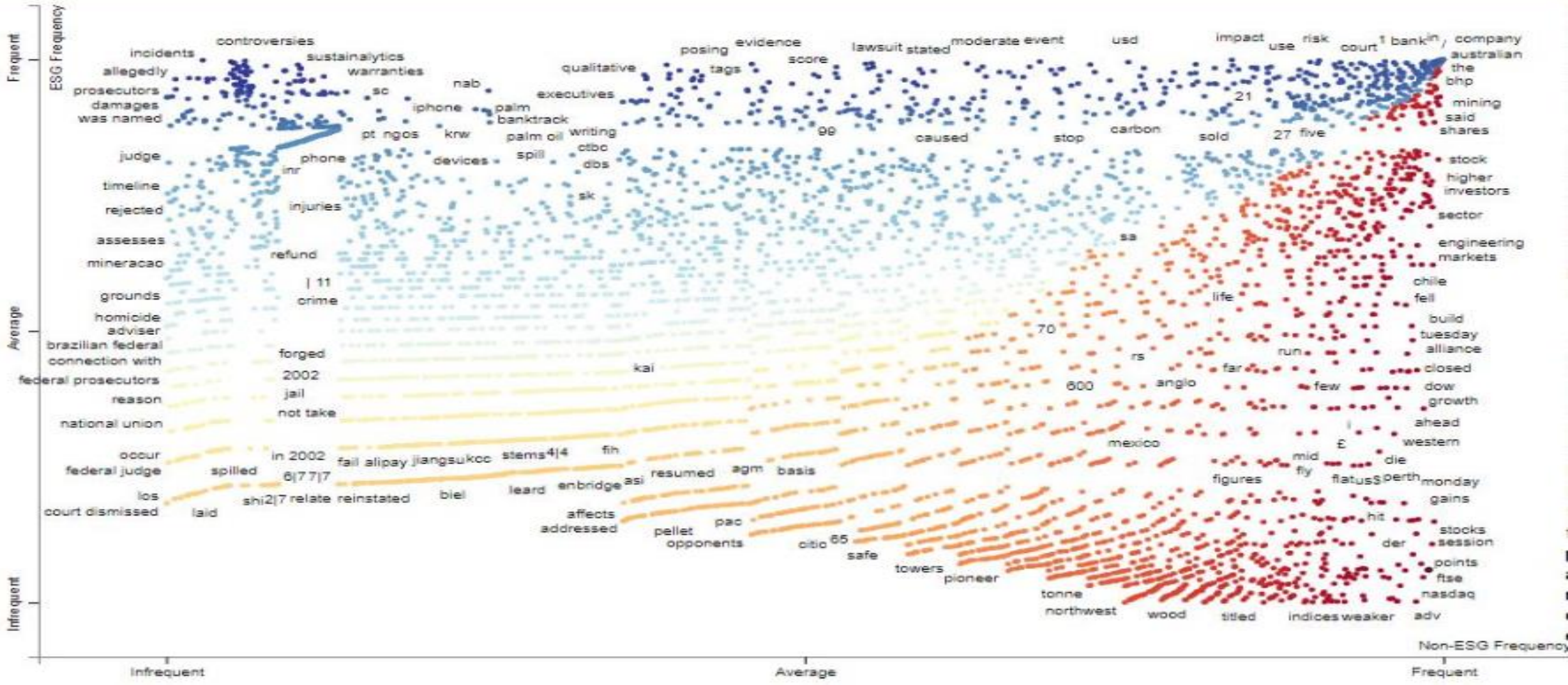

M & G Prudential AI Projects Overview

AICommunity@prudential.co.uk

12 February 2019

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Directors Deals Project

Directors deals…different stories

Jamie Dimon buys $26.6 million ir JPMorgan Chase stock

by Chris Isidore @CNNMoneyInvest

February 12, 2016: 7:49 AM ET

Elon Musk buys $10 million in Tesla shares and plans to purchase $20 million more next week

- Tesla CEO Elon Musk added about $10 million worth of shares to his personal stake in Tesla, according to a filing on Tuesday.
- A second $20 million purchase, done as a direct transaction with Tesla, should follow next week, according to the filing.
- Musk previously announced plans to buy $20 million in Tesla shares after a settlement with the SEC over fraud charges cost him and the company $20 million each.

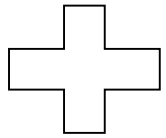
Directors dealing as an alpha source

Do directors deals signal an investment opportunity?

Dataset: Europe & US director trades

Model : Data before 2015 (140,000 trades)
Test period: 2015**,** 2016,2017,2018 (35,500 trades)

Measuring outperformance over a 30 day period



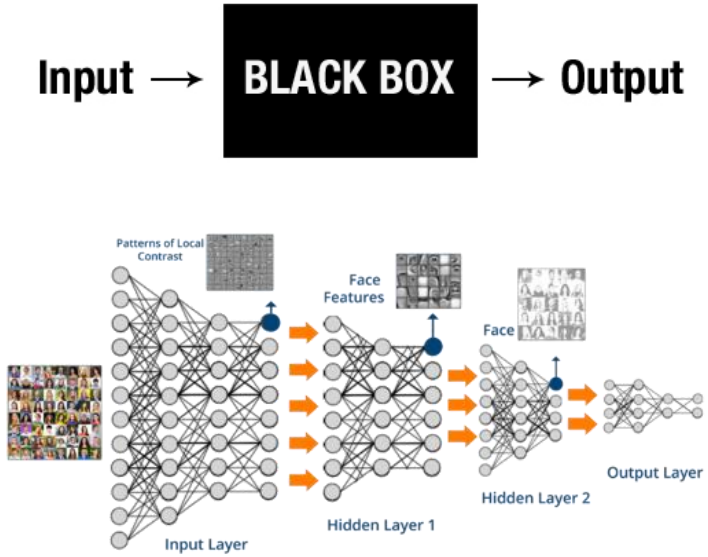
1. New features/variables +
2. New Models
3. Understanding the model selection
4. Moving from “a lot of data” to “big data”

Machine learning vs econometrics/statistical analysis

$$y = -5.4x + 91.3$$
$$R^2 = 0.85$$

(+) Focus on understanding casual relationships (if x…then y)
(+)Establishes precise relationships (equation)
(+)good with “small” amounts of data (still benefits from more data)

