Stock Technical Analysis with Python

Section 1: Course Overview

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Course Overview

- Practical course is divided into **five sections**.
- In **first section** stock technical analysis definition, Python Distribution and Integrated Development Environment downloading, data reading or downloading, data sources, code files and related packages are defined.

Course Overview

- 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 and 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 and Williams %R.

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- 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 and 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.

Course Overview

- In **fourth section** stock trading strategies are calculated using single and multiple indicator trading signals to determine if they lead to owning or not owning 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.
- Find **course bibliography** below:
  - 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 3.6 programming language* because of current python package compatibility. Downloading of following software is recommended:
  - ***Miniconda Python 3.7 (64-bit) Distribution (PD)***.
  - ***Python PyCharm Community Integrated Development Environment (IDE).***

- **Notes:** *Miniconda3* installation currently includes *Python 3.7* but instructions for creating a *Conda Environment* for *Python 3.6* will be explained within following *Stock Technical Analysis Data* lecture. Also, course lectures from *Section 1* were updated using *Python 3.6* but course lectures from *Section 2* onwards were previously recorded using *Python 2.7*. Nevertheless, *Course Code Files* are compatible with both *Python 2* and *Python 3*.

Stock Technical Analysis Data

- **Stock technical analysis data** is based on *S&P 500 State Street Exchange Traded Fund ETF* daily prices (ticker: *SPY*) for one business calendar year (January 4th, 2016 to December 30th, 2016: 252 observations).
- Data can be **read** into *Python PyCharm IDE* by downloading **.txt plain text file in .csv comma separated values format** within **Course Data File** lecture.
- Data can be **downloaded** directly into *Python PyCharm IDE* from several sources such as:
  - *Yahoo! Finance*

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 read or downloaded data within *Python PyCharm IDE*.
- They can be downloaded in **Course Code Files** Lecture.

Stock Technical Analysis Data

- **Stock technical analysis packages** are used for performing numerical and statistical operations, reading or downloading data, charting related data and performing stock technical analysis operations.
- Following **python packages** need to be installed.
  - ***numpy***
    - *NumPy Community*
  - ***pandas***
    - *Wes McKinney and PyData Development Team*
  - ***pandas-datareader***
    - *PyData Development Team*
  - ***matplotlib***
    - *John Hunter, Darren Dale, Eric Firing, Michael Droettboom and the Matplotlib Development Team*

Stock Technical Analysis Data

- ***ta-lib***
  - *Mario Fortier, TicTacTec, Quantopian*