Final Project Report: Online Trading with Pine Script

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Contents

Chapter 1

Strategy 1 - Trend Catcher

1.1 About the Strategy

The TrendCatcher Strategy uses two moving averages: a short-term moving average and a long-term moving average. The idea is to follow trends in the market. When the short-term moving average crosses above the long-term moving average, it signals a potential upward trend (buy signal). When the short-term moving average crosses below the long-term moving average, it signals a potential downward trend (sell signal). This strategy helps to capture major market trends and filter out minor price fluctuations.

1.2 Code Explanation

In the TrendCatcher Strategy, we calculate the short-term and long-term simple moving averages (SMAs). The code identifies crossovers of these SMAs to generate buy and sell signals. The signals are then displayed on the chart.

- **Define Parameters**: Set the periods for the short-term and long-term moving averages.

- **Calculate SMAs**: Use the `ta.sma` function to calculate the short-term and long-term SMAs.

- **Plot SMAs**: Plot the moving averages on the chart.

- **Identify Crossovers**: Identify when the short-term SMA crosses above or below the long-term SMA.

- **Plot Signals**: Plot buy and sell signals on the chart.

1.3 Pine Script Code

```
1  @version=5
2  indicator("TrendCatcher", overlay=true)
3
4  // Define the short-term and long-term moving averages
5  short_period = 10
6  long_period = 30
7  short_ma = ta.sma(close, short_period)
8  long_ma = ta.sma(close, long_period)
9
10 // Plot the moving averages
11 plot(short_ma, color=color.blue, title="Short MA")
12 plot(long_ma, color=color.red, title="Long MA")
13
14 // Buy and sell signals
15 longCondition = crossover(short_ma, long_ma)
16 shortCondition = crossunder(short_ma, long_ma)
17
18 // Plot buy and sell signals
19 plotshape(series=longCondition, location=location.
      belowbar, color=color.green, style=shape.labelup, text
      ="BUY")
20 plotshape(series=shortCondition, location=location.
      abovebar, color=color.red, style=shape.labeldown, text
      ="SELL")
```

Listing 1.1: TrendCatcher Strategy

Figure 1.1: Trend Catcher Strategy on IRFC Stock for 1 month window

Figure 1.2: Trend Catcher Strategy on Mazagon Dock Stock for 1 Day window

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Chapter 2

Strategy 2 - Momentum Rider

2.1   About the Strategy

The MomentumRider Strategy uses the Stochastic Oscillator to find overbought and oversold conditions. The Stochastic Oscillator compares the closing price to its price range over a certain period, usually 14 days. The strategy signals a buy when the %K line crosses above the %D line from below the oversold level (20), suggesting a potential price increase. It signals a sell when the %K line crosses below the %D line from above the overbought level (80), suggesting a potential price decrease.

2.2   Code Explanation

In the MomentumRider Strategy, we calculate the %K and %D lines of the Stochastic Oscillator. The code identifies crossovers of these lines combined with overbought and oversold levels to generate buy and sell signals.

- **Define Parameters**: Set the length for the Stochastic Oscillator and smoothing periods.

- **Calculate %K and %D**: Compute the %K line and smooth it to get the %D line.

- **Plot Stochastic Oscillator**: Plot the %K and %D lines, along with overbought and oversold levels.

- **Identify Crossovers**: Identify when the %K line crosses above or below the %D line within the defined levels.

- **Plot Signals**: Plot buy and sell signals on the chart.

2.3   Pine Script Code

```
1  @version=5
2  indicator("MomentumRider", overlay=true)
3
4  // Define the Stochastic Oscillator
5  length = 14
6  smoothK = 3
7  smoothD = 3
8
9  highestHigh = ta.highest(high, length)
10 lowestLow = ta.lowest(low, length)
11 k = 100 * (close - lowestLow) / (highestHigh - lowestLow)
12 d = ta.sma(k, smoothK)
13
14 // Smooth %K line
15 smoothK = ta.sma(k, smoothK)
16
17 // Plot the Stochastic Oscillator
18 hline(80, "Overbought", color=color.red)
19 hline(20, "Oversold", color=color.green)
20 plot(smoothK, color=color.blue, title="%K")
21 plot(d, color=color.orange, title="%D")
22
23 // Buy and sell signals
24 buyCondition = crossover(smoothK, d) and smoothK < 20
25 sellCondition = crossunder(smoothK, d) and smoothK > 80
26
27 // Plot buy and sell signals
28 plotshape(series=buyCondition, location=location.belowbar
      , color=color.green, style=shape.labelup, text="BUY")
29 plotshape(series=sellCondition, location=location.
      abovebar, color=color.red, style=shape.labeldown, text
      ="SELL")
```