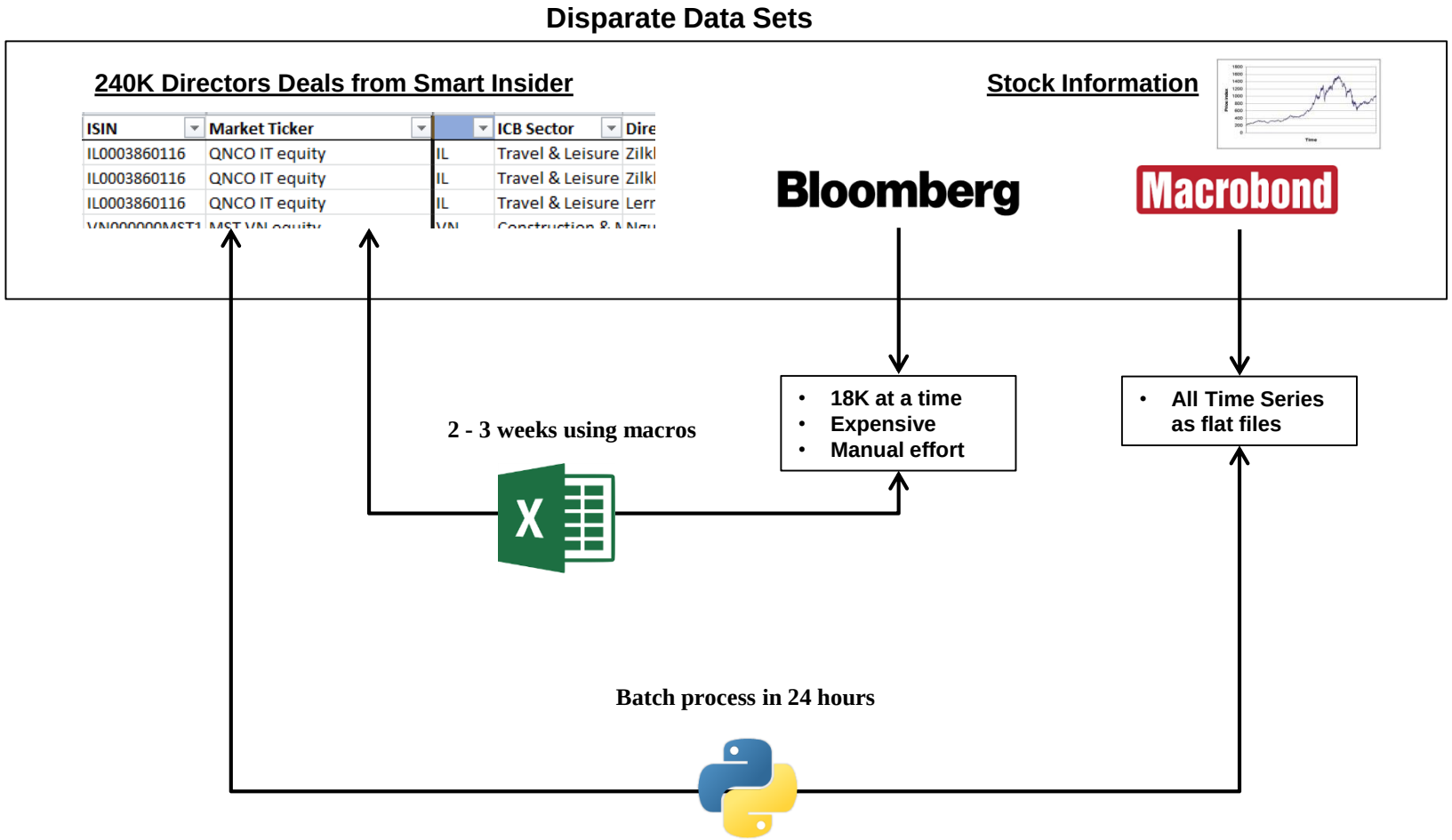
(-)Limited capacity for more variables
(-)Limited forecasting capacities
(-)Often lower accuracy
(-)Long time to build



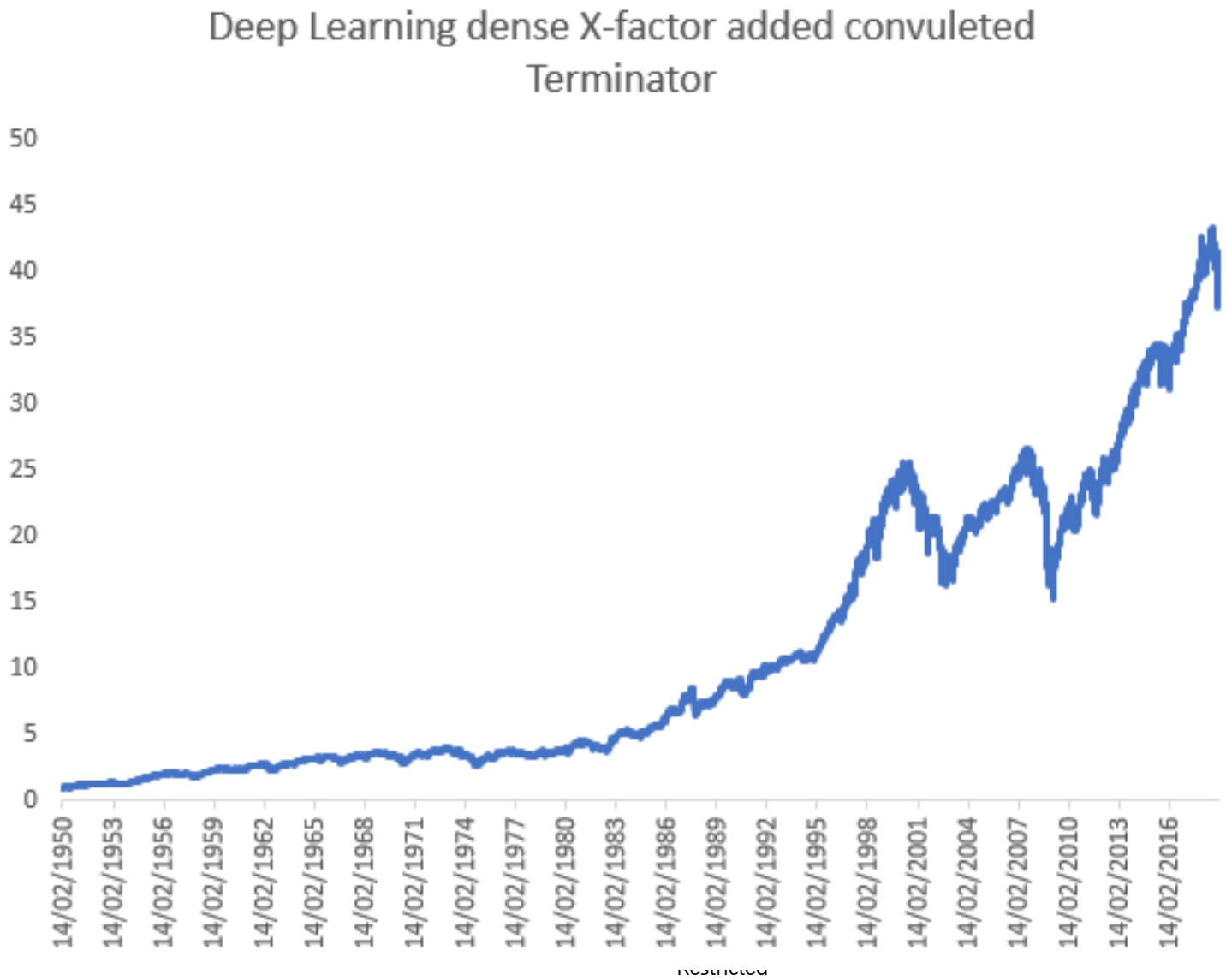
(+)Focused on forecasting & classification
(+)Handles huge amount of variables(features)
(+)Ensemble approach: a lot of “bad” models is better than a good model

(-)Machine learning often means…only the machine understand the relationship
(-) Much more data intensive
(-)Computation of models is slower and memory intensive (GPUs…)

Data Preparation using Python



Measuring performance in finance….



