

Project 4 - Bollinger Bands

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1 Objectives

1. Gather the daily high, low, and closing prices for McDonald's stock (ticker symbol MCD) for January 2004 through July 2005 from an appropriate financial website such as Google Finance, Yahoo Finance, Quandl, CityFALCON, or another similar source.
2. Calculate 10-day and 60-day SMAs. Plot these two curves with a bar chart of the stock prices.
3. Compare and contrast the 10-day and the 60-day SMA.
4. Explain the relationship between the market trend and the 60-day SMA during the following periods:
 - May 2004-October 2004

- October 2004-May 2005
 - May 2005-July 2005
5. Draw the moving average oscillator of the price chart.
 6. Bollinger Band is a band plotted 1.5 standard deviations away from a simple moving average. Calculate the Bollinger bands of 10-day simple moving average for Mac Donald share.
 7. Develop a trading strategy based on the relation between price and Bollinger Bands. Graphically represent the risk-return profile of such a trading strategy

2 Data Download

Required data has been downloaded from Yahoo Finance using next python function:

```
from pandas_datareader import data as pdr
pdr.get_data_yahoo()
```

3 SMA

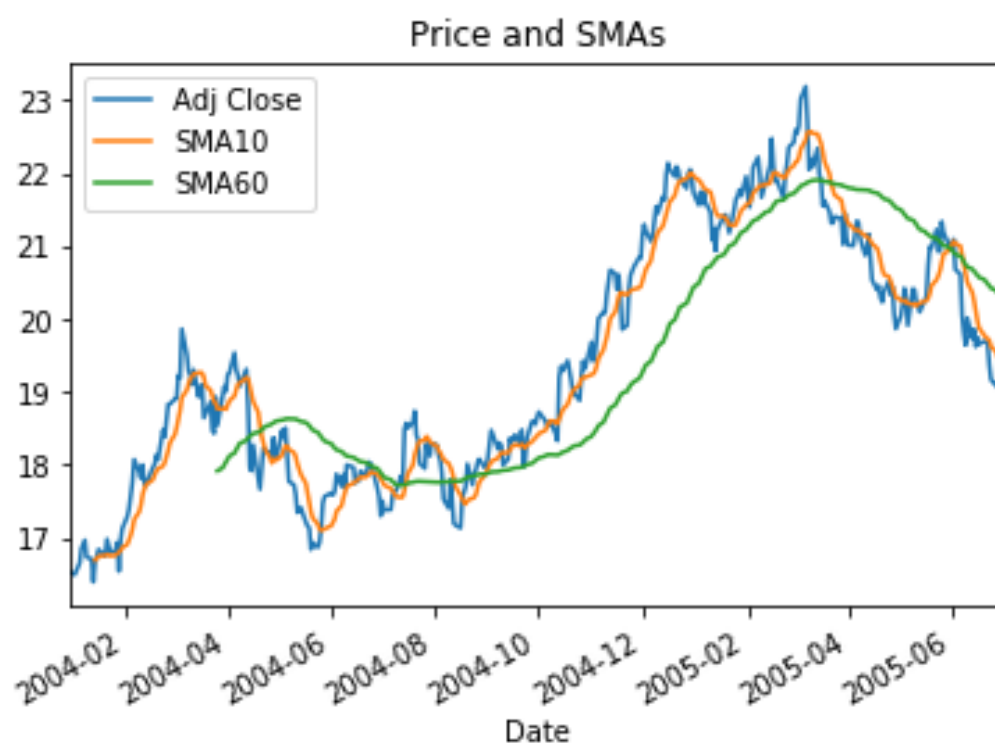
A **simple moving average (SMA)** is a widely used indicator in technical analysis that helps smooth out price action by filtering out the “noise” from random price fluctuations. It is a trend-following, or lagging, indicator because it is based on past prices.

