BOLLINGER BAND STRATEGY

IBM US Equity from Dec 31, 2007 until Dec 31, 2009.

Basic Bollinger Band Introduction

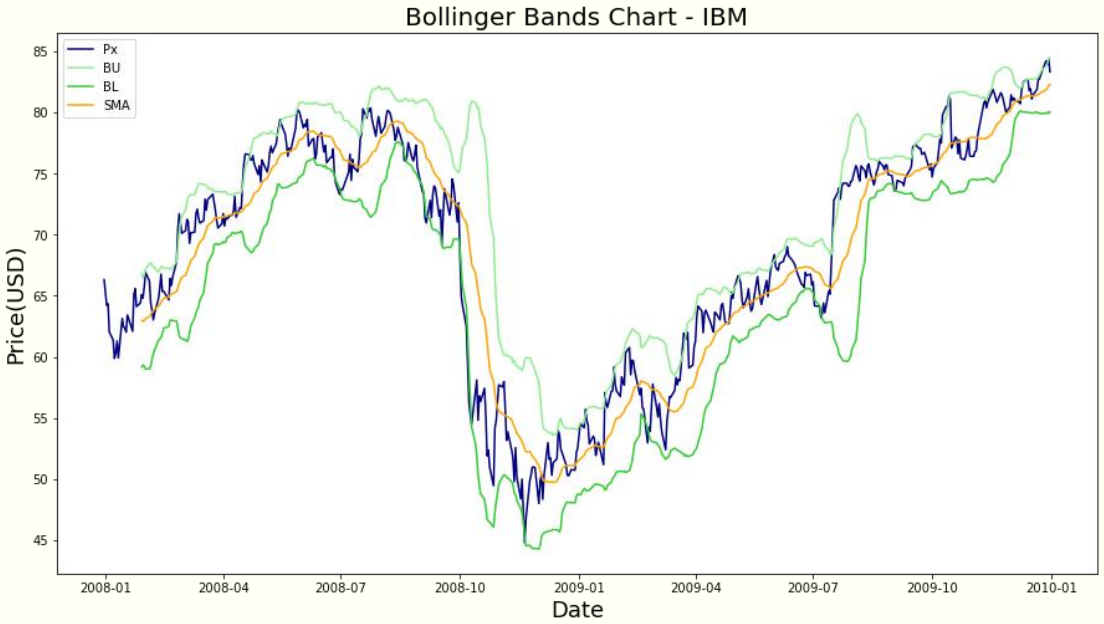
- Bollinger Bands:
  - Bollinger Bands are a type of statistical chart characterizing the prices and volatility over time of a financial instrument or commodity, using a formulaic method propounded by John Bollinger in the 1980s.
  - Bollinger Bands display a graphical band (the envelope maximum and minimum of moving averages) and volatility (expressed by the width of the envelope) in one two-dimensional chart.
- Purpose:
  - The purpose of Bollinger Bands is to provide a relative definition of high and low prices of a market. By definition, prices are high at the upper band and low at the lower band. This definition can aid in rigorous pattern recognition and is useful in comparing price action to the action of indicators to arrive at systematic trading decisions.

Basic Bollinger Band Trading Strategy

- Basic Bollinger Band Trading Strategy - Two Potential Entries, Long and Short.
  - Long: The long entry is made when the price transitions from below the lower band to above the lower band. This indicates that the stock price has moved substantially away from the moving average, but is now moving back towards the moving average. When this entry signal criteria is met, buy the stock and hold it until the exit. The exit signal occurs when the price moves from below the SMA to above it.
  - Short: The short entry is made when the price transitions from above the upper band to below the upper band. This indicates that the stock price has moved substantially away from the moving average, but is now moving back towards the moving average. When this entry signal criteria is met, short the stock and hold it until the exit. The exit signal occurs when the price moves from above the SMA to below it.
- Steps:
  - 1. Calculate and Display Bollinger Bands
  - 2. Find Trading Signals
  - 3. Back testing