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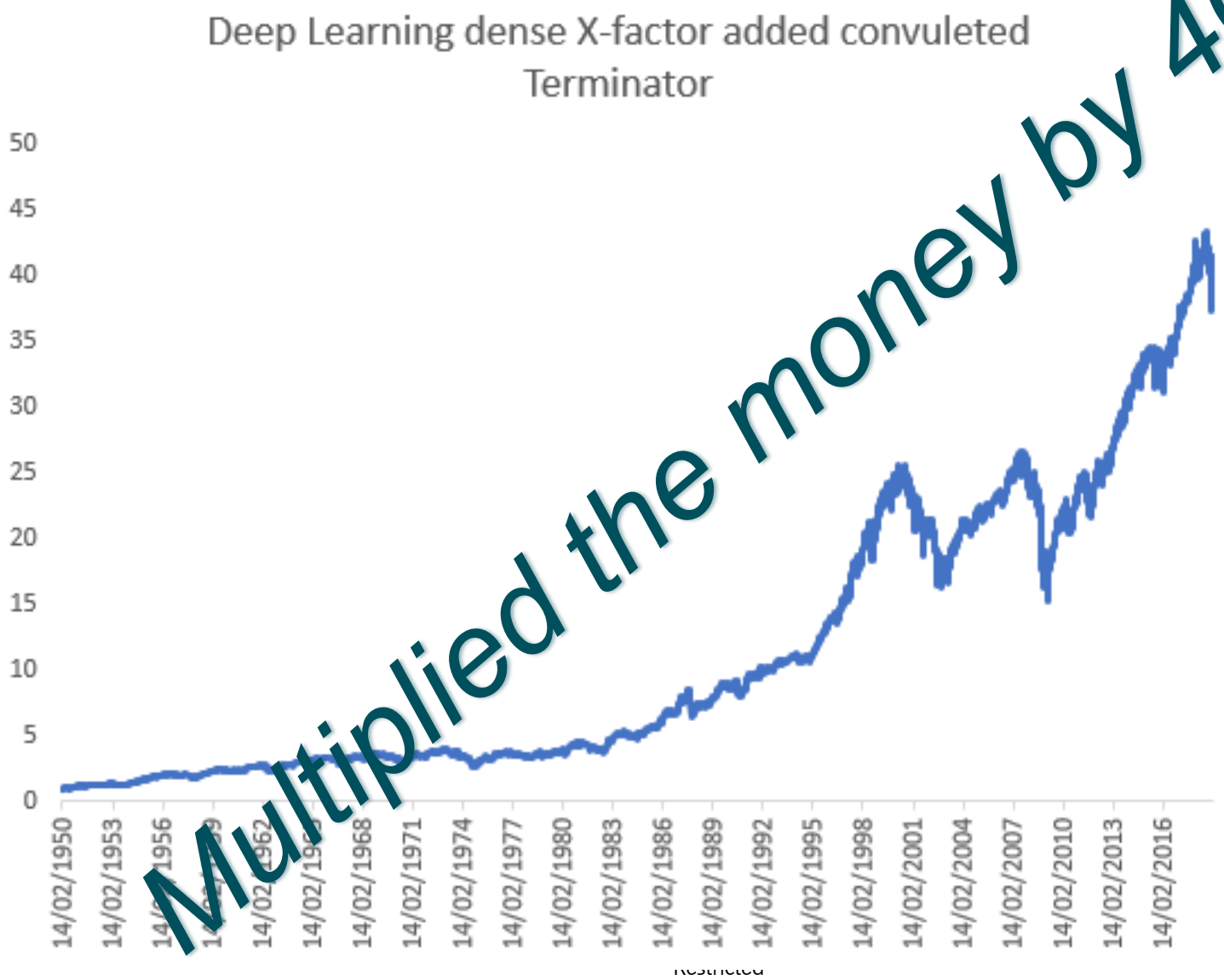
Measuring performance in finance….



Multiplied the money by 40!

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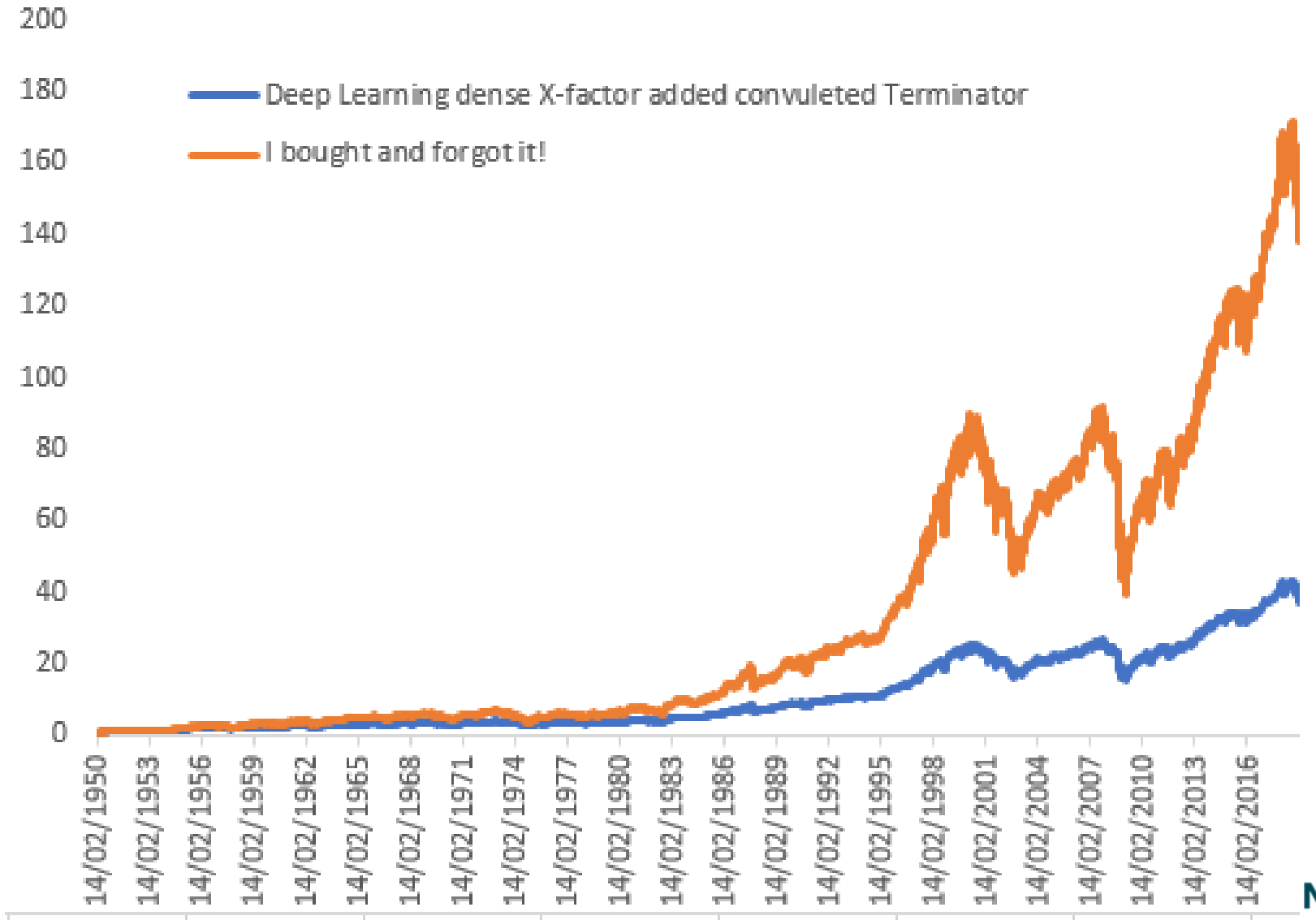
Relative performance!



