SOC

Topic: Online Trading with Pine Script

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1 Bollinger Bands

Bollinger Bands is designed to provide a relative definition of high and low prices of a financial instrument. By definition, prices are high at the upper band and low at the lower band.

1.1 Components of Bollinger Bands

Middle Band: The Middle Band is a Simple Moving Average (SMA) of the security's price typically set to a 20-day period. The SMA is calculated by summing up the closing prices of the security for the past 'n' periods and then dividing by 'n'.

$$\text{Middle Band} = \text{SMA}(n)$$

Upper Band: The Upper Band is calculated by adding a certain number of standard deviations (typically 2) to the SMA.

$$\text{Upper Band} = \text{SMA}(n) + (K \times \text{Standard Deviation}(n))$$

Where K is a multiplier usually set to 2.

Lower Band: The Lower Band is calculated by subtracting the same number of standard deviations from the SMA.

$$\text{Lower Band} = \text{SMA}(n) - (K \times \text{Standard Deviation}(n))$$

1.2 Theory Behind Bollinger Bands

- **Market Volatility:** Bollinger Bands are primarily used to measure market volatility. When the market is volatile, the bands widen (expand); during less volatile periods, the bands contract.
- **Price Movements:** Prices tend to oscillate within the bands. When prices move outside the bands, it indicates extreme conditions (overbought or oversold). This could signal a potential reversal or continuation of the trend.
- **Overbought:** When the price touches or moves above the Upper Band, it may indicate that the asset is overbought and could be due for a pullback.
- **Oversold:** When the price touches or moves below the Lower Band, it may indicate that the asset is oversold and could be due for a rebound.
- **Mean Reversion:** The concept of mean reversion suggests that prices tend to return to the SMA (Middle Band) over time. This makes Bollinger Bands useful for identifying potential entry and exit points in trading.

1.3 Example of Bollinger Bands in Trading

- **Breakout Strategy:** Traders might use Bollinger Bands to identify breakouts. A price breaking above the Upper Band might signal a buying opportunity, while a price breaking below the Lower Band might signal a selling opportunity.

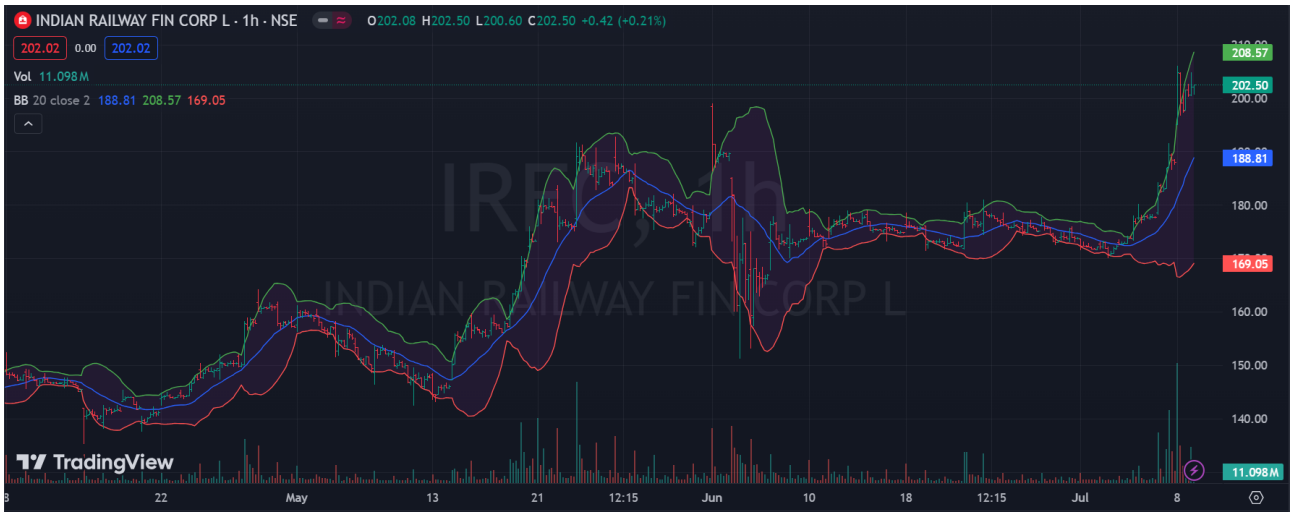

Figure 1: Bollinger Band indicator applied on the Trading view terminal on IRFC

```
//@version=5
indicator("Bollinger Bands", shorttitle="BB", overlay=true)
length = input(20, title="Length")
src = input(close, title="Source")
mult = input(2.0, title="Multiplier")
basis = ta.sma(src, length)
dev = mult * ta.stdev(src, length)
upper = basis + dev
lower = basis - dev
p1 = plot(basis, color=color.blue, title="Basis")
p2 = plot(upper, color=color.green, title="Upper Band")
p3 = plot(lower, color=color.red, title="Lower Band")
fill(p2, p3, color=color.purple, transp=90, title="Background")
```

Figure 2: Code for Bollinger Band indicator

- **Mean Reversion Strategy:** Traders might use the bands to trade based on the idea that prices will revert to the mean. For example, if the price touches the Lower Band, a trader might buy expecting the price to move back toward the Middle Band.