Bollinger Bands Calculation Chart

- Data Source: Yahoo Finance API, IBM US Equity, from 12/31/2007 to 12/31/2009
- Variables
  - Stock Price (‘Px’): Adj. Close
  - SMA: 20 day simple moving average (SMA) line.
  - Upper Band (‘BU’)= SMA + 2 * 20 day standard deviation.
  - Lower Band (‘BL’)= SMA - 2 * 20 day standard deviation.
- Methods:
  - pd.Series
- Display



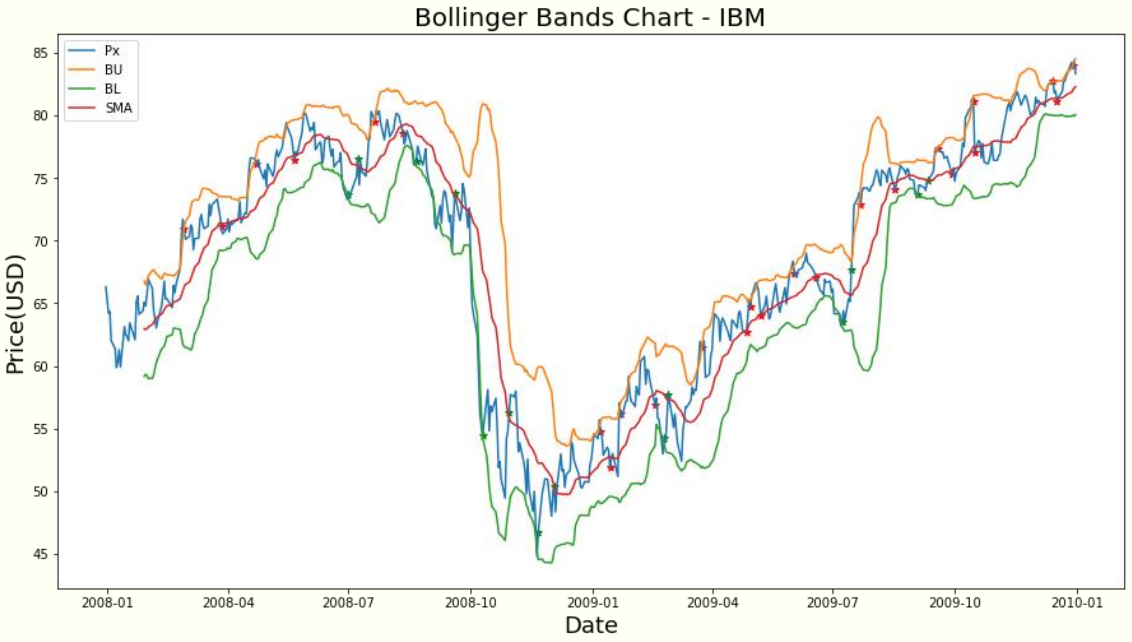
Entry and Exit Signals

- Assumptions: trading cost and security lending cost is 0 and all traded are executed at adj. close.
- Initial Capital: $10,000
- Buys: Define and append a list for all “long” trades
  - Long Entry: Buy 1 lot(100 shares) of IBM and hold to exit
  - Long Exit: Sell the long trade
  - buys: append all “buy” signals incl long entry and long exit.
  - pos_b: append all “buy” position change, where 1 represents buy and -1 represents sell
- Sells: Define and append a list for all “long” trades
  - Short Entry: Short sells 1 lot(100 shares) of IBM and hold to exit
  - Short Exit: Cover the short trade
  - sells: append all “sell” signals incl sell entry and sell exit.
  - pos_s: append all “sell” position change, where 1 represents sell and -1 represents buy

