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About me

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- Solution architect Microsoft Business Applications @Inetum – Realdolmen
- Blogs:
  - https://jopx.blogspot.com
  - https://jopxfin.blogspot.com
- Twitter: @jopxtwits
- Started investing before the dotcom bubble
- Got bored during Covid and started with Python

2

Want to join the Inetum Realdolmen Smart Data & AI team?

inetum realdolmen
Positive digital flow

Advanced specializations

Microsoft Partner

- **An experienced team of +40 Data experts with following competences:**
- Data platforms (Azure, Snowflake, AWS)
- Business Intelligence (Power BI)
- Data science (Python, R)
- Artificial Intelligence (Machine & Deep Learning)
- Master Data Management

Talk to our Senior Solution Manager Data & AI → Scan this

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The fine print

The information in this presentation represents an opinion and is for information purposes only. It is not intended to be investment advice. Seek a duly licensed professional for investment advice.

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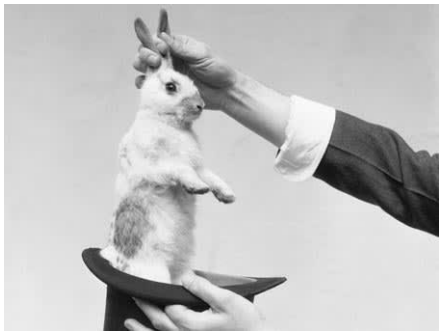
Objective

- Gets you excited about investing/trading and data
- See how Python and Azure can help you make better investment/trading decisions



What are we not covering?

- Crypto currencies, bonds, forex, derivative contracts (futures/options)
- Non-financial assets (real estate, P2P lending, luxury goods,…)
- Deep dive technical stuff

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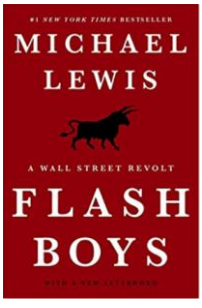
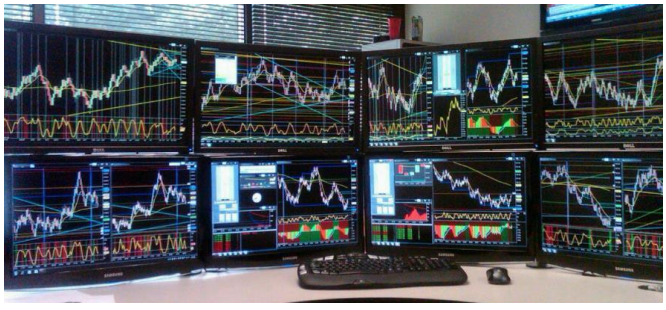
Trading vs investing





HFT trading → Milliseconds-minutes

Day trading → Intraday

Swing trading → Few days to weeks

Position trading → Weeks to months

Investing → Months to years …

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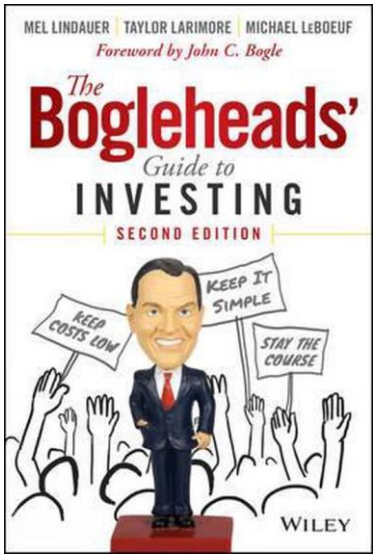
Merits of passive investing

- EMH: Share prices reflect all information and consistently beating the market (adjusted for risk) is impossible (Fama and Samuelson, 1960)(1)
- Over a 10-year period – 83% of actively managed European Equity funds failed to beat the market https://bit.ly/3qZZo05
- Choose passive investing
- Bogleheads investment philosophy https://bit.ly/3LBWMz9



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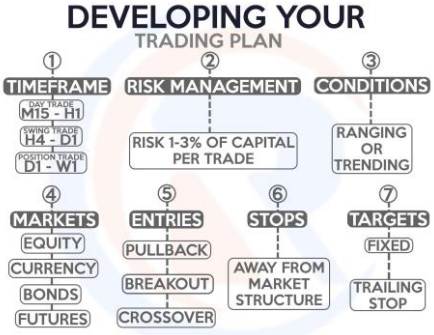
Do you believe that you can beat the market?

- Day Trading for a Living? by Fernando Chague, Rodrigo De-Losso, Bruno Giovannetti : SSRN, (June, 2020) - 97% lost money
- The cross-section of speculator skill: Evidence from day trading (2013) – only 1% consistently beats the market
- Every game has different rules – know who you compete with



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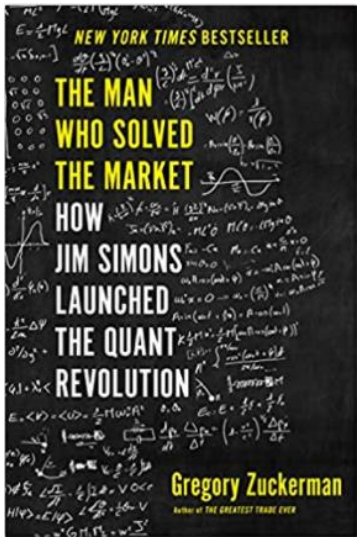
Data first approach towards trading

