



Making investing a science

Deep Learning and Big Data technologies

qplum.co/interactive-brokers

The problem

Assets managed globally: \$164 trillion

Fees charged : more than \$1 trillion a year

Yet, we are no closer to solving the problem

Towards a science of investing

“ In future, we should be investing with a trustworthy tool and not experts.

The tool should look at every aspect of the data.

The tool should be affordable and efficient.

The tool should know what we have learned already.”

- Benjamin Graham



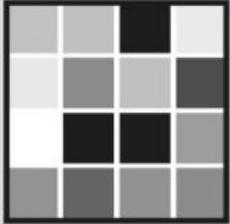
... and it should keep learning

The answer is obvious ... Deep Learning

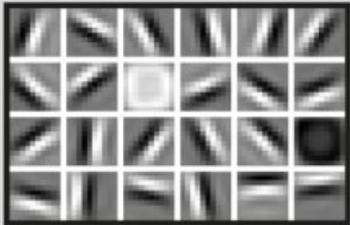
What is Deep learning?

FACIAL RECOGNITION

Deep-learning neural networks use layers of increasingly complex rules to categorize complicated shapes such as faces.



Layer 1: The computer identifies pixels of light and dark.



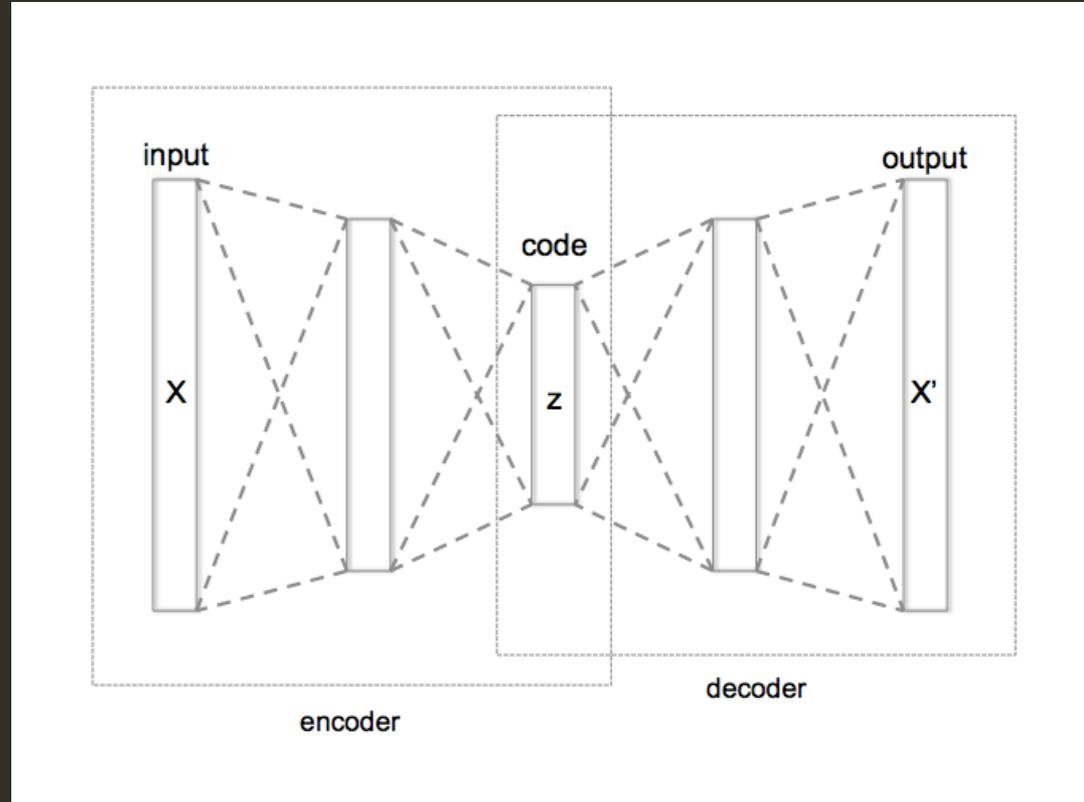
Layer 2: The computer learns to identify edges and simple shapes.