2 Relative Strength Index (RSI)

The Relative Strength Index (RSI) is a momentum oscillator that measures the speed and change of price movements. It was developed by J. Welles Wilder and is widely used in technical analysis to identify overbought or oversold conditions in a market. The RSI oscillates between 0 and 100, providing a visual representation of potential reversal points.

2.1 Theory

- **Overbought Condition:** An RSI value above 70 indicates that a stock may be overbought. This suggests that the stock has been experiencing strong upward momentum

and may be due for a correction or pullback.

- **Oversold Condition:** An RSI value below 30 indicates that a stock may be oversold. This suggests that the stock has been experiencing strong downward momentum and may be due for a rebound or upward correction.

2.2 Calculation

The RSI is calculated using the following steps:

1. **Calculate the Gain and Loss:**
   - Compute the difference between the current close and the previous close.
   - If the current close is higher than the previous close, this difference is considered a gain.
   - If the current close is lower than the previous close, this difference is considered a loss.
2. **Calculate the Average Gain and Average Loss:**
   - Use a lookback period (typically 14 days).
   - Average Gain = Sum of Gains over the lookback period / Number of periods
   - Average Loss = Sum of Losses over the lookback period / Number of periods
3. **Calculate the Relative Strength (RS):**

$$RS = \frac{\text{Average Gain}}{\text{Average Loss}}$$

4. **Calculate the RSI:**

$$RSI = 100 - \left(\frac{100}{1 + RS}\right)$$

The formula can be simplified for computational efficiency using a smoothed version of the averages which incorporates the previous averages with the current gain or loss.

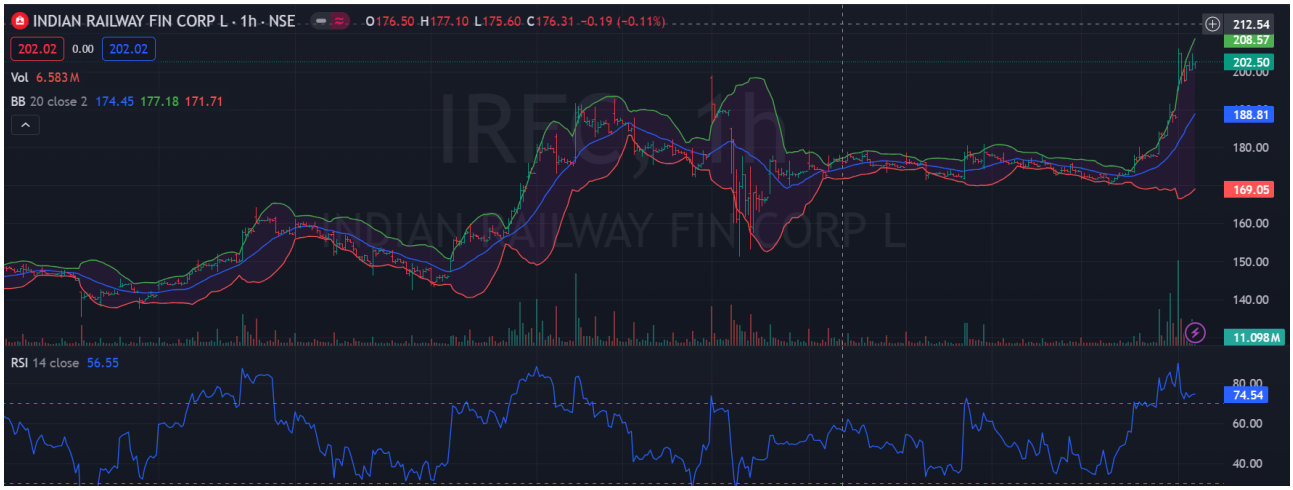

Figure 3: RSI indicator applied on the Trading view terminal on IRFC

```
//@version=5
indicator("Relative Strength Index (RSI)", shorttitle="RSI", overlay=false)
length = input(14, title="Length")
src = input(close, title="Source")
rsi = ta.rsi(src, length)
hline(70, "Overbought", color=color.red)
hline(30, "Oversold", color=color.green)
plot(rsi, color=color.blue, title="RSI")
```

Figure 4: Code for RSI