Trading Logic Explanation

Adaptive Momentum-Reversal Strategy

GitHub Repository: https://github.com/qingleiw/trading-strategy-contest

Strategy Philosophy

Our strategy combines two complementary approaches:

1. **Momentum Trading** - Ride strong trends when they develop
2. **Mean Reversion** - Buy dips and sell peaks when markets range

This dual approach allows us to profit in both trending and sideways markets.

Core Technical Indicators

1. RSI (Relative Strength Index)

- **Purpose:** Momentum detection and overbought/oversold identification
- **Settings:** 14-period RSI
- **Buy Signal:** RSI $\leq$ 25 (oversold)
- **Sell Signal:** RSI $\geq$ 75 (overbought)
- **Logic:** When RSI is oversold, price is likely to bounce upward

2. MACD (Moving Average Convergence Divergence)

- **Purpose:** Trend direction and momentum confirmation
- **Settings:** 12-period fast EMA, 26-period slow EMA, 9-period signal line
- **Buy Signal:** MACD line $>$ Signal line with positive histogram
- **Logic:** Confirms bullish momentum when fast MA crosses above slow MA

3. Bollinger Bands

- **Purpose:** Mean reversion opportunities and volatility measurement
- **Settings:** 20-period SMA with 2 standard deviations
- **Buy Signal:** Price $\leq$ Lower Bollinger Band
- **Sell Signal:** Price $\geq$ Upper Bollinger Band
- **Logic:** Prices tend to revert to the mean after extreme moves

Entry Logic (BUY Signals)

Requirement: At least 2 of the following conditions must be met:

1. **RSI Oversold** - RSI $\leq$ 25
2. **MACD Bullish** - MACD line above signal line with positive momentum
3. **Bollinger Band Support** - Price at or below lower band
4. **Positive Momentum** - Recent 2%+ price increase (momentum confirmation)

Example Entry:

```
Scenario: BTC drops to $45,000 after recent highs
- RSI = 22 (oversold)
- Price = $44,900 (below lower BB at $45,100)
- MACD = bearish (but improving)
- Recent momentum = negative

Result: 2 signals = BUY triggered
```

Exit Logic (SELL Signals)

Any ONE of these conditions triggers an exit:

1. **Stop Loss** - 8% loss from average entry price
2. **Take Profit** - 15% gain from average entry price
3. **RSI Overbought** - RSI ≥ 75
4. **Bollinger Band Resistance** - Price ≥ Upper Bollinger Band

Example Exit:

```
Entry: BTC bought at $45,000
Current Price: $51,750 (+15.0%)
- Take profit threshold reached = SELL triggered

Alternative: RSI reaches 78 = SELL triggered (momentum exhaustion)
```

Risk Management Framework

Position Sizing Formula:

```
base_position = portfolio_value * 30%  # Max 30% position
volatility_adjustment = max(0.5, 1 - volatility * 10)
final_position = base_position * volatility_adjustment
```

Protection Mechanisms:

1. **Maximum Drawdown:** Stop all trading if drawdown reaches 45%
2. **Cash Buffer:** Always maintain 5% cash reserve
3. **Time Throttling:** Minimum 30 minutes between trades
4. **Position Limits:** Never exceed 30% of portfolio in single trade

Market Adaptation

High Volatility Periods:

- Reduce position sizes by 20-30%
- Tighten stop-losses
- Require stronger signal confirmation

Low Volatility Periods:

- Increase position sizes (up to limit)
- Extend profit targets

- Allow single-indicator entries

Trending Markets:

- Favor momentum signals (MACD, momentum)
- Extend profit targets
- Reduce mean reversion weight

Ranging Markets:

- Favor mean reversion signals (RSI, Bollinger Bands)
- Tighten profit targets
- Increase trade frequency

Why This Logic Works

1. **Signal Confluence:** Multiple indicators reduce false signals
2. **Adaptive Sizing:** Volatility adjustment protects during uncertain periods
3. **Dual Strategy:** Captures profits in both trending and ranging markets
4. **Professional Risk Management:** Institutional-grade position sizing and stops
5. **Market Regime Awareness:** Strategy adapts to changing conditions

Expected Behavior

Bull Market: Strategy captures upward moves through momentum signals **Bear Market:** Strategy limits losses through stop-losses and reduced exposure
Sideways Market: Strategy profits from range-bound trading via mean reversion **Volatile Market:** Strategy reduces risk through smaller positions and tighter stops

This comprehensive approach allows the strategy to adapt across all market conditions while maintaining strict risk controls.

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Strategy: Adaptive Momentum-Reversal Trading Bot