Bollinger Bands mean-Reversion

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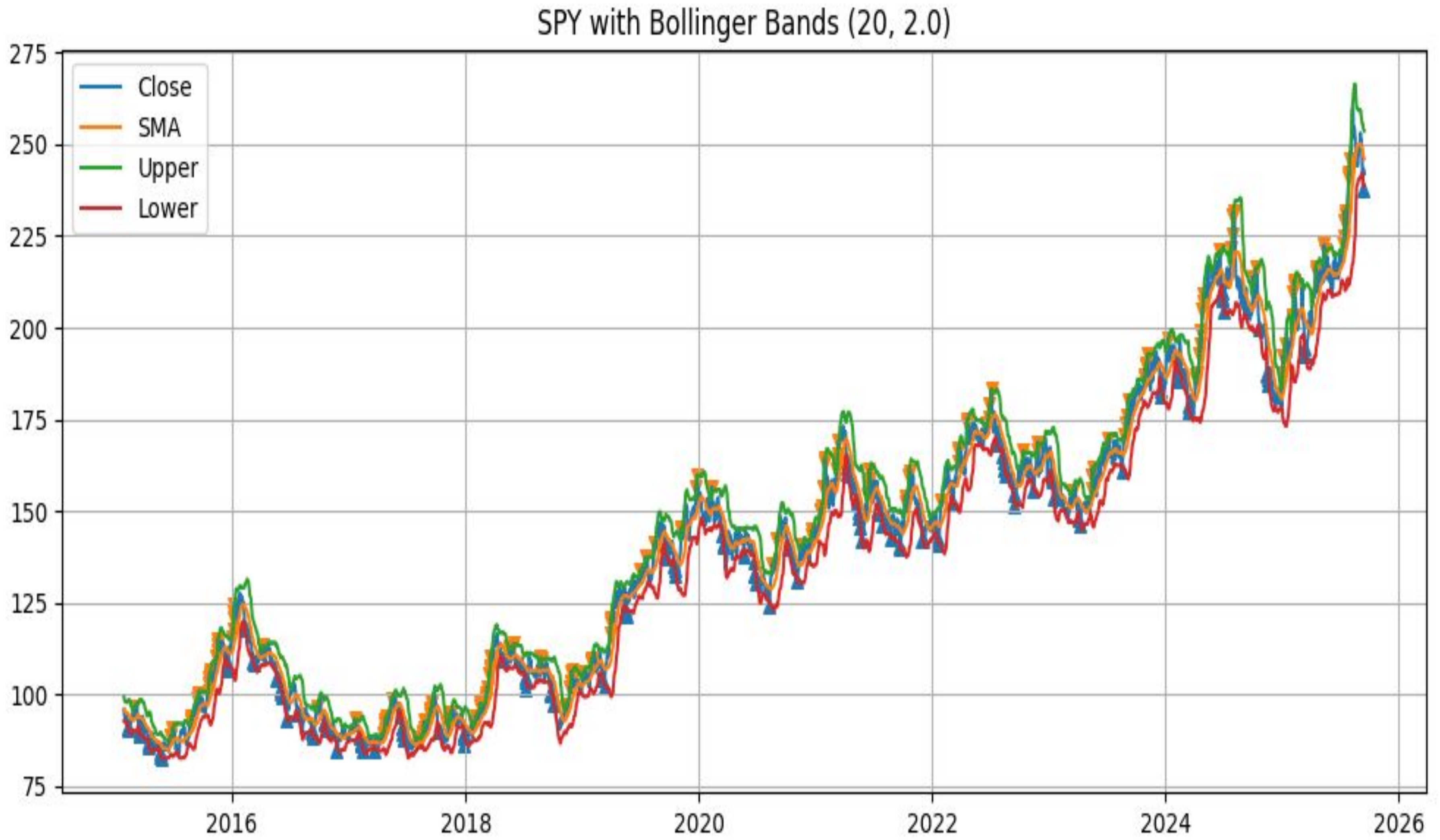
Strategy Overview

- Concept
  - Bollinger Bands = SMA ± k·σ
  - Buy when price falls below lower band → expect reversion upward.
  - Short when price rises above upper band → expect reversion downward.
  - Exit when price crosses back over the middle band.
- Parameters
  - Window = 20 days
  - k = 2.0
  - Asset tested: SPY (2015–2025)


SPY with Bollinger Bands (20, 2.0)
Close
SMA
Upper
Lower
275
250
225
200
175
150
125
100
75
2016
2018
2020
2022
2024
2026

Headline Metrics

- Ticker & Period: SPY (2015-01-28 → 2025-09-15)
- Initial Cash: $100,000
- Final Equity: $83,940
- CAGR: –1.58% per year
- Sharpe Ratio: –0.04 (risk-adjusted performance was slightly negative)
- Max Drawdown: –45.9% (largest peak-to-trough loss)
- Number of Trades: 100
- Win Rate: 64% of trades were profitable
- Average Trade %: –0.12% per trade
- Costs: 2 bps per side, shorts allowed

Analysis

- The strategy won more often than it lost (64%), but average gains were too small and losses too large → net capital decreased over time.
- A negative Sharpe ratio shows returns didn't compensate for volatility.
- The large drawdown highlights risk of fading trends with a simple mean-reversion system.
- Shows why quants often add filters (RSI, volume, regime detection) to avoid trading against strong moves.