day high minus difference of current day highest and current difference 382 is greater than difference of current day highest and currentday difference of 382 minus current data low and current day RSI is less than 70

**11.2.2 Long pattern Exit :**

Current data close is greater than the previous day highest

**Long profit target:** Price crosses above the profit target

OR

**Long stop loss:** Price crosses below the stop loss

OR

**Long trailing targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**

**11.3.1 Short Entry:**

Variable number is zero , and

Difference of 61 crossover is equal to -1 then number will set to -1.

Variable number is -1 and difference of current day high and low is less than the difference of previous day high and low and difference of current day high minus difference of current day highest and current difference 618 is less than the difference of current day highest and current day difference of 618 minus current data low and current day RSI is greater than 30

**11.3.2 Short pattern exit:**

Current data close is less than the previous day lowest

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**11.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Highest/Lowest | Highest/Lowest | H=6,l=18 |
| RSI | RSI | rsi=18 |

**11.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Faster Moving Average in range [5,20] and RSI with range [6,28], [6,28] and [6,18].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
|  |  |  |  |
| Period\_highPeriod\_lowPeriod\_rsi | Period\_highPeriod\_lowPeriod\_rsi | Grid search | [6, 18]  [6, 28]  [6, 28] |

**Strategy 12:gl\_fcpo\_d\_000003\_v0\_single**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**12.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| sma5 | 5 day simple moving average of daily close price for last five days | [2, +­∞) |
| sma20 | 20 days simple moving average of daily close price for last 20 days | [2, +­∞) |
| smaco | Cross over of faster moving average and slower moving average  -1: faster moving average crosses slower moving average upwards  0:  1: faster moving average crosses slower moving average downwards | {-1, 0, 1} |
|  |  |  |
| ao | Awesome Oscillator for fast =12 and slow=26 |  |
| Aosma9/aosma12 | Simple moving average for AO | [6,12] |

* 1. **Long Entry and Exit Criteria**

**12.2.1 Long Entry:**

Current simple moving average crossover is greater than zero, and

Current day awesome oscillator is greater than current day awesome oscillator for period of 9 simple moving.

**12.2.2 Long pattern Exit :**

Current Awesome oscillator minus current awesome oscillator for period 9 simple moving average less than previous Awesome oscillator minus previous awesome oscillator for period 9 simple moving average , and

Previous Awesome oscillator minus previous awesome oscillator for period 9 simple moving average less than maximum awesome oscillator histogram.

**Long profit target:** Price crosses above the profit target

OR

**Long stop loss:** Price crosses below the stop loss

OR

**Long trailing targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**

**12.3.1 Short Entry:**

Current simple moving average crossover is less than zero, and

Current day awesome oscillator is less than current day awesome oscillator for period of 12 simple moving.

**12.3.2 Short pattern exit:**

Current Awesome oscillator minus current awesome oscillator for period 9 simple moving average greater than previous Awesome oscillator minus previous awesome oscillator for period 9 simple moving average , and

Previous Awesome oscillator minus previous awesome oscillator for period 9 simple moving average greater than maximum awesome oscillator histogram.

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**12.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Simple moving average | sma5 | 15 bars |
| Simple moving average | Sma25 | 17 bars |
| Awesome oscillator | ao | Ao=15,17  Aosma9=9  Aosma12=6 |
|  |  |  |

**12.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Awesome oscillator for range [6,12] and Faster Moving Average in range [6,15], [8,17].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Period\_sma5  Period\_sma25  Period\_fast  Period\_slow  Period\_aosma9  Period\_aosma12 | Period\_sma5  Period\_sma25  Period\_fast  Period\_slow  Period\_aosma9  Period\_aosma12 | Grid Search | 6, 15  8, 17  6, 18  8, 20  6, 12  6,12 |

**Strategy 13:gl\_fcpo\_d\_000007\_v0\_Single**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**13.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| bb | Bollinger Bands for period 10 | [2,+∞) |
|  |  |  |
| macdhist | MACD Histogram | [2,+∞) |

* 1. **Long Entry and Exit Criteria**

**13.2.1 Long Entry:**

Current bar high is greater than the current Bollinger Band top , and

Previous day high is greater than the previous day Bollinger band top , and

Current day close is greater than current day open , and

Previous day close is greater than the previous day open

**13.2.2 Long pattern Exit:**

Current day MACD histogram is less than previous day MACD histogram, and

Previous day MACD histogram is less than MAX MACD histogram

**Long profit target:** Price crosses above the profit target

OR

**Long stop loss:** Price crosses below the stop loss

OR

**Long trailing targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**

**13.3.1 Short Entry:**

Current bar high is less than the current Bollinger Band top, and

Previous day high is less than the previous day Bollinger band top, and

Current day close is less than current day open, and

Previous day close is less than the previous day open

**13.3.2 Short pattern Exit:**

Current day MACD histogram is greater than previous day MACD histogram, and

Previous day MACD histogram is greater than MAX MACD histogram

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**13.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| MACD | macd | macd=10,14,10 |
| Bollinger Band | bb | bb=18 |

**13.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Bollinger Band in range [6,18] and MACD histogram in range [6,18], [6,18] and [6,18].