MA can be calculated using the next formula:

$$MA_i = \frac{\sum_{i=1}^n P_i}{n}$$

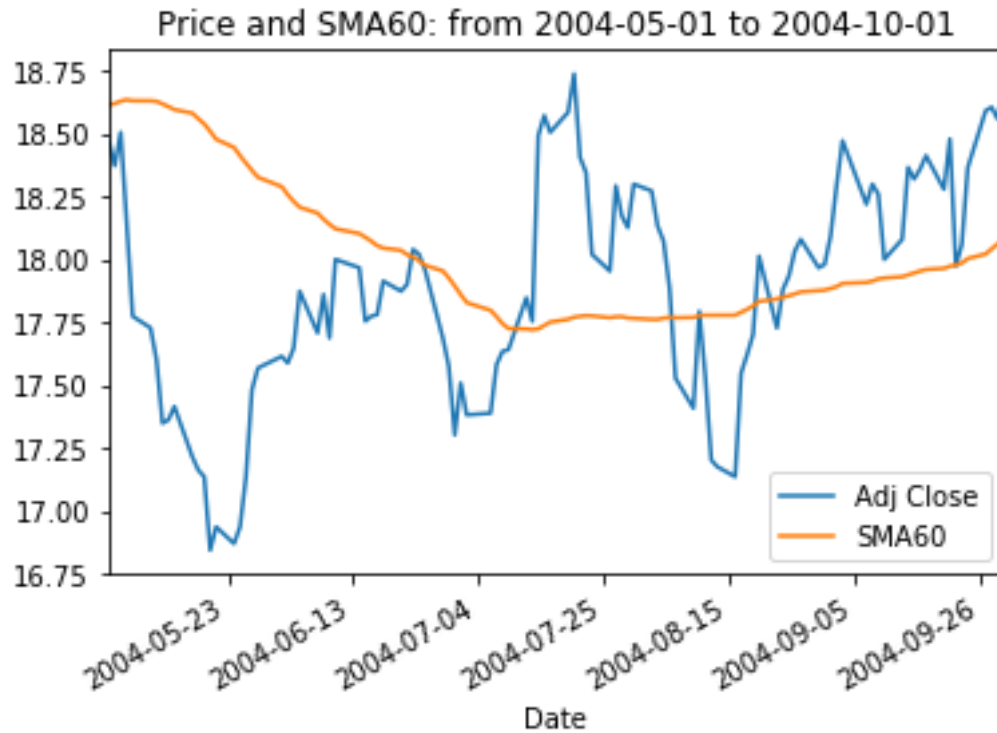
, where P_i - prices

In the task SMA_{10} and SMA_{60} . They are represented below with with a bar chart of the stock prices.

