Stock Technical Analysis with Python

Section 1: Course Overview

Course Disclaimer

- This course has an educational and informational purpose and doesn´t constitute any type of forecasting or investment advice. All conclusions reflect solely the instructor's opinions based on historical data and calculations with the possibility of future outliers not previously observed within this time series. Past performance doesn´t guarantee future returns. Investment risk and uncertainty can possibly lead to its total loss for unleveraged products and even larger for leveraged ones.
- Therefore, the instructor is not responsible for any damages caused by using data, information, forecasts, opinions or conclusions for investment decisions; exclusively transferring all this responsibility to the student. Recommending that the student does own due-diligence based on several scenarios and assumptions before taking any forecasting or investment decision.

Course Overview

- Practical course is divided into **five sections**.
- In **first section** stock technical analysis definition, Python Distribution and Integrated Development Environment downloading, data downloading, data sources, code files and related packages are defined.
- In **second section** stock technical indicators are calculated by applying a certain formula to stock prices and volume data. They are either lagging indicators plotted on top of price bars or leading indicators charted below as oscillators.
  - Lagging indicators are used to identify uptrends or downtrends and follow price movements while exploring:
    - simple moving averages
    - exponential moving averages
    - Bollinger bands®
    - parabolic stop and reverse.
  - Leading indicators are used to identify momentum tendencies of rising or falling prices to keep on doing so and lead their movements while exploring:
    - average directional movement index
    - commodity channel index
    - moving averages convergence/divergence
    - rate of change
    - relative strength index
    - stochastic oscillator
    - Williams %R.

Course Overview

- In **third section** stock trading signals are calculated using several types of single and multiple indicator crossovers which identify buying or selling opportunities.
  - Single indicator buying or selling opportunities are identified through:
    - price crossovers among stock close prices and certain indicators
    - double crossovers among two indicators
    - upper or lower band crossover incurred by various indicators
    - signals crossover between them and their corresponding indicators.
  - Multiple indicator buying or selling opportunities are identified through:
    - price crossovers among stock close prices and certain indicators which need to be confirmed by a second indicator being above or below its upper or lower bands.
- In **fourth section** stock trading strategies are calculated using single and multiple indicator trading signals to determine if they lead to being long (buying) or short (selling) of the corresponding stock.
- In **fifth section** strategies performance comparison is calculated using buy and hold strategy as benchmark against stock trading strategies based on single and multiple indicators.
  - Metrics such as annualized return for performance, annualized standard deviation for volatility or risk and annualized Sharpe ratio for risk adjusted performance are defined and calculated for this evaluation.

Stock Technical Analysis

- **Stock technical analysis** is a methodology that uses technical indicators to identify price trends, momentum (tendency of either rising or falling prices to keep on doing so) and volatility.
  - John J. Murphy. "*Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*". Prentice Hall Press. 1999
  - Martin J. Pring. "Technical Analysis Explained: The Successful Investor's Guide to Spotting Investment Trends and Turning Points". Fifth Edition. McGraw Hill. 2014

Stock Technical Analysis

- **Stock technical analysis calculations** are made in *Python 2.7 programming language*. Downloading of following software is recommended:
  - ***Miniconda Python 2.7 (64-bit) Distribution***.
  - ***PyCharm Community Integrated Development Environment.***

Stock Technical Analysis Data

- **Stock technical analysis data** is based on Apple Inc.'s daily stock prices (ticker: AAPL) for one business calendar year (October 1st, 2014 to September 30th, 2015: 252 observations). Data is downloaded directly into Python IDE from several sources such as:
  - ***Yahoo! Finance***
  - *Google Finance*
  - *Kenneth French's data library*
  - *St. Louis Federal Reserve Economic Data FRED database*

Stock Technical Analysis Data

- **Stock technical analysis code files** are originally in **.txt plain text format** but then converted into **.py Python format**. They contain instructions for performing stock technical analysis operations on previously downloaded data within Python IDE.
- They can be downloaded at the beginning of the course in **Course Code Files** Lecture.

Stock Technical Analysis Data

- **Stock technical analysis packages** are used for performing numerical and statistical operations, downloading data, charting related data and performing stock technical analysis operations.
- For **compatibility**, following **package versions** and **installation order** are recommended:
  1. *numpy=1.10*
  2. *pandas=0.14*
  3. *matplotlib=1.4*
  4. *ta-lib=0.4.9*