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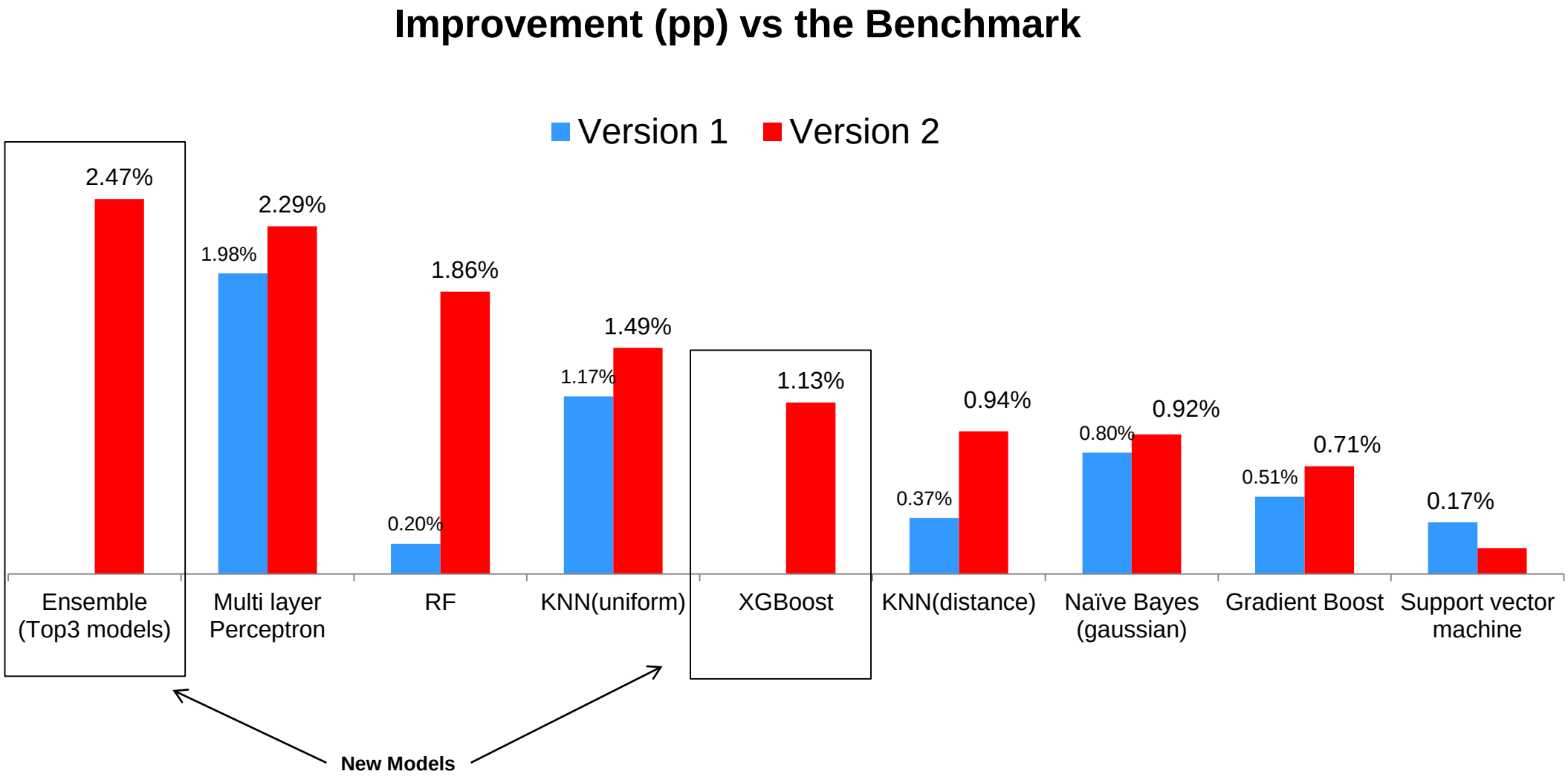
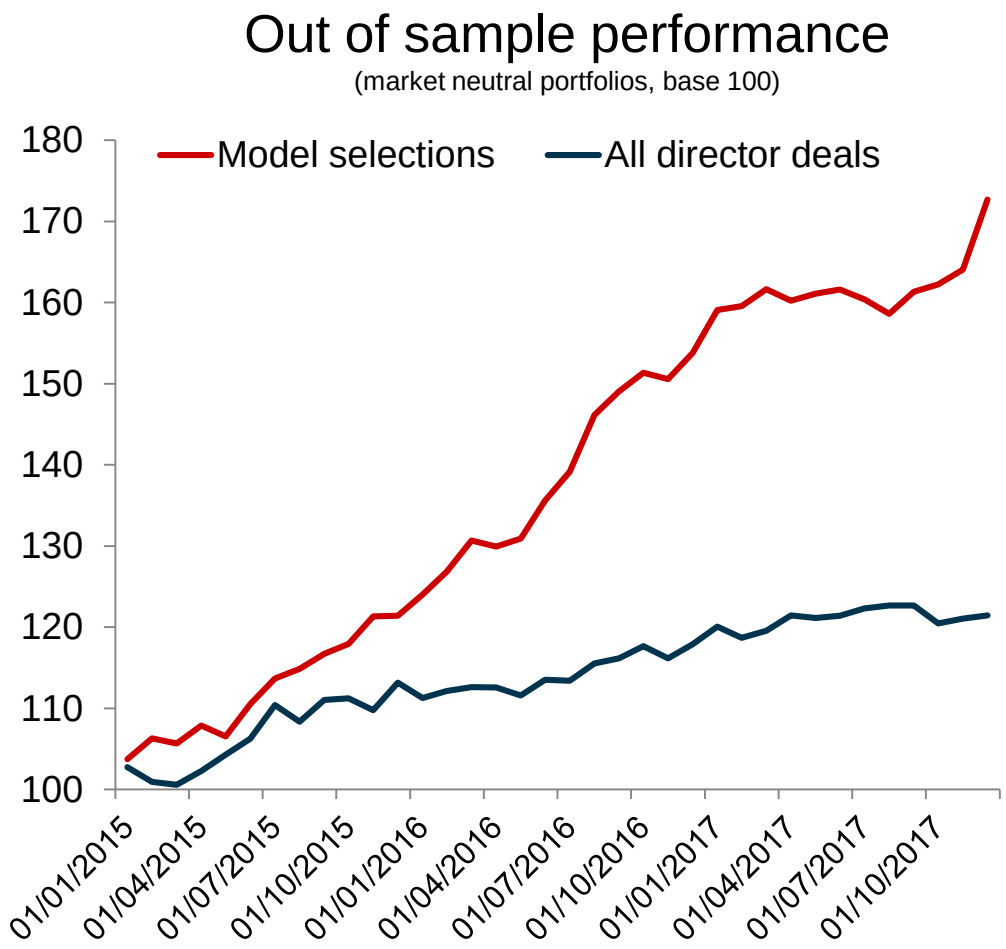
What's a “good" accuracy rate?