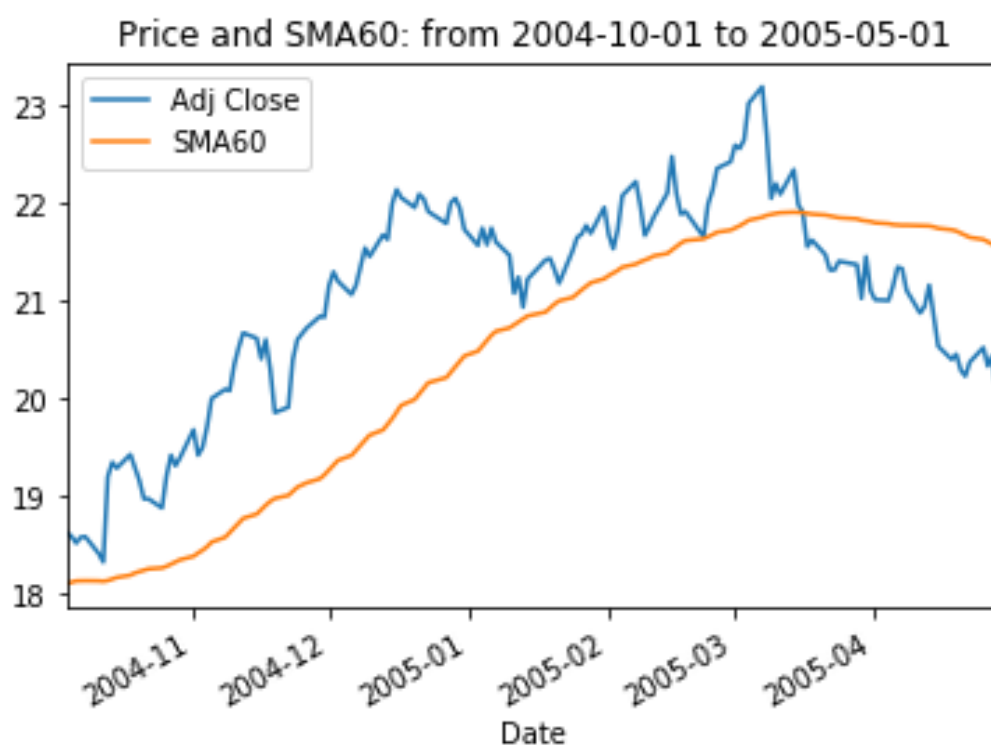


It is obvious that SMA_{10} is much closer to the price values when SMA_{60} is smoother.

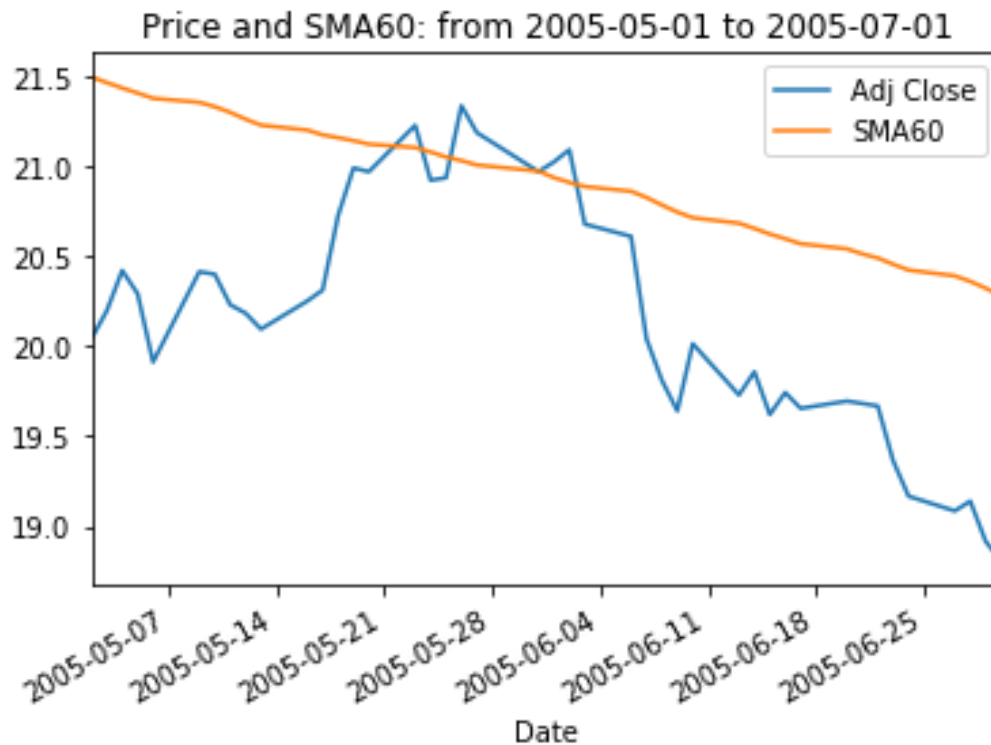
3.1 Market Trends and SMA60



At the first picture we can see that there is no clear trend at that time. Moreover, it seems that exactly during this period previous down trend is changing in upward direction.



