Overview of COMP226

During the module we considered examples in R for almost all topics. These examples appeared both in lectures/slides, worksheets, and assessments. You should have a thorough understanding of all these R examples.

R basics (from all slides and assignments)

- vectorized arithmetic
- vectors, `order`, and subsetting
- `seq`
- `sum`, `cumsum`, `prod` and `cumprod`, etc.
- `max`, `cummax`, `min`, `cummin`, etc.
- `matrix`, `data.frame`
- `apply`, `lapply`, `mapply`, `sapply`
- functions
- `xts`
- global assignment (`<<-`)
- `endpoints` (e.g. for in-sample/out-of-sample)

Equities and futures

- adjusted prices (stock dividends, cash dividends, stock splits)

Microstructure

- Limit order books/ dark pools
- Market orders versus limit orders
- Average execution price
- Slippage
- Dark Pools of liquidity
- Exeuction algorithms: VWAP, TWAP, Implementation Shortfall
- Profit seeking versus execution algorithms

Performance Measurement

- Simple and log returns (motivation and definitions)
- Conversions between simple and log returns
- Returns for long and short trades e.g. for a long trade with entry price e and exit price x, the simple return is $(x-e)/e$
- Equity curves (aggregating returns/profit and loss)
- Sharpe Ratio, Information Ratio, Sortino Ratio (using Downside Deviation)
- Maximum drawdown (return-based and profit-and-loss-based)
- Calmar Ratio
- Similarities and differences between Sharpe Ratio, Information Ratio, Sortino Ratio, and Calmar Ratio
- Perfect profit/perfect return (using perfect position)

Trading Strategies

- Moving averages (simple and exponential)
- Moving averages as filters
- Bollinger Bands
- Path-dependent and path-independent strategies
- Example of simple strategies in R
- Holding period, profit target, stop loss
- Momentum versus mean-reversion
- Spread trading

Backtesting

- Counting parameter combinations
- Choosing paramater ranges
- Grid search
- Fitness landscape
- Cross-validation
    - In-sample, out-of-sample tests
    - Walk-forward testing
- Biases:
    - Look-ahead bias
    - Survivorship Bias
    - Data-snooping Bias
    - Time period Bias