- RenTech – 66% average yearly return since 1988
- "There's no data like more data"(*)
- Quantitative or algorithmic trading
- Only 1 AI driven Belgian investment fund on the market - https://bit.ly/3mnLWAq



https://twitter.com/TrungTPhan/status/1424399014204637186?s=20

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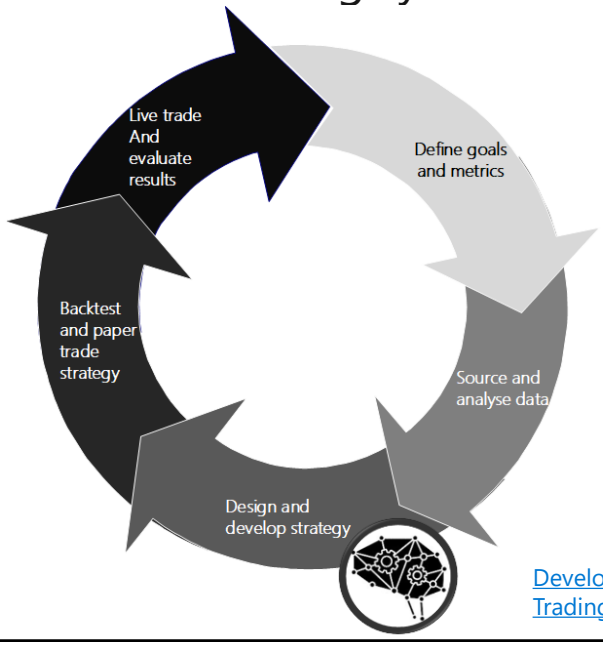
Quantitative trading system development process



- Non-linear process
- Extract signals to generate alpha
- Avoid investor bias and mistakes
- Risk vs return
- Back-testing framework

Development Process | Learning Path: Hands-On Algorithmic Trading with Python (oreilly.com)

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Why Python?

- General purpose language
- Concise, expressive and readable
- Interactivity with Jupyter notebooks
- Massive open-source software development community
- First class citizen in the Data & AI world
- https://www.python.org/

pandas

matplotlib

NumPy

python Package Index

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ANACONDA

PYTHON

NumPy, SciPy, Pandas, Scikit-learn, Jupyter / IPython, Numba, Matplotlib, Spyder, Numexpr, Cython, Theano, Scikit-image, NLTK, NetworkX and 150+ packages

conda

- Popular Python distro (150+ packages for data science)
- 25 M+ users
- Open-source individual edition - https://www.anaconda.com/products/individual
- **conda:** cross platform and language agnostic package and environment manager.
- **Environments:** custom isolated sandboxes with different versions of packages and/or Python
- Conda sheat cheet - https://bit.ly/3liHtzU
- Pip and Conda

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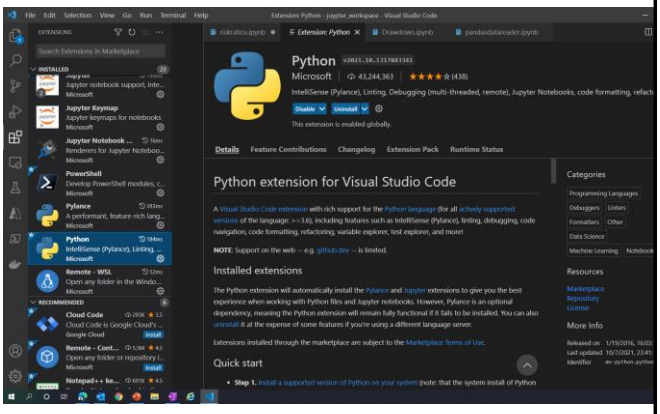
Visual Studio Code Python extension

- Available in the extension marketplace
- Works on any OS
- Requires Python 3
- Features:
  - Syntax coloring
  - Code completion
  - Linting
  - Debugging
  - Code navigation
  - Code formatting
  - Jupyter notebook support



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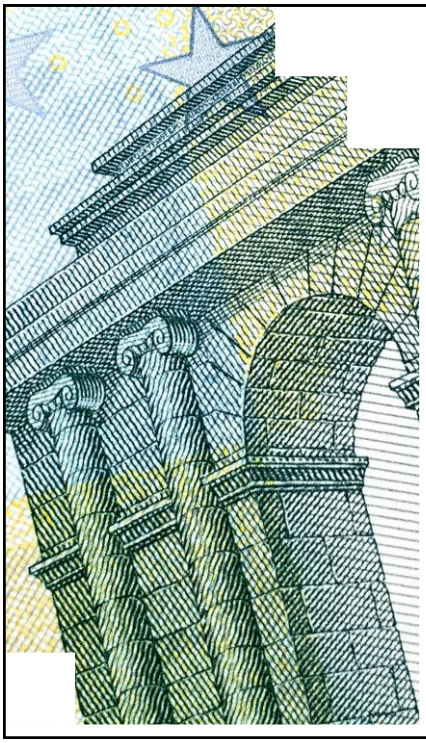