Layer 3: The computer learns to identify more complex shapes and objects.



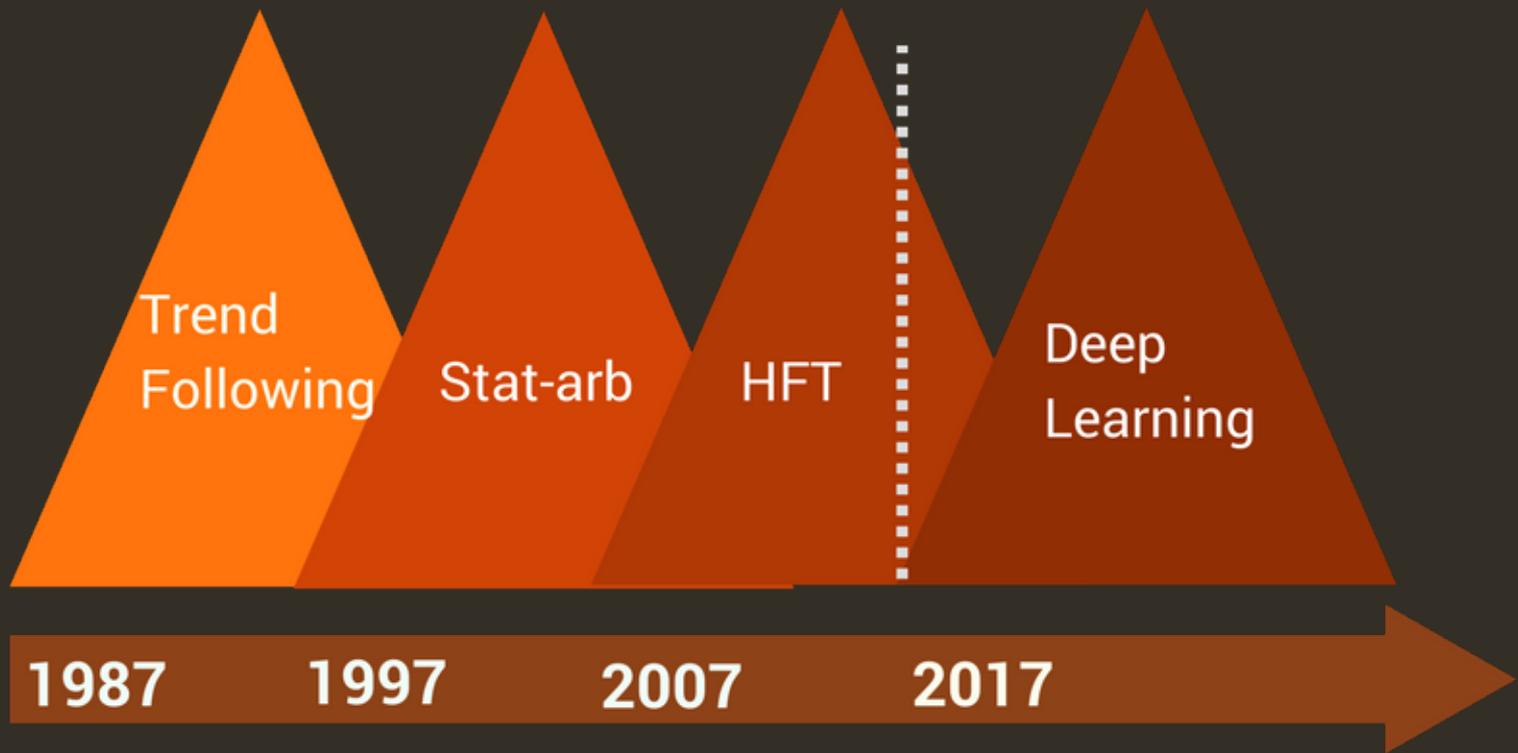
Layer 4: The computer learns which shapes and objects can be used to define a human face.



The ten-year cycle of innovation in Trading

Research report on the ten year cycle in quant trading ⁶

1987, 1997, 2007, 2017?



Business drivers for Deep Learning in Trading: Why now?