Listing 2.1: MomentumRider Strategy

Figure 2.1: Momentum Rider Strategy on Mazagon Dock Stock for 1 Day window

Figure 2.2: Momentum Rider Strategy on IRFC Stock for 1 Day window

Chapter 3

Strategy 3 - Momentum Divergence

3.1 About the Strategy

The MomentumDivergence Strategy uses the MACD (Moving Average Convergence Divergence) indicator. The MACD consists of two lines: the MACD line (difference between the 12-day and 26-day exponential moving averages) and the signal line (9-day exponential moving average of the MACD line). A buy signal is generated when the MACD line crosses above the signal line, indicating upward momentum. A sell signal is generated when the MACD line crosses below the signal line, indicating downward momentum.

3.2 Code Explanation

In the Momentum Divergence Strategy, we calculate the MACD line and the signal line. The code identifies crossovers of these lines to generate buy and sell signals.

- **Define Parameters**: Set the periods for the fast and slow EMAs and the signal line.

- **Calculate MACD**: Compute the MACD line as the difference between the fast and slow EMAs.

- **Calculate Signal Line**: Compute the signal line as the EMA of the MACD line.

- **Plot MACD**: Plot the MACD line and the signal line.

- **Identify Crossovers**: Identify when the MACD line crosses above or below the signal line.

- **Plot Signals**: Plot buy and sell signals on the chart.

3.3 Pine Script Code

```
1  @version=5
2  indicator("Momentum Divergence", overlay=true)
3  // Defining paramaters
4  fast_length = 12
5  slow_length = 26
6  signal_smoothing = 9
7
8  macdLine = ta.ema(close, fast_length) - ta.ema(close,
       slow_length)
9  signalLine = ta.ema(macdLine, signal_smoothing)
10
11 plot(macdLine, color=color.blue, title="MACD Line")
12 plot(signalLine, color=color.orange, title="Signal Line")
13
14 // Buy and sell signals
15 buyCondition = crossover(macdLine, signalLine)
16 sellCondition = crossunder(macdLine, signalLine)
17
18 // Plot buy and sell signals
19 plotshape(series=buyCondition, location=location.belowbar
       , color=color.green, style=shape.labelup, text="BUY")
20 \begin{figure}
21     \centering
22     \includegraphics[width=1\linewidth]{Screenshot (275).
           png}
23     \caption{Enter Caption}
24     \label{fig:enter-label}
25 \end{figure}
26 plotshape(series=sellCondition, location=location.
       abovebar, color=color.red, style=shape.labeldown, text
       ="SELL")
```

Listing 3.1: MomentumDivergence Strategy

Figure 3.1: Momentum Divergence Strategy on Mazagon Dock Stock for 1 day window

Figure 3.2: Momentum Divergence Strategy on IRFC Stock for 1 month window

Chapter 4

Performance Metrics

TrendCatcher: This strategy performs well in trending markets as it captures significant upward or downward movements. However, it might generate false signals in sideways or choppy markets.

Momentum Rider: This strategy is effective in markets with clear overbought and oversold conditions. It works well in volatile markets but may generate false signals during strong trends.

Momentum Divergence: This strategy identifies momentum shifts, making it suitable for markets experiencing reversals or significant momentum changes. It might generate fewer signals compared to the other two strategies but can be more accurate.

Best Strategy and Reason

The **Momentum Divergence** strategy is likely the best among the three due to its ability to capture momentum shifts and potential reversals. It is less likely to generate false signals compared to TrendCatcher in sideways markets and compared to Momentum Rider in trending markets. The use of the MACD indicator helps filter out noise and provides clearer signals.

Conclusion

The **Momentum Divergence** strategy, with its focus on identifying momentum shifts using the MACD, offers a balanced approach to capturing market reversals and significant momentum changes. This makes it the most reliable among the three strategies, particularly in varying market conditions.

Conclusion

This report provides an analysis of four trading strategies using Pine Script: the Trend-Catcher Strategy (Moving Average Crossover), the MomentumRider Strategy (Stochastic Oscillator), the MomentumDivergence Strategy (MACD Crossover), and the ReversionSeeker Strategy (VWAP Mean Reversion). Each strategy has a unique approach to identifying trading opportunities and has been evaluated for effectiveness in capturing market trends, momentum, and mean reversion.

The TrendCatcher Strategy emerged as the best performer due to its ability to effectively capture significant market trends while minimizing noise. However, the choice of strategy ultimately depends on the trader's specific goals, market conditions, and risk tolerance.

By understanding and implementing these strategies, traders can make informed decisions and potentially enhance their trading performance.