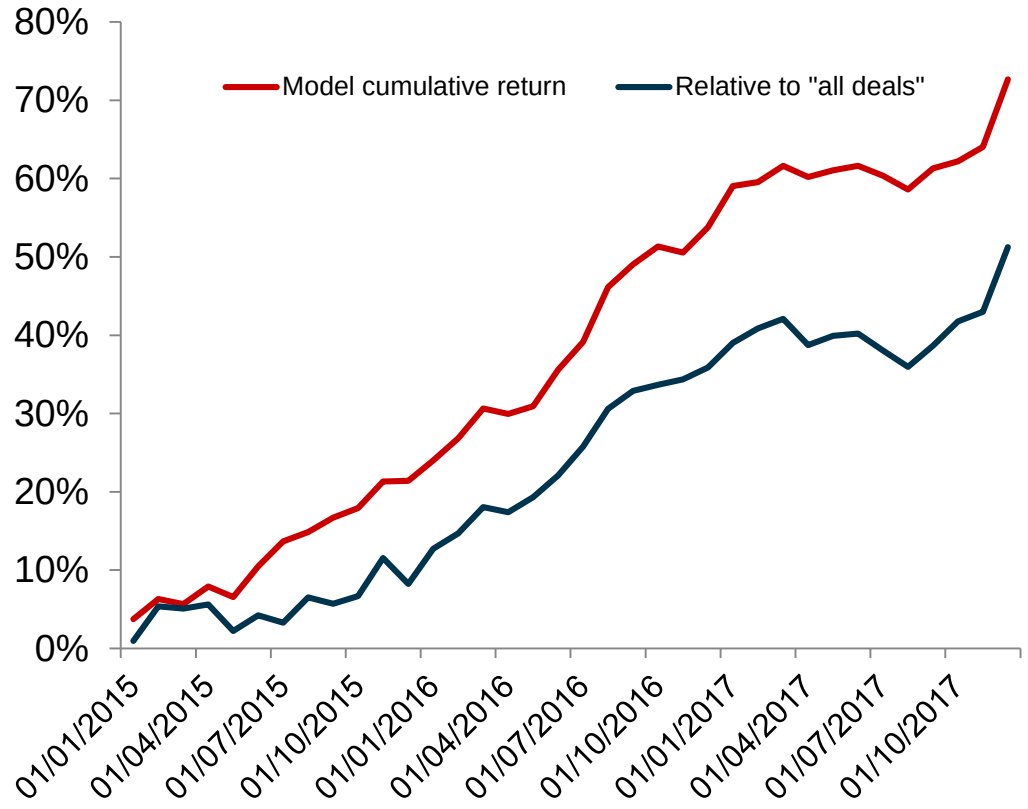
52.7% looks great!

Comparison of Models



Out-of-sample performance (2015,2016,2017)





	Model Selection	All deals
Positive months	29	23
Best	5.3%	3.9%
Worst	-1.2%	-1.9%
Max Drawdown	-1.9%	-2.1%

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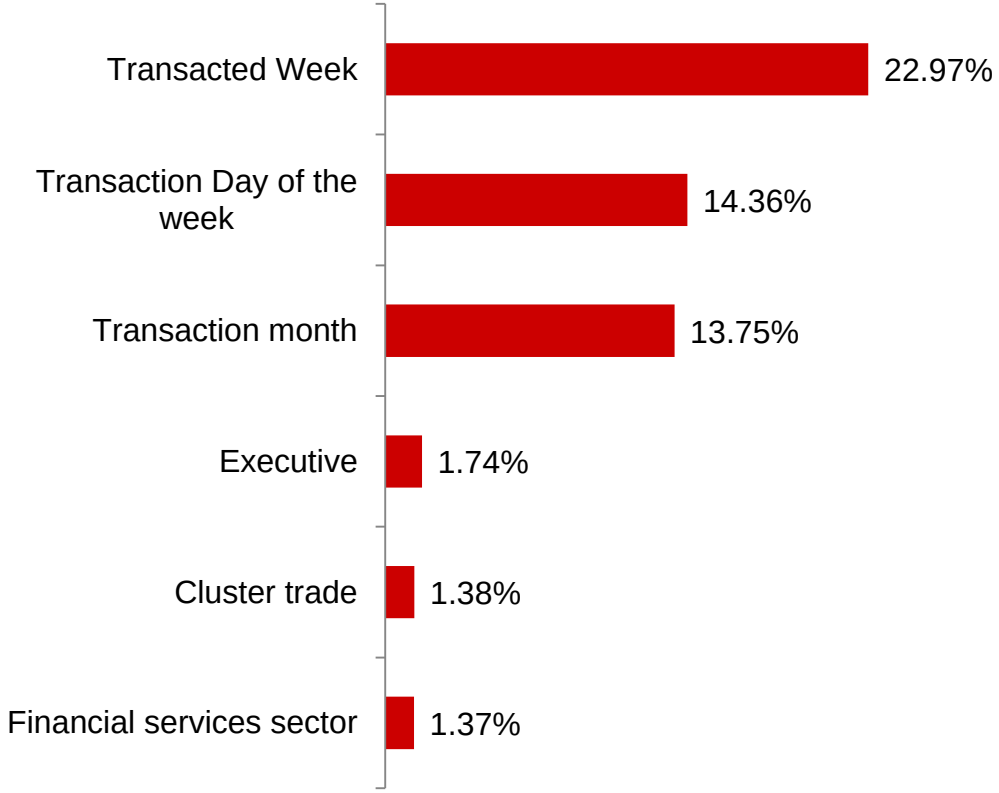
Understanding the “Black Box”