Why now? - Lots of data

- High Frequency trading has led to a lot of data. We are generating more data in one day now than we were in the entire decade of the 1990s. In a world awash with data, finding information needs Deep Learning.
- The traditional quant approach does not spend as much time in discarding the noise. It tries to find a signal everywhere.

Why now? - Hardware and Software optimized for DL

- GPUs and customized hardware that allows us to solve problems in hours that would have taken weeks a year or two ago.
- Software like Tensorflow/PyTorch and MapReduce make all of this cheap enough for small companies to innovate with.

Why now? - ML in social sciences

- Trading is a social science and until recently all machine learning was focused on pure sciences. Deep Learning is perfect for social sciences.

Why now? - ML is better than traders

- A shift in power from star traders to complex systems.
- Five years ago, no serious money manager would let us touch their money with DL

Why now? - Because of us

- Availability of talented engineers in DevOps, Data Infrastructure and Machine Learning who can make it happen, who want to make inroads into this last bastion of inequality and want to stop people from selling low quality products to investors.

Why is Deep Learning better for trading?

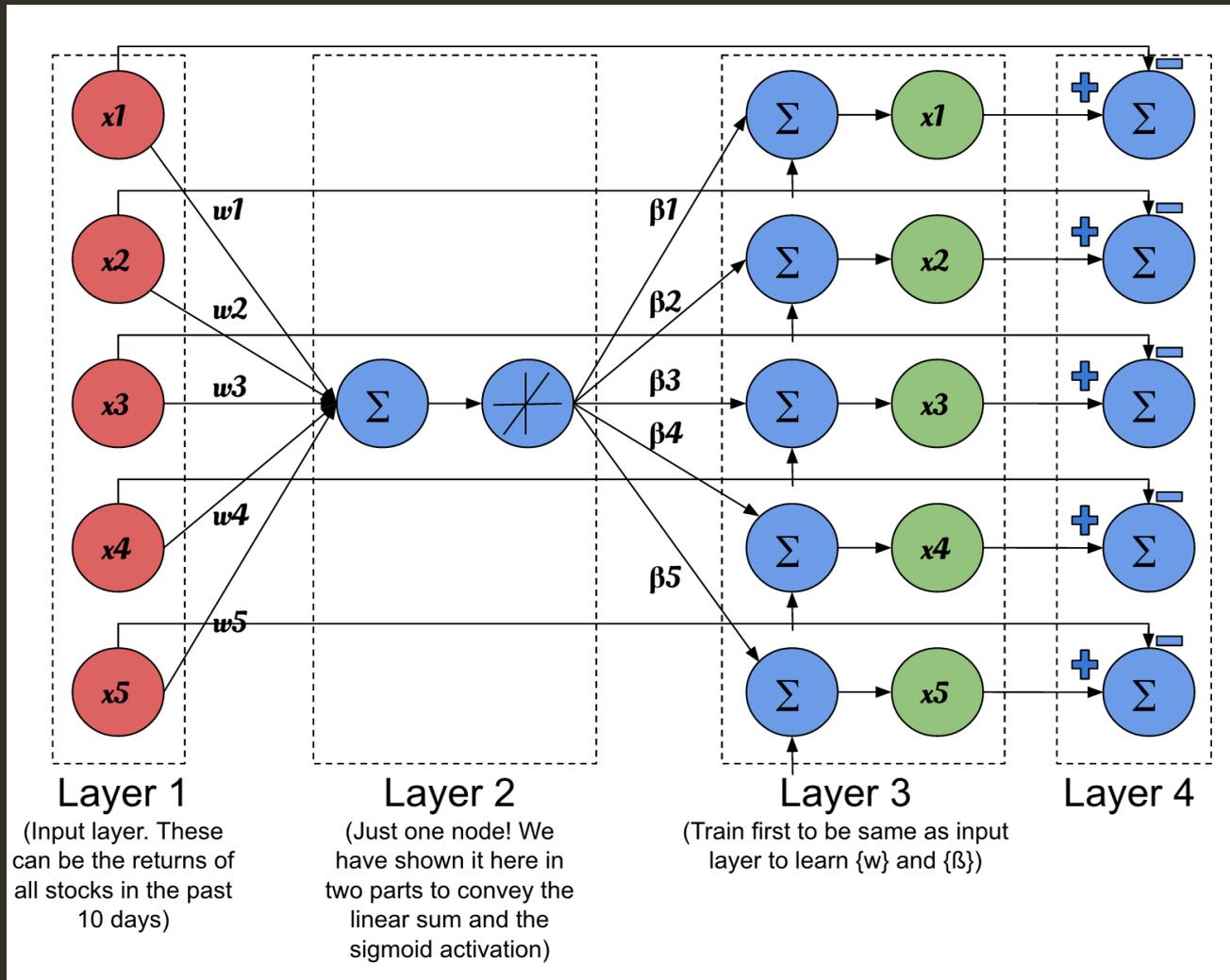
Why is DL a good fit for trading?