Here the picture is clear: uptrend in the end of the period changes its direction. SMA_{60} perfectly reflect price movement

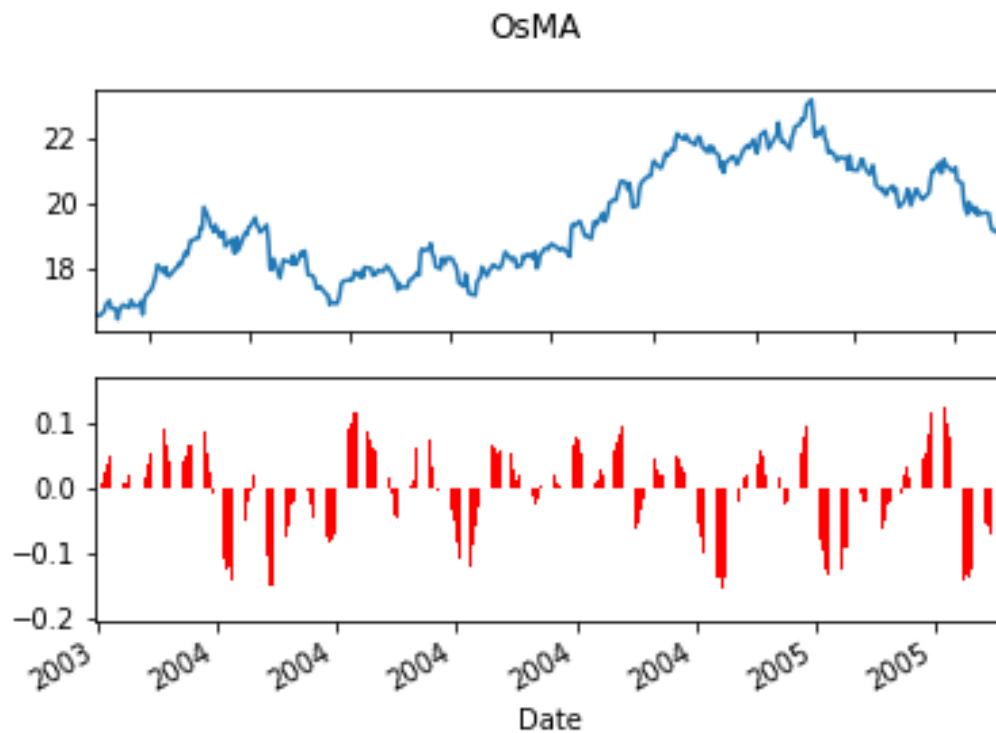


This period is rather short, however in general SMA_{60} shows clear downtrend that corresponds to the prices.

4 MA oscillator

Moving Average oscillator (OsMA) is used in technical analysis to represent the variance between an oscillator from its moving average, over a given period of time. Typically the primary line of the MACD will serve as the oscillator, with the signal line of the MACD then acting as the moving average. The OsMA relationship is one of the most fundamental in technical analysis.

The chart below represents OsMA of the price chart:



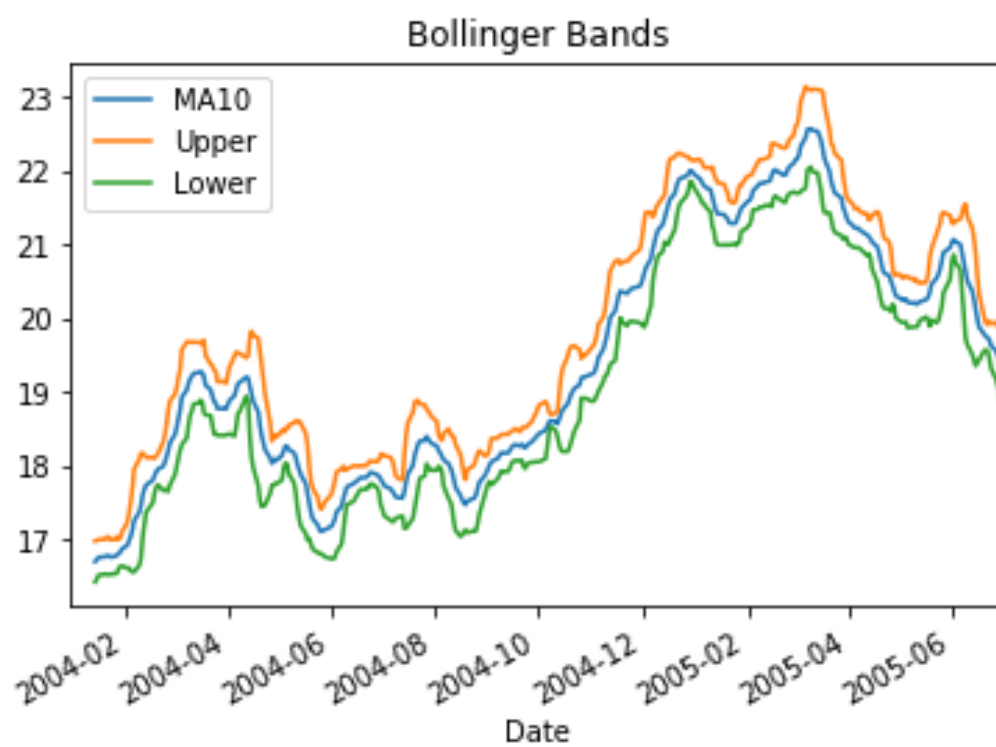
5 Bollinger Band

Bollinger Band is a band plotted 1.5 standard deviations away from a simple moving average.

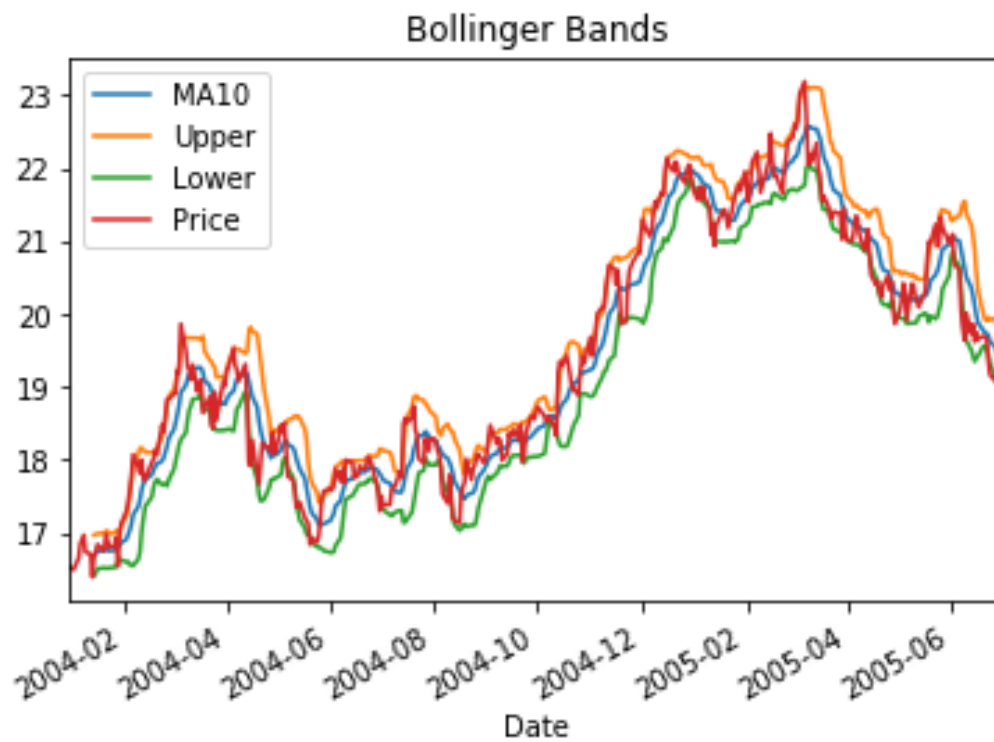
To implement this idea next function are used:

- `pandas.rolling(window=10, center=False).mean()`
- `pandas.rolling(window=10, center=False).std()`

After calculations we have next result:



6 Trading Strategy



I choose the next strategy:

1. If the price crosses lower bound above I buy the stock
2. If the price crosses upper bound below I sell the stock



As we can see, unfortunately, the strategy gave us losses.
Precisely **-0.144166205605** or around **- 14.4%**