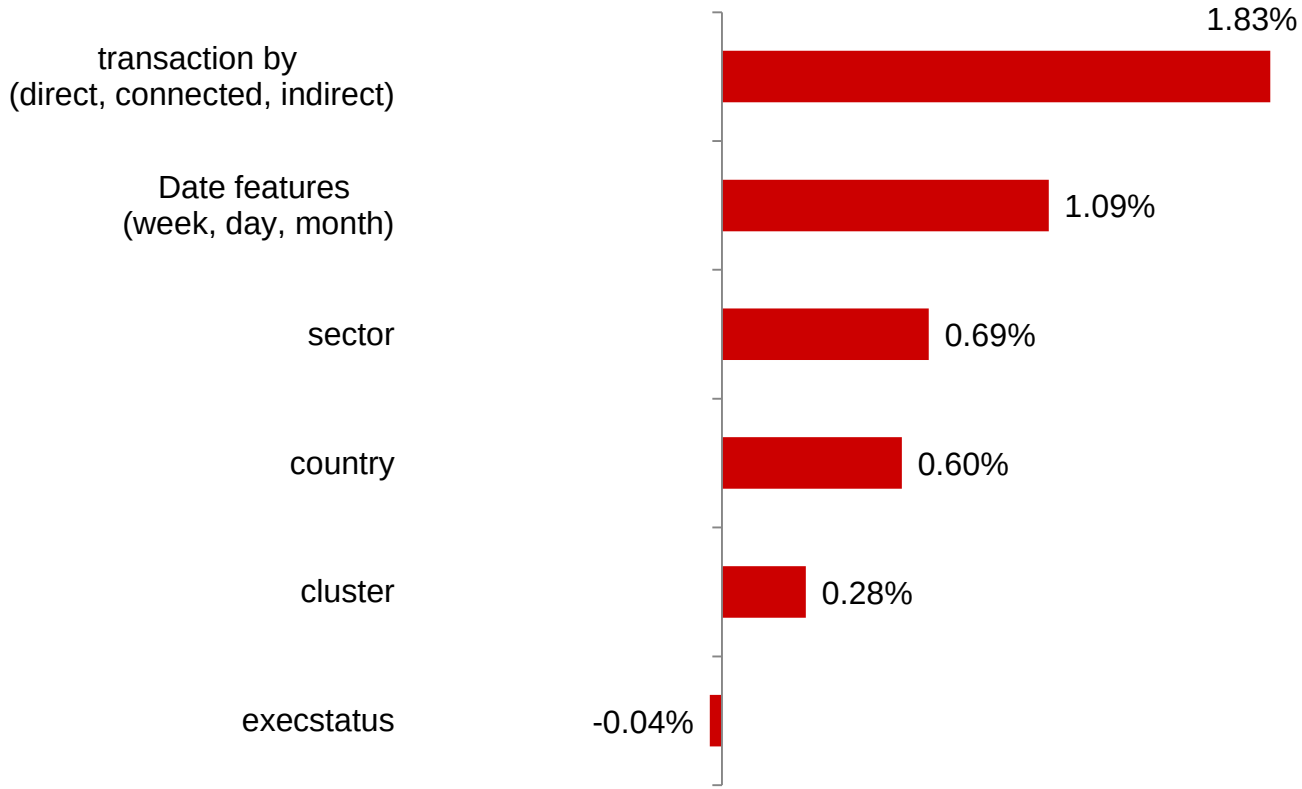
Feature importance

(RF Model, total = 100%)

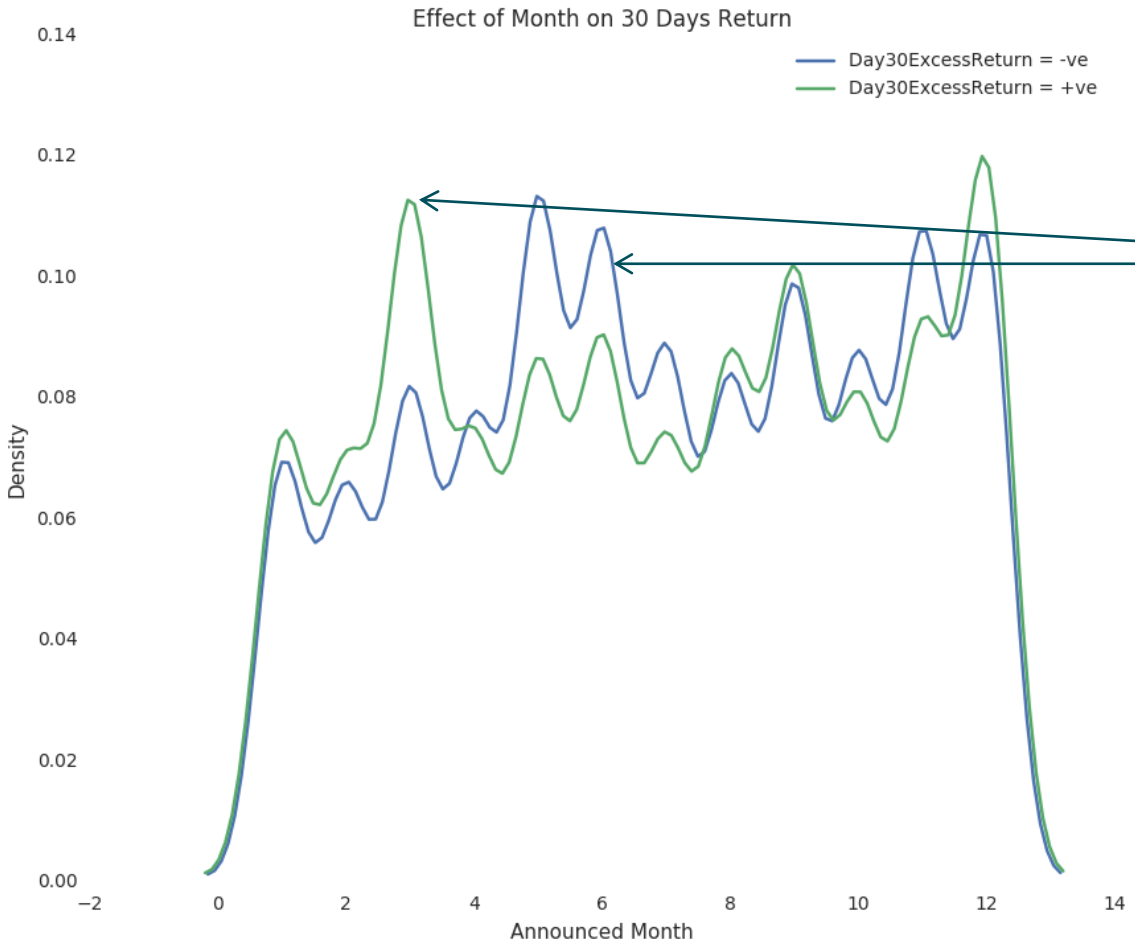


Increased accuracy by feature type

(MLP model, in percentage points against the benchmark)



Finding Finer Data Patterns



Fine variations in 30 days returns with respect announced month.