Demo - Anaconda + Python + VS Code

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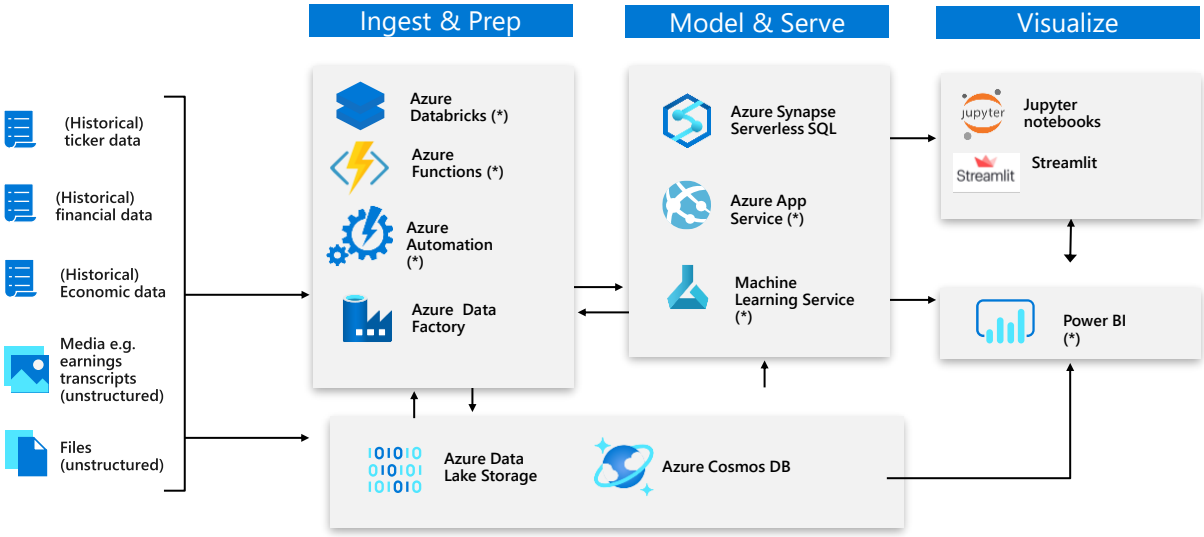
Using Azure and Python for trading



(*) Native Python support

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Source and analyze data

Types of data

Market data

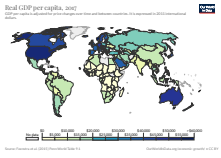
- OHLC
- Volume
- Market book

Technical indicators

- Derived from market data – (Exponential) Moving Average, Relative Strength Index, Moving Average Convergence/Divergence, …

Company data

- Revenue, debt financing, profit margin
- Ratios: PE, EPS, …
- Some gotchas to consider



Economic data

- GDP, inflation, interest rates, …
- Commodities
- Shipping prices
- …

Alternative data

- Non-traditional sources such as satellite imagery, social media activity, …
- Most hyped

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Source and analyze data

Where to find the data?

Market data

- yFinance
- Quandl (*)
- Alphavantage
- Your broker

Technical indicators

- Calculate yourself (Python TA-Lib)
- Alphavantage
- yFinance

Company data

- yFinance
- Alphavantage

Economic data

- Quandl
- World Bank
- St. Louis FED (FRED)
- Fama/French dataset

Alternative data

- Quiver Quantitative
- Build your own models e.g., NLP on earnings transcripts
- FSMA(**)

Pandas-datareader as wrapper library around multiple sources

Build a web scraper with Python and Beautiful Soup

(*) Quandl recently renamed to Nasdaq Data Link
(**) FSMA insider trading list https://www.fsma.be/en/transaction-search

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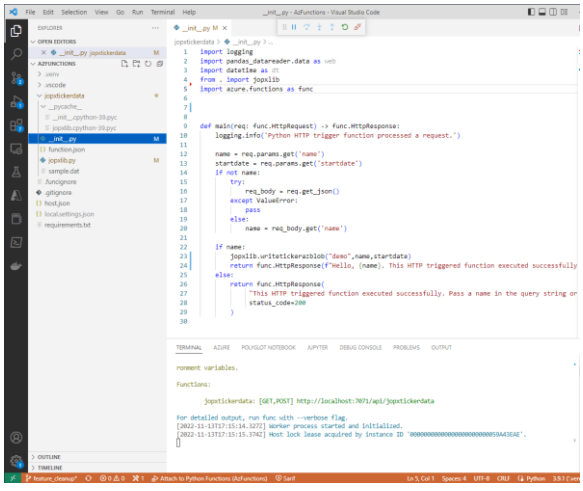
Azure Functions and Python

- Event-based, **serverless** compute to accelerate app development at low cost.
- Supports Python 3.7, 3.8 and 3.9
- Trigger Python code using multiple built-in triggers and bindings
- Great developer experience with VS Code
- Real-time monitoring with Azure Applications Insights



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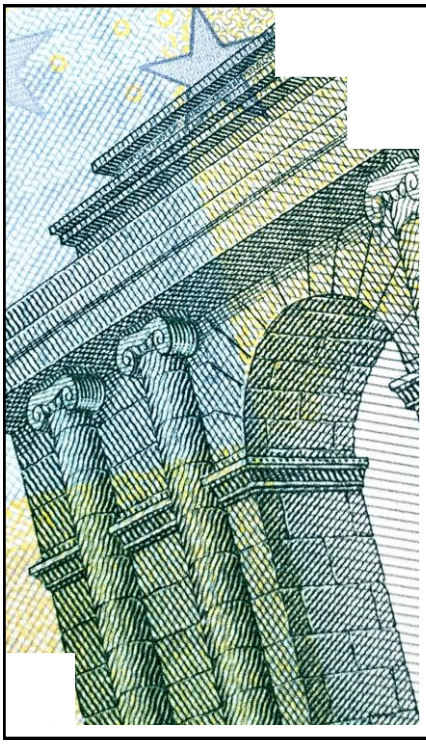