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| MACD  Bollinger Band | Period\_me1 Period\_me2  Period\_sig  Period\_band | Grid search  Grid search | [6, 18]  [6, 18]  [6, 18]  [6, 18] |

**Strategy 14:gl\_fcpo\_d\_000003\_v0\_BracketOrde\_SG**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**14.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| sma5 | 5 day simple moving average of daily close price for last five days | [2, +­∞) |
| sma20 | 20 days simple moving average of daily close price for last 20 days | [2, +­∞) |
| smaco | Cross over of faster moving average and slower moving average  -1: faster moving average crosses slower moving average upwards  0:  1: faster moving average crosses slower moving average downwards | {-1, 0, 1} |
|  |  |  |
| MACD | MACD | [2, +­∞) |

**Long Entry:**

Current Simple Moving Average crossover is greater than zero , and

Current MACD line is greater than current single line.

.

**Long pattern Exit:**

Current MACD histogram is less than previous day MACD histogram, and

Previous day MACD histogram is less than MACD max Histogram

**Long Profit Target:** Price crosses above the profit target

OR

**Long Stop Loss:** Price crosses below the stop loss

OR

**Long Trailing Targets:** Price crosses below the trailing target

**Short Entry:**

Current histogram MACD line is less than current MACD histogram single line.

**Short pattern exit:**

Current MACD histogram is greater than previous day MACD histogram, and

Previous day MACD histogram is greater than MACD max Histogram

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**14.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % (Applicable only for pattern Entry) |
| Long Stop Loss | lsl | 3%(Applicable only for pattern Entry) |
| Long Trailing target: | ltt | 3%(Applicable only for pattern Entry) |
| Short Profit target: | spt | 10%(Applicable only for pattern Entry) |
| Short Stop Loss: | ssl | 3%(Applicable only for pattern Entry) |
| Short Trailing target | stt | 3%(Applicable only for pattern Entry) |
| Simple moving average | sma5 | 14bars |
| Simple moving average | Sma25 | 18 bars |
| Simple moving average crossover | smaco |  |
| MACD | Macd | default |

**14.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Faster moving average range [6,18] for last 5 days and Faster moving average range [8,20] for last 25 days.

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Period\_sma5 | Period\_sma5 | Grid search | [6, 18] |
| Period\_sma20 | Period\_sma20 | Grid search | [8, 20] |

**Strategy 15 :gl\_fcpo\_d\_000003\_v0\_single\_outsample**

**Overview:** This strategy is generating sell and buy signals on the basis of below mention indicators for short and long trades.

**15.1 Indicators**

|  |  |  |
| --- | --- | --- |
| Indicator | Description | Allowable Range |
| sma5 | 5 day simple moving average of daily close price for last five days | [2, +­∞) |
| sma25 | 25 days simple moving average of daily close price for last 25 days | [2, +­∞) |
| smaco | Cross over of faster moving average and slower moving average  -1: faster moving average crosses slower moving average upwards  0:  1: faster moving average crosses slower moving average downwards | {-1, 0, 1} |
| he | Hurst exponent is calculated for last 20 bars | [2, +­∞) |
| di | Directional Movement for last 20 bars | [2, +­∞) |

* 1. **Long Entry and Exit Criteria**

**15.2.1 Long Entry:**

Current Plus directional Indicator is greater than Current Minus directional Indicator, and

Close has to be greater than open i.e. green bar

.

**15.2.2 Long Pattern Exit:**

Current Plus directional Indicator is less than Current Minus directional Indicator

**Long Profit Target:** Price crosses above the profit target

OR

**Long Stop Loss:** Price crosses below the stop loss

OR

**Long Trailing Targets:** Price crosses below the trailing target

* 1. **Short Entry and Exit Criteria**

**15.3.1 Short Entry**

Current Plus directional Indicator is less than Current Minus directional Indicator, and

Close has to be less than open

**15.3.2 Short pattern exit:**

Current Plus directional Indicator is greater than Current Minus directional Indicator

**Short profit target:**Price crosses below the profit target

OR

**Short stop loss:**Price crosses above the stop loss

OR

**Short trailing targets:**Price crosses above the trailing target

**15.4 Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Value** |
| Long Profit Target | lpt | 10 % |
| Long Stop Loss | lsl | 3% |
| Long Trailing target: | ltt | 3% |
| Short Profit target: | spt | 10% |
| Short Stop Loss: | ssl | 3% |
| Short Trailing target | stt | 3% |
| Simple moving average | sma5 | 5 bars |
| Simple moving average | Sma25 | 20 bars |
| Simple moving average crossover | smaco |  |
| Directional | period\_direc | 20 |
| Hurst exponent | he | 20 bars |

**1.5 Parameter Optimization**

In this algorithm, we are using grid search optimization method for technical indicator

Faster moving average range [6,18] for last 5 days and Faster moving average range [8,20] for last 25 days and Hurst Exponent in range [6,18]

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Parameter Code** | **Optimized Method** | **Optimization Range** |
| Faster moving average | Period\_sma5 | Grid search | [6, 20] |
| Faster moving average | Period\_sma25 | Grid search | [8, 22] |
| Period\_direc | Period\_direc | Grid search | [6,18] |
| Period\_he | Period\_he | Grid search | [6, 20] |