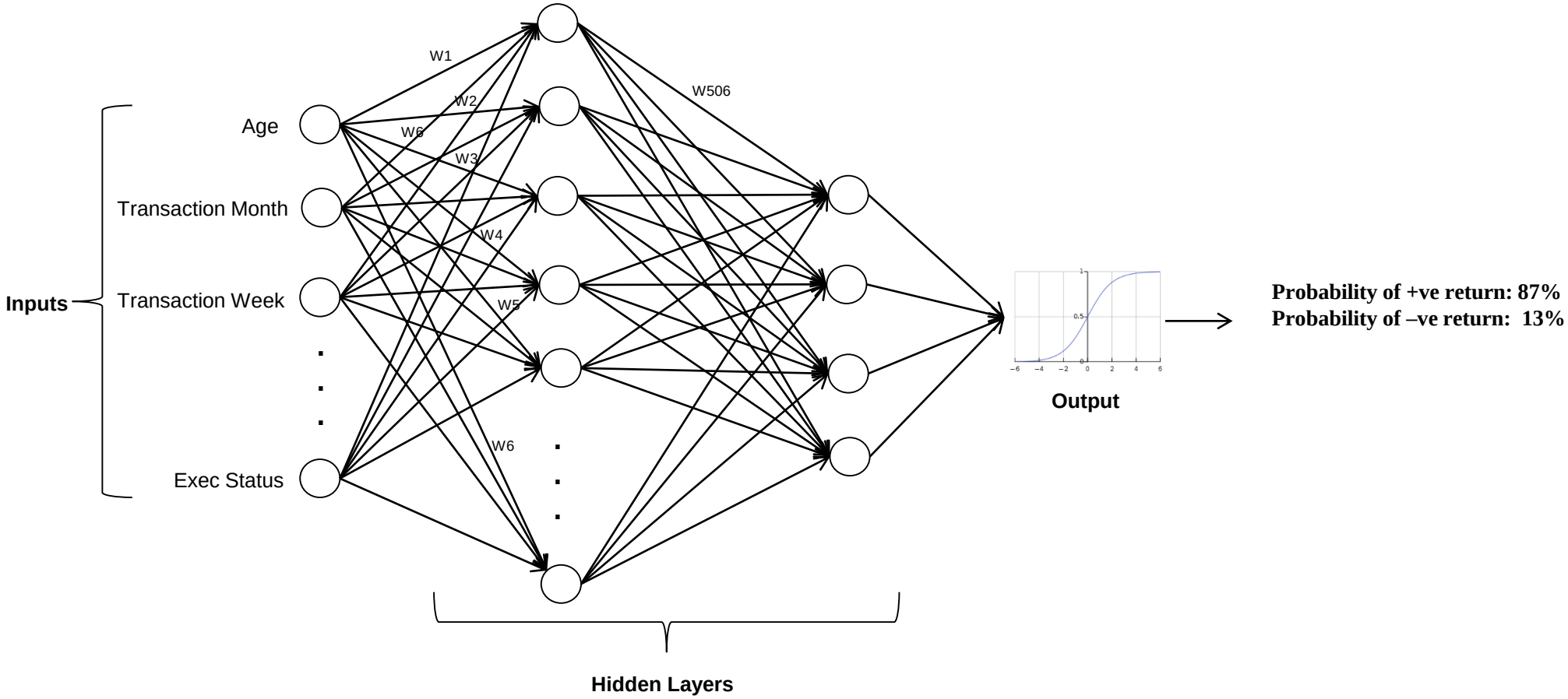
Complex models (Neural Networks) are able to factor in these effects

The Neural Networks Concept

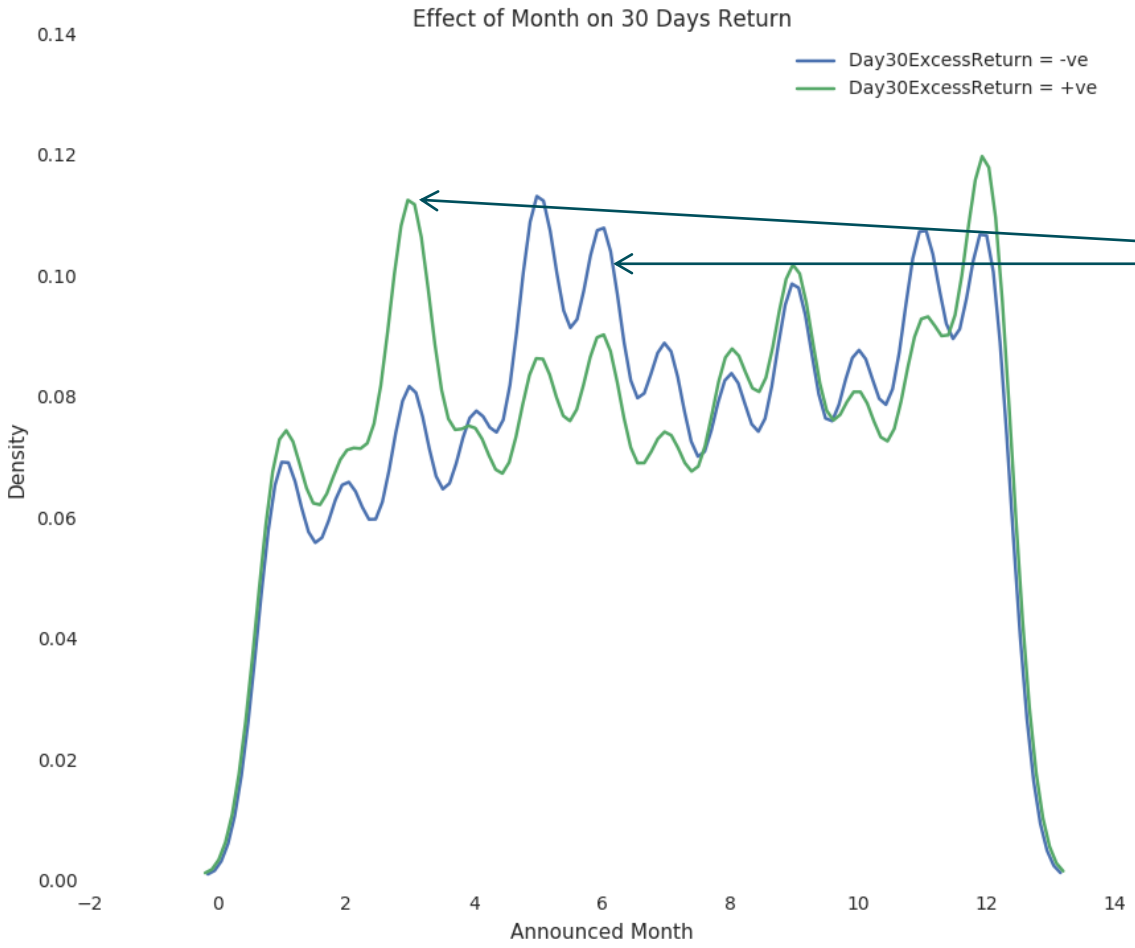
A "very large & complex equation" between inputs & output

The algorithm iterates till it gets a "good" combination of these "weights"

This picks the finer patterns



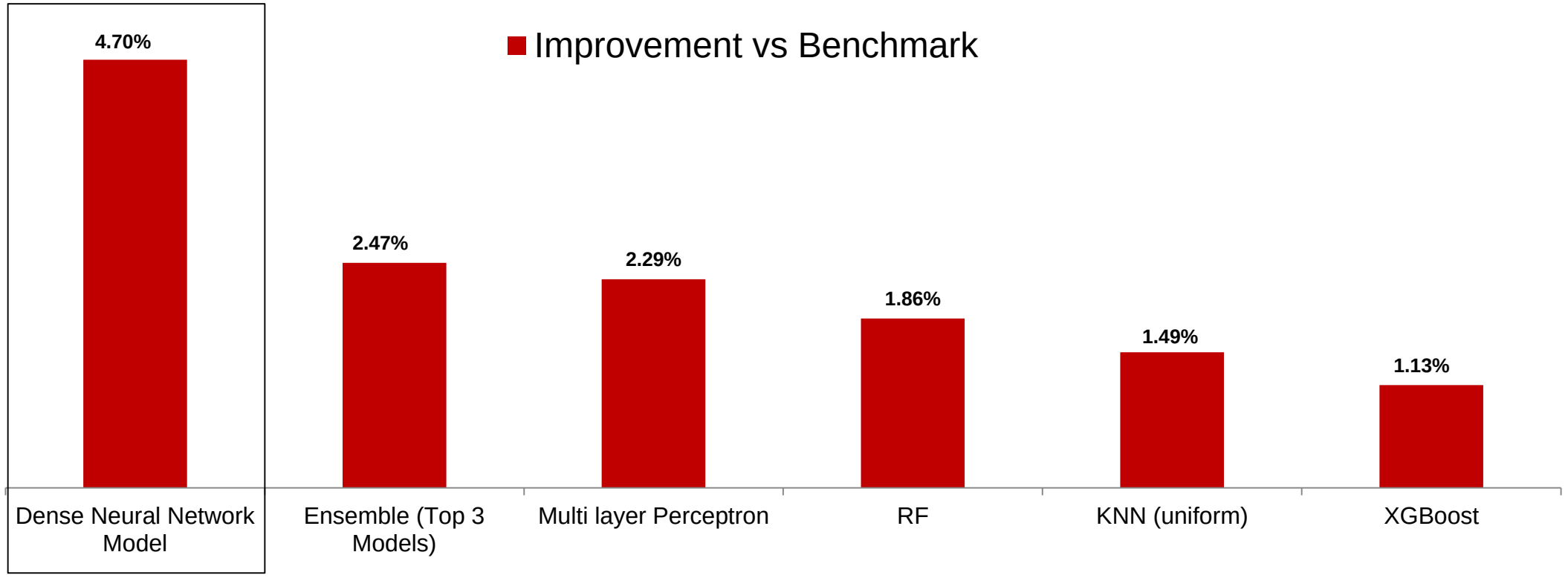
Finding Finer Data Patterns



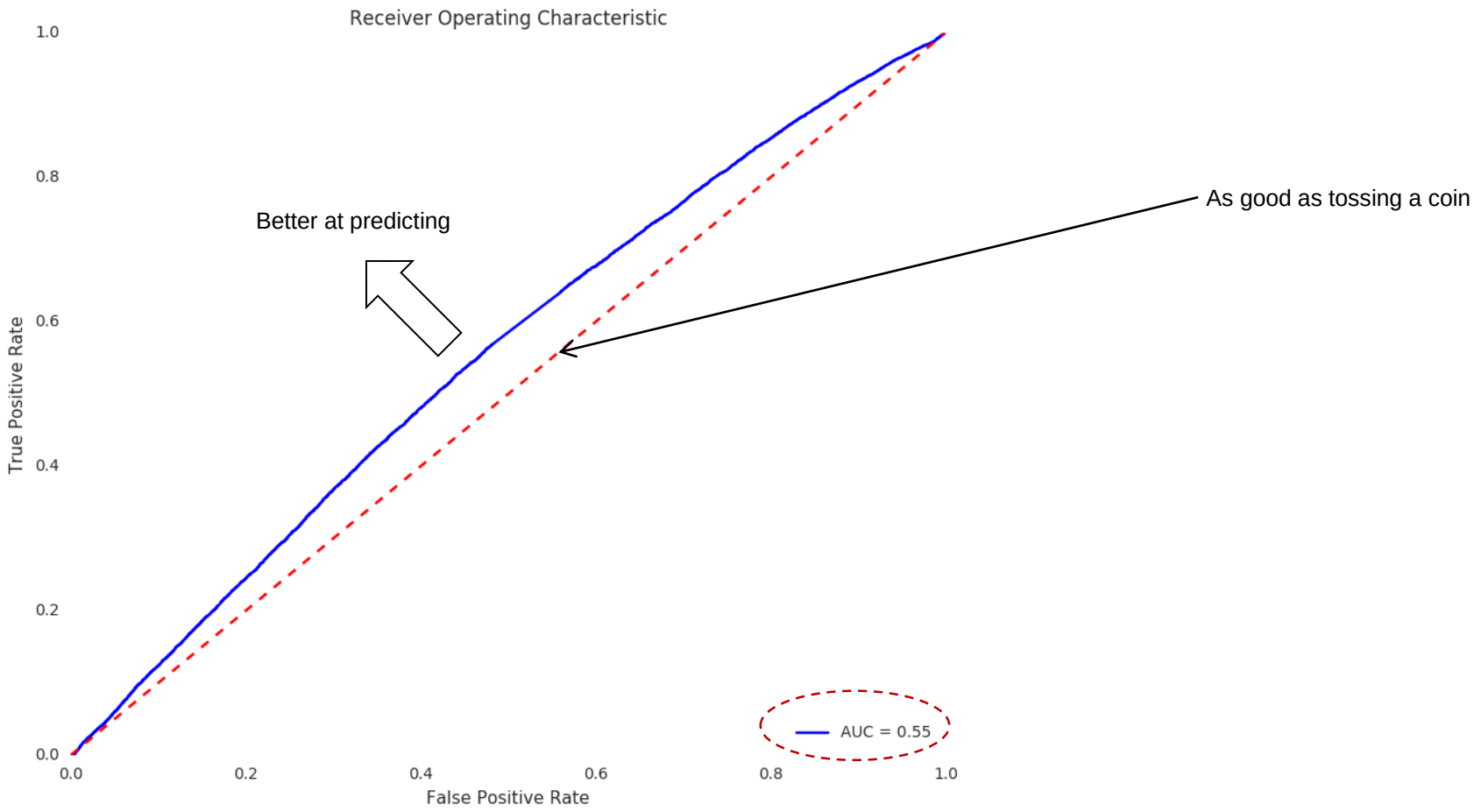
Fine variations in 30 days returns with respect announced month.

Complex models (Neural Networks) are able to factor in these effects

Neural Network outperforms by a large margin



Evaluating the Neural Network