Displays

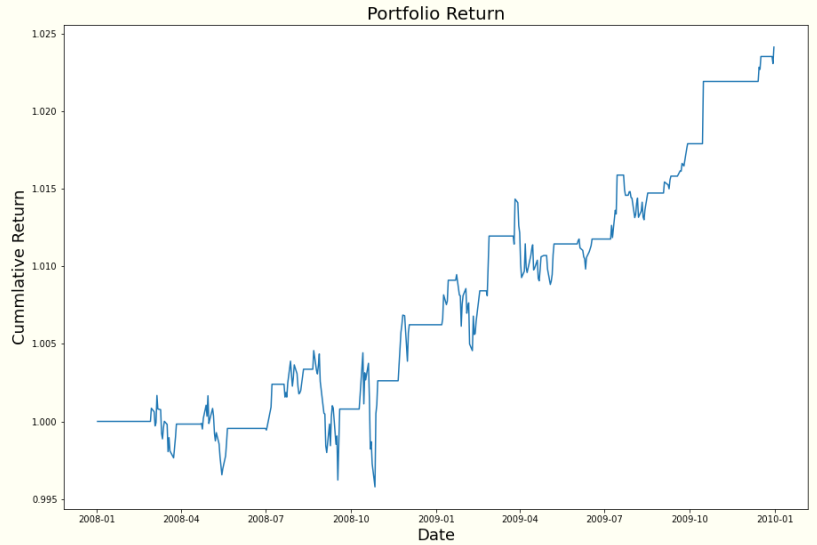
Buys	
Date	trades
2008/7/1	Buy
2008/7/8	Sell
2008/8/21	Buy
2008/9/19	Sell
2008/10/10	Buy
2008/10/30	Sell
2008/11/21	Buy
2008/12/3	Sell
2009/2/24	Buy
2009/2/27	Sell
2009/7/8	Buy
2009/7/15	Sell
2009/9/3	Buy
2009/9/11	Sell

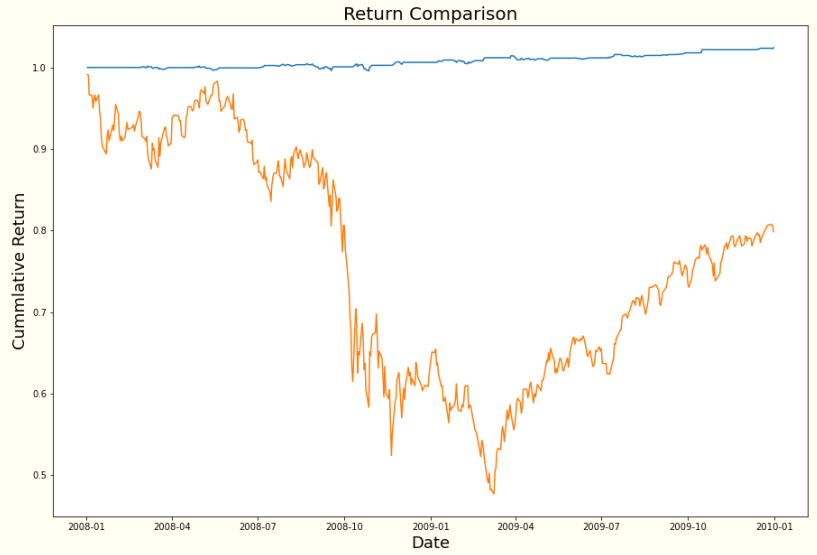
Sells	
Date	trades
2008/2/28	Sell
2008/3/27	Buy
2008/4/22	Sell
2008/5/21	Buy
2008/7/21	Sell
2008/8/11	Buy
2009/1/7	Sell
2009/1/14	Buy
2009/1/22	Sell
2009/2/17	Buy
2009/3/25	Sell
2009/4/27	Buy
2009/4/30	Sell
2009/5/8	Buy
2009/6/2	Sell
2009/6/18	Buy
2009/7/22	Sell
2009/8/17	Buy
2009/9/18	Sell
2009/9/29	Buy
2009/10/15	Sell
2009/10/16	Buy
2009/12/14	Sell
2009/12/17	Buy
2009/12/29	Sell



Back Testing

- Portfolio NAV: accumulated cash + accumulated stock value
- Benchmark: SPY US Equity
- Accumulated returns comparison
  - Simulation Portfolio: 2.4%
  - SPY return: -20.1%





Disclaimers

1. All data are from Yahoo API and are public available.
2. This is a simplified theoretical strategy for illustrating purpose and does not provide any investment advice.
3. Various studies of the effectiveness of the Bollinger Band strategy have been performed with mixed results, though strategies related to Bollinger bands have been adopted broadly in the market.
4. The time period we choose here is very special (the GFC). Similar results are not guaranteed for different time period/different tickers in such a basic technical strategy.

THANKS!!!