Demo - Python and Azure Functions

http://bit.ly/3O9AQwK

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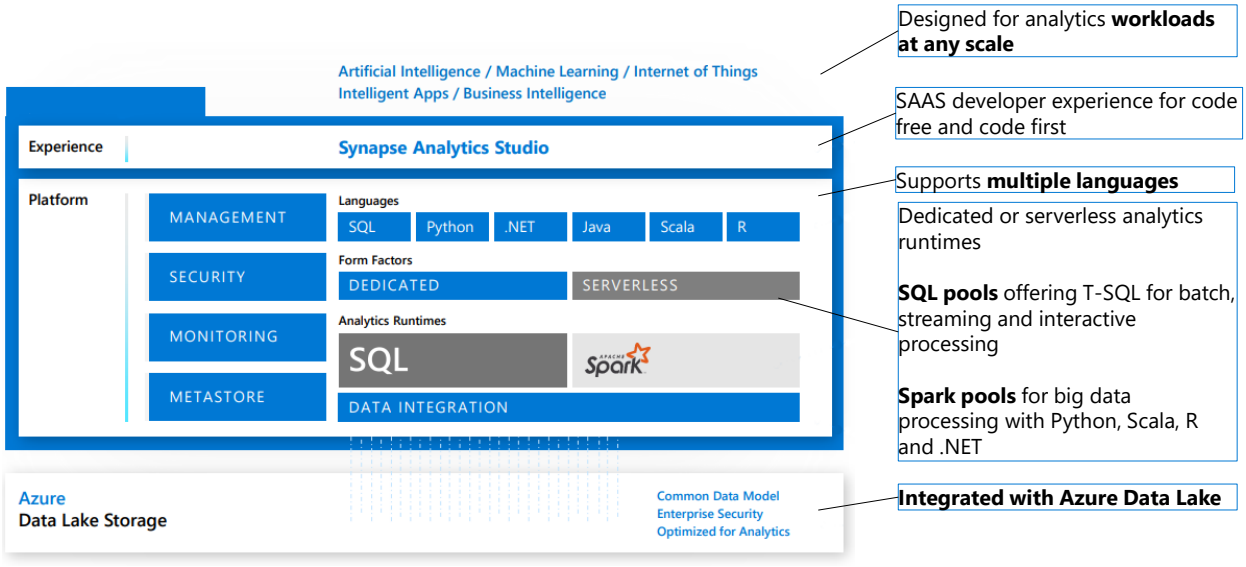
Azure Synapse



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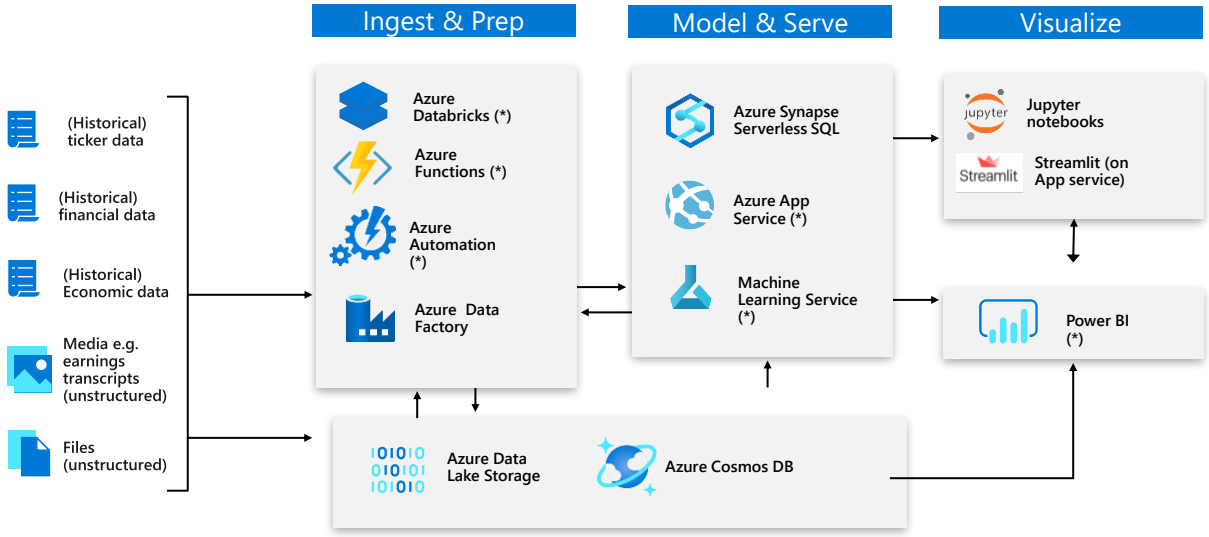
Using Azure and Python for trading



(*) Native Python support

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Azure Synapse

Serverless vs dedicated SQL pools

Serverless SQL pools

- Used for data preparation or ad-hoc queries against unstructured data
- Provides an always available SQL endpoint for unplanned workloads
- Enables interactive querying
- Pay per use - 4,48€/TB of data processed.

Dedicated SQL pools

- Used for Data Warehouse operations
- Provides predictable performance
- Reserves processing power for data stored in SQL tables
- Cost known upfront - smallest DW100C (100 DWU) – monthly cost +/- 1.000 EUR

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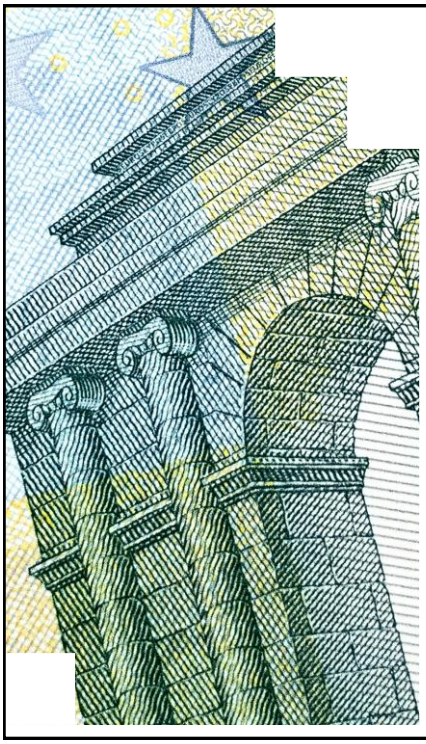

Demo - Explore and analyze the S&P 500 using Azure Synapse Serverless SQL

http://bit.ly/3O9AQwK

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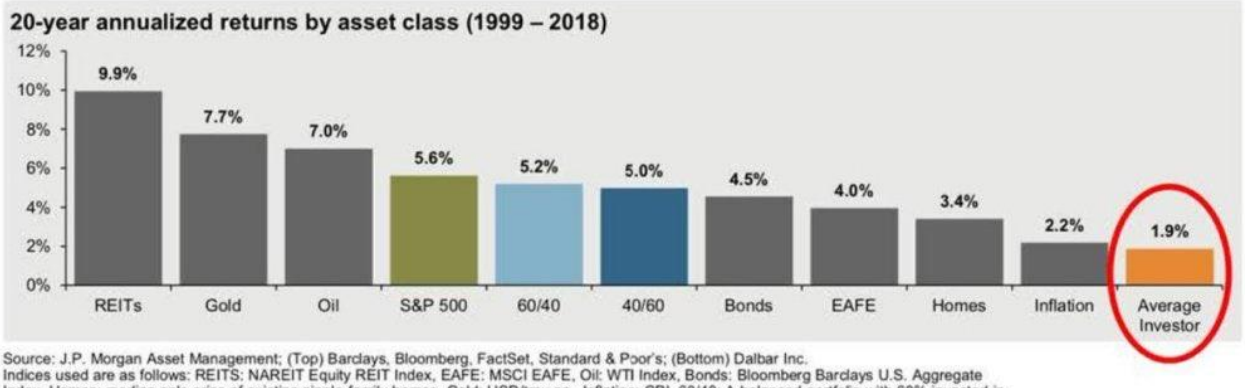
Assessing returns



Source: J.P. Morgan Asset Management; (Top) Barclays, Bloomberg, FactSet, Standard & Poor's; (Bottom) Dalbar Inc.
Indices used are as follows: REITS: NAREIT Equity REIT Index, EAFE: MSCI EAFE, Oil: WTI Index, Bonds: Bloomberg Barclays U.S. Aggregate Index, Homes: median sale price of existing single-family homes, Gold: USD/troy oz., Inflation: CPI. 60/40: A balanced portfolio with 60% invested in S&P 500 Index and 40% invested in high-quality U.S. fixed income, represented by the Bloomberg Barclays U.S. Aggregate Index. The portfolio is rebalanced annually. Average asset allocation investor return is based on an analysis by Dalbar Inc., which utilizes the net of aggregate mutual fund sales, redemptions and exchanges each month as a measure of investor behavior. Returns are annualized (and total return where applicable) and represent the 20-year period ending 12/31/18 to match Dalbar's most recent analysis.
Guide to the Markets – U.S. Data are as of March 31, 2019.

J.P.Morgan
Asset Management

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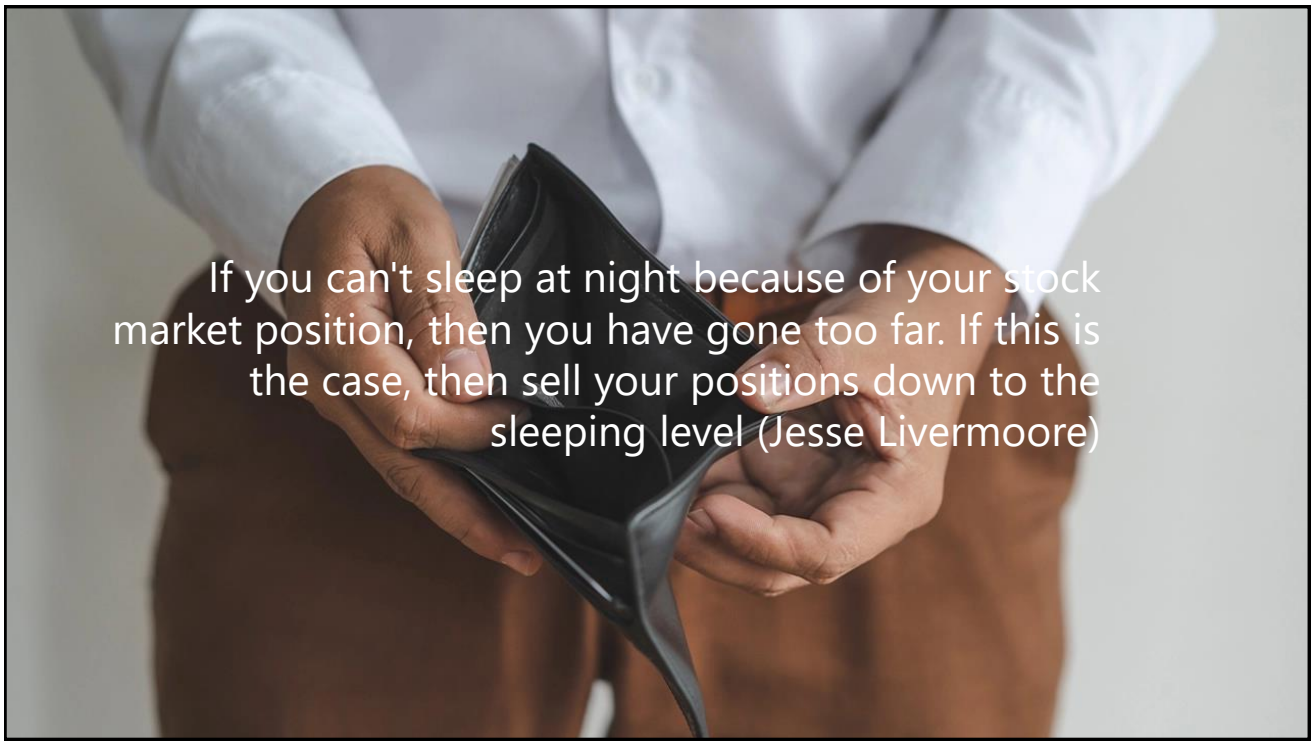

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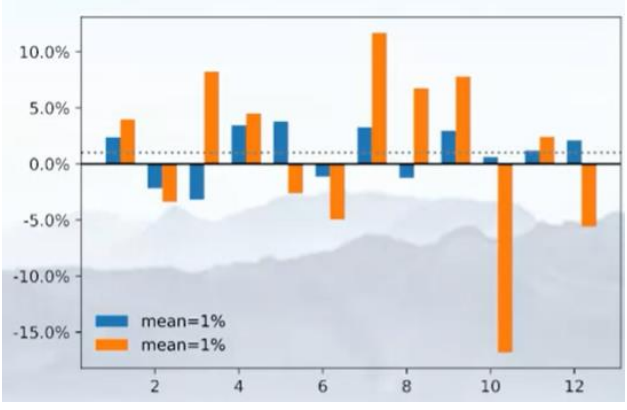
Risk and return



- Volatility as measure for risk
- Volatility measured by standard deviation
- Different metrics for comparing reward (return) to risk
  - Beta, Sharpe ratio, max drawdown, Sortino ratio, Calmar ratio, sterling ratio, …

$$\sigma = \sqrt{\frac{\sum(x_i - \mu)^2}{N}}$$

Introduction to Portfolio Construction and Analysis with Python(Coursera)
https://github.com/jorisp/tradingnotebooks/blob/master/riskratios.ipynb

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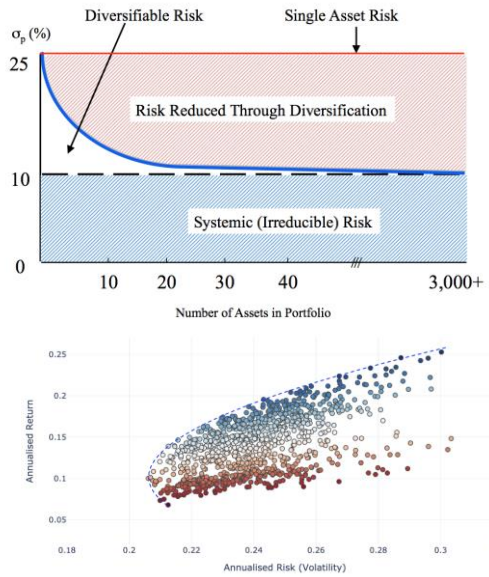
Modern Portfolio Theory and diversification

- Harry Markowitz (Nobel Prize 1990) – Journal of Finance 1952- "Portfolio Selection" (5)(6)
- Modern portfolio theory (MPT) is a theory on how risk-averse investors can construct portfolios to maximize **expected return** based on a given level of **market risk**.
- Portfolio diversification allows you to get rid of a portion of risk
- Limits to diversification –during market crashes, covariance will increase



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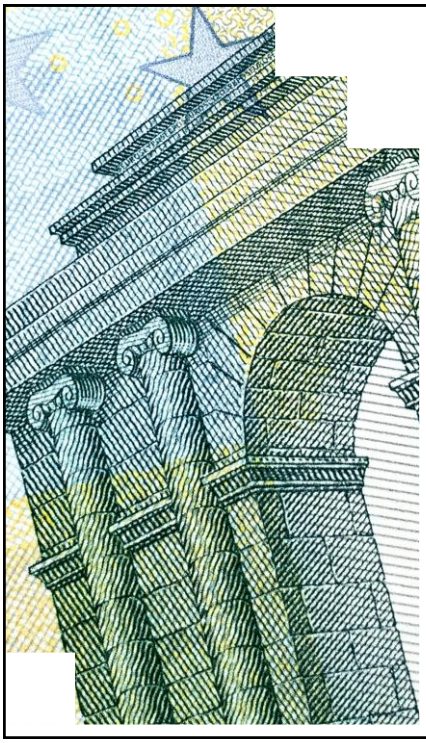

Demo - Visualizing risk vs return with Power BI

https://bit.ly/3EgAnUK

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Design and develop a strategy

Introduction

- Generating alpha
- Main strategies:
  - Momentum trading – "The trend is your friend (until it ends)
  - Mean reverting trading strategy
- SMA cross-over example

Quant	Momentum (time-series or cross-sectional)	Pair-trading, most types of statistical arbitrage	Advanced models (e.g. HMM, regime switching)	HF Market-making, Cash-futures arbitrage	News-based automated trading
Technical	MA cross-over, Continuation patterns	Swing, Retracement, Pivot trading	Opening range, dual thrusts, patterns	Range-based short gamma (vol selling)	Nothing much here
Fundamental	Factor-based investing	value investing	value/ RV (relative value) strategies	Cross-asset, cross country RV/ short gamma	Usually discretionary
	Trending	Mean-reverting	Break-out	Carry	Event-based

Quantinsti YouTube - https://bit.ly/3iLo352

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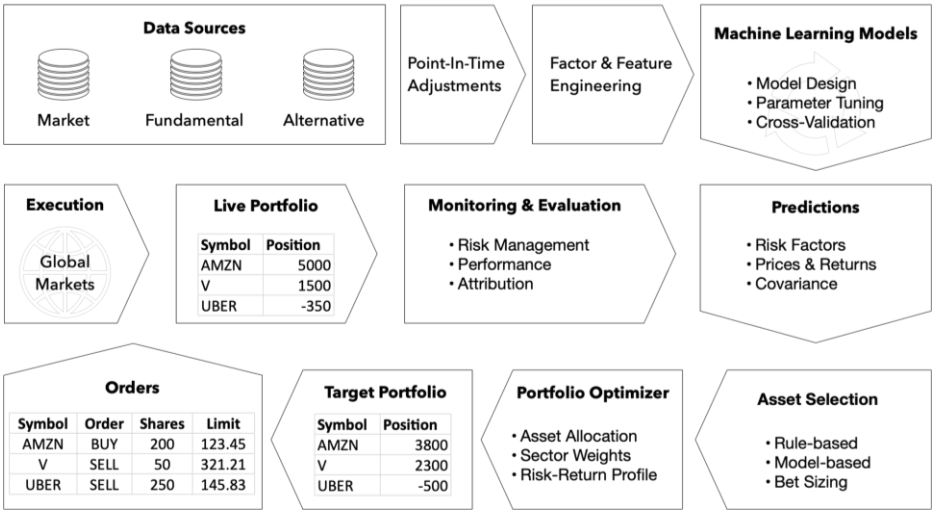
Applying machine learning to Trading

ML4T workflow



Machine Learning for Algorithmic Trading, Stefan Jansen - https://github.com/stefan-jansen/machine-learning-for-trading

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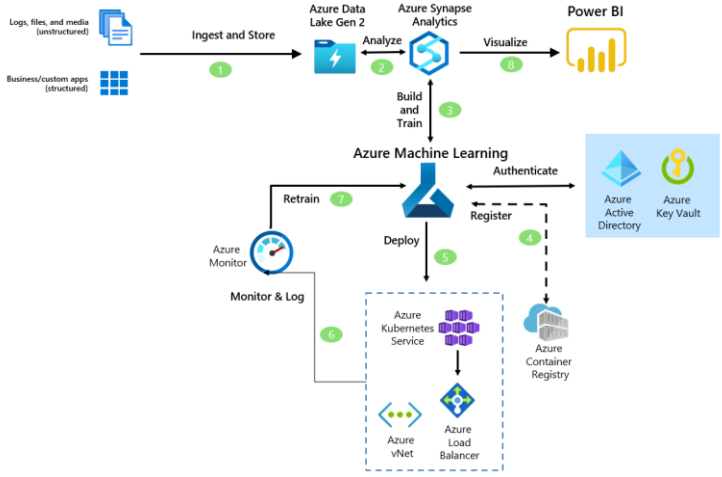
Design and develop a strategy

ML approach with Azure Machine Learning

- Managed machine learning service
- Azure services + Python SDK
- Support MLOps with MLFlow
- AutoML https://bit.ly/3v64bOX



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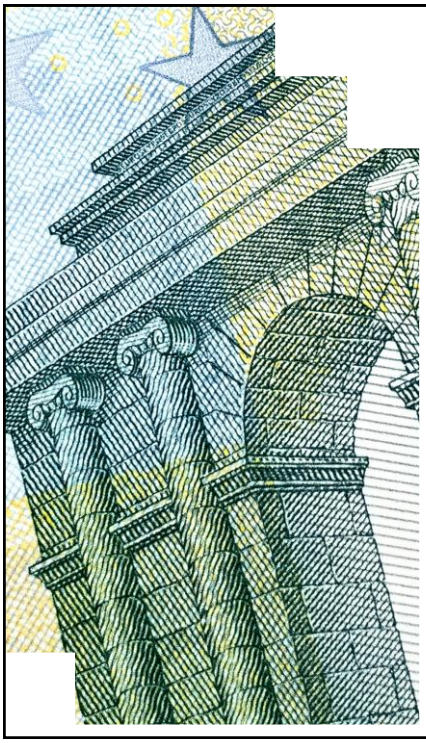

Demo - Trading strategy using SMA cross-over
http://bit.ly/3XjSmm6

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Summary

- Start by building a foundational portfolio of low-cost index ETFs
- Trading and building a trading system is a full-time activity
- No easy way to make money fast
- Python and Jupyter notebooks easy solution to gather/transform/visualize information
- Azure Synapse Serverless SQL rocks !!!
- Use Azure when you need to scale or get started quickly (otherwise work locally)

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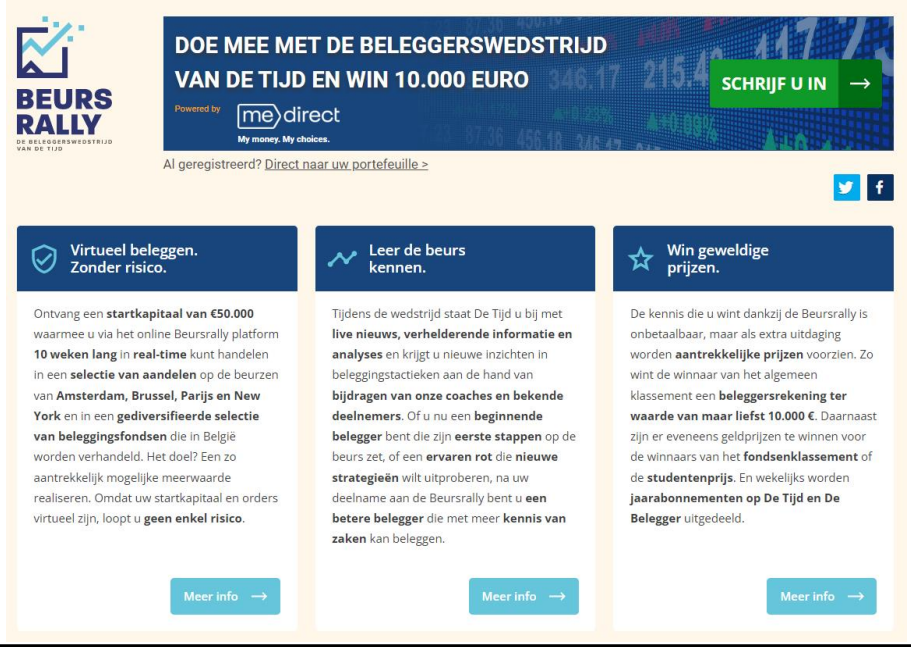
https://www.tijd.be/beursrally.html



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Resources - Getting started

- Passive Investing
  - Bogleheads investing philosophy https://bit.ly/3LBWMz9
  - Are markets efficient? (discussion between Fama and Thaler) https://www.youtube.com/watch?v=bM9bYOBuKF4
  - https://backtest.curvo.eu
- Active Investing
  - Beursrally | De beleggerswedstrijd van De Tijd | De Tijd (Start 21/11)
  - https://spaarvarkens.be/ (NL)
  - Vlaamse Federatie van Beleggers (VFB) - https://www.vfb.be/ (NL)
  - Chess Capital (NL only) - https://www.chesscapital.be/start-hier/ (NL)
  - Chess Capital podcast – Alles over waardebeleggen - https://spoti.fi/301gXmj (NL)
  - Inside Beleggen Podcast van Trends - https://spoti.fi/303EPFV (NL)
  - De Beurs van Tegenwoordig (De Tijd) - https://spoti.fi/3mA4nly (NL)
- Python
  - https://docs.microsoft.com/en-us/learn/paths/python-first-steps/
  - https://aka.ms/python-getting-started
  - PyCon and PyVideo.org
  - Master the basics of Conda environments in Python - https://www.youtube.com/watch?v=1VVCd0eSkYc

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Resources - Getting started

- Azure Synapse
  - Realize Integrated Analytical Solutions with Azure Synapse Analytics - Training | Microsoft Learn
  - Work with Data Warehouses using Azure Synapse Analytics - Training | Microsoft Learn
  - Perform data engineering with Azure Synapse Apache Spark Pools - Training | Microsoft Learn

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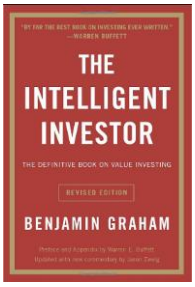
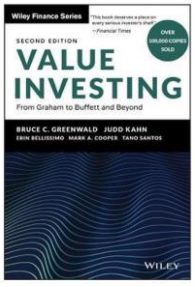
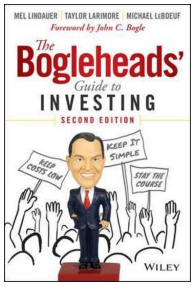
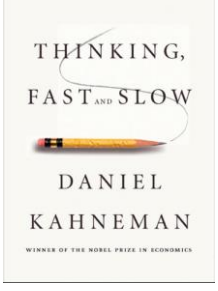
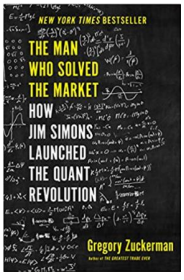
My favorite books on investing

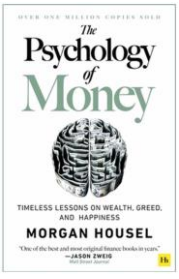


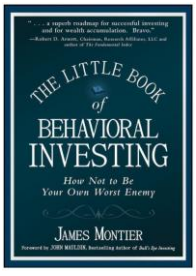












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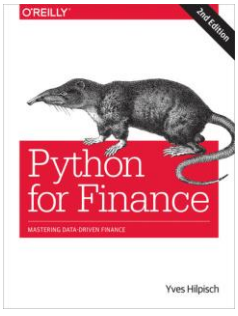
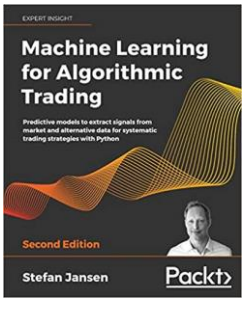
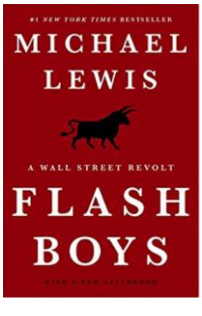
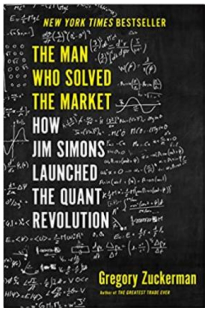
My favorite books on trading

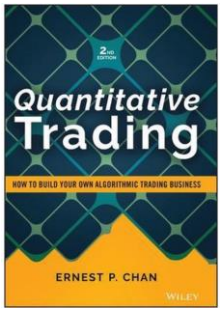
- Python for Finance, Yves Hilpisch
- Machine Learning for Algorithmic Trading, Stefan Jansen
- Flash Boys, Michael Lewis
- The man who solved the market, Gregory Zuckerman
- Quantitative trading: how to build your own algorithmic trading business (2nd edition), Ernest Chan











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