“ Deep Learning is about learning the perfect representation of markets on which to make predictive models.

“ Financial markets have a lot of noise. Hence we should be spending a lot more time learning a summary of what happened. That's why ... Deep Learning.

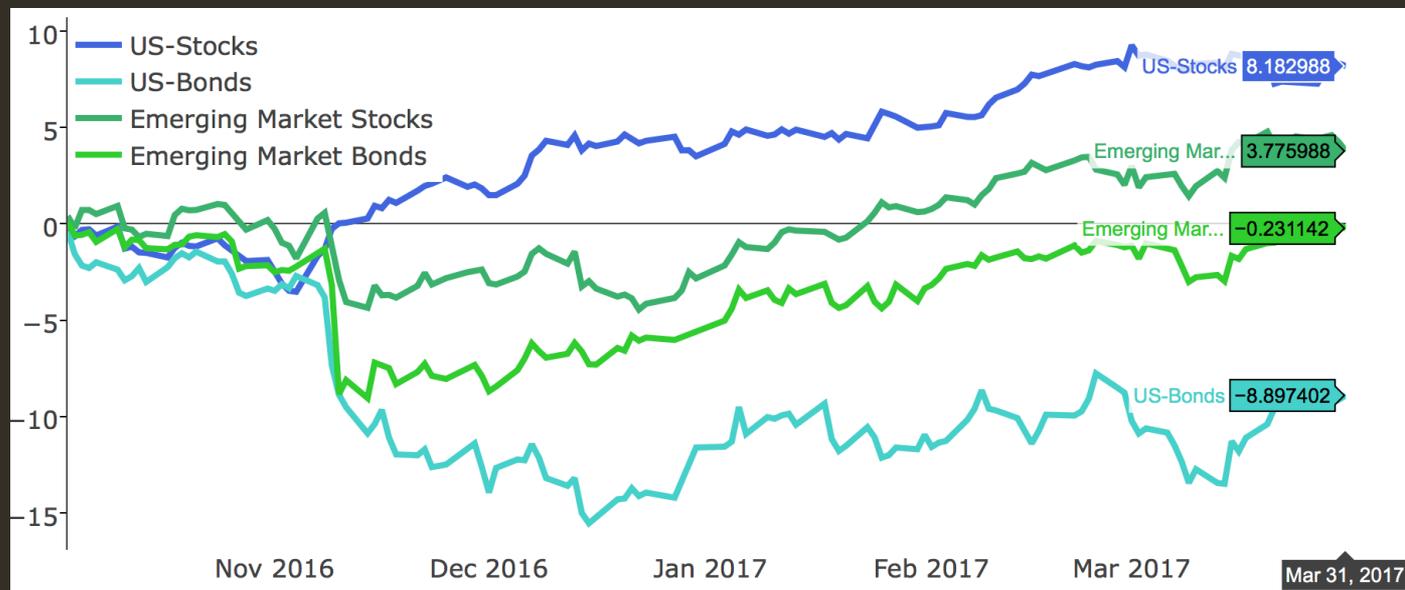
“ Deep Learning is much better than machine learning methods in social sciences. Trading is the ultimate human generated dataset.

Use an autoencoder to interpret markets

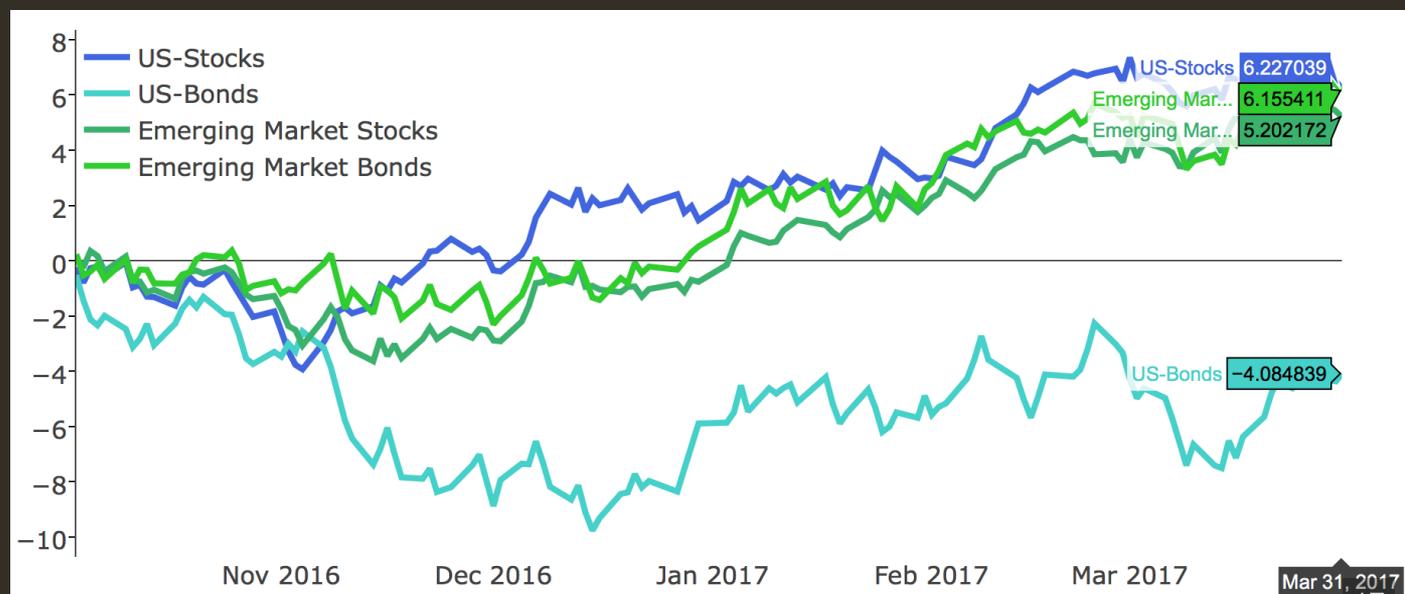


How we use Deep Learning at qplum

Original data
in markets

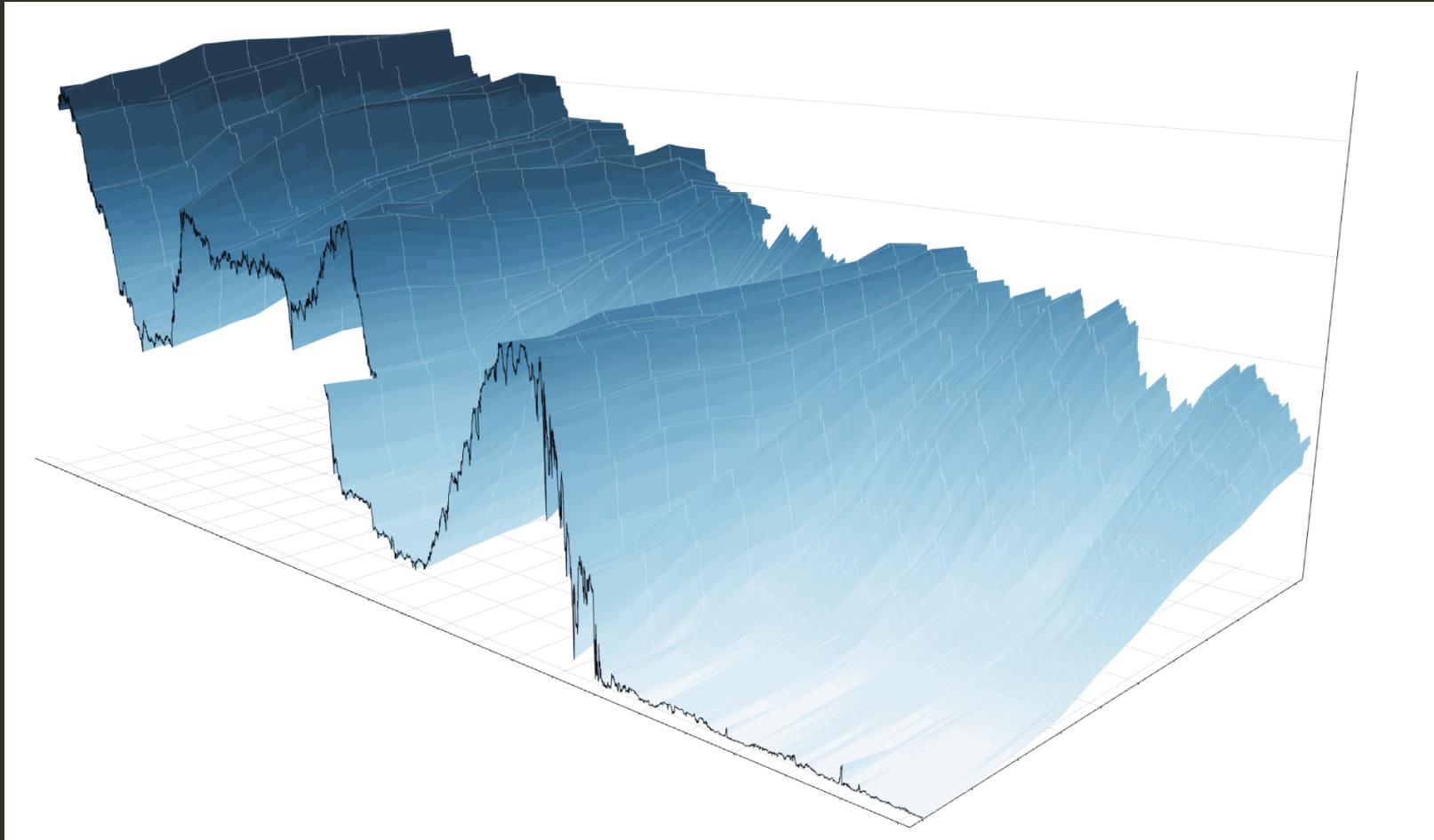


Our DL network
understands the
summary



Understanding the yield curve

.. the way humans do



Quiz

1. What is systematic trading?
2. What is the difference between quant and data-science?
3. What is trend following?
4. What is statistical arbitrage?
5. When did machine learning start getting used in finance?
6. What is high frequency trading? Quant / data-science?
7. What is deep learning (DL)?
8. How is DL different than old-school machine learning?
9. What makes more money buy and hold / data-science?
10. What sort of funds are more likely to make money now?
11. Which companies are hiring data-scientists?
12. What is the difference between FinTech and finance?

Email me your answers at [gchak \[AT\] qplum.co](mailto:gchak@qplum.co)

How is it different from the traditional
quant approach?

The traditional quant approach

1. Hire lots of quants.
2. They all think of trading strategies.
3. They backtest them
4. The firm invests in the strategies that have the best returns.

Problem: Too much data at every step

- This requires hiring a lot of quants
- They will then make millions and billions of features.
- Challenge then is to pick the needle in a haystack of trading strategies, with very little data.

Clean formulas don't make money

- The workflow for a good quant is to make an integrable mathematical formula.
- But that's not real-world.
- Case in point is Modern Portfolio Theory. The "optimal" trading strategy is easily outperformed by rebalancing.

What's the end goal? What are we
working towards?

Investing can be a science

Not a game

Not a competition

but an inclusive process where decision making is truly data-driven.



Investing can be a science,
if we all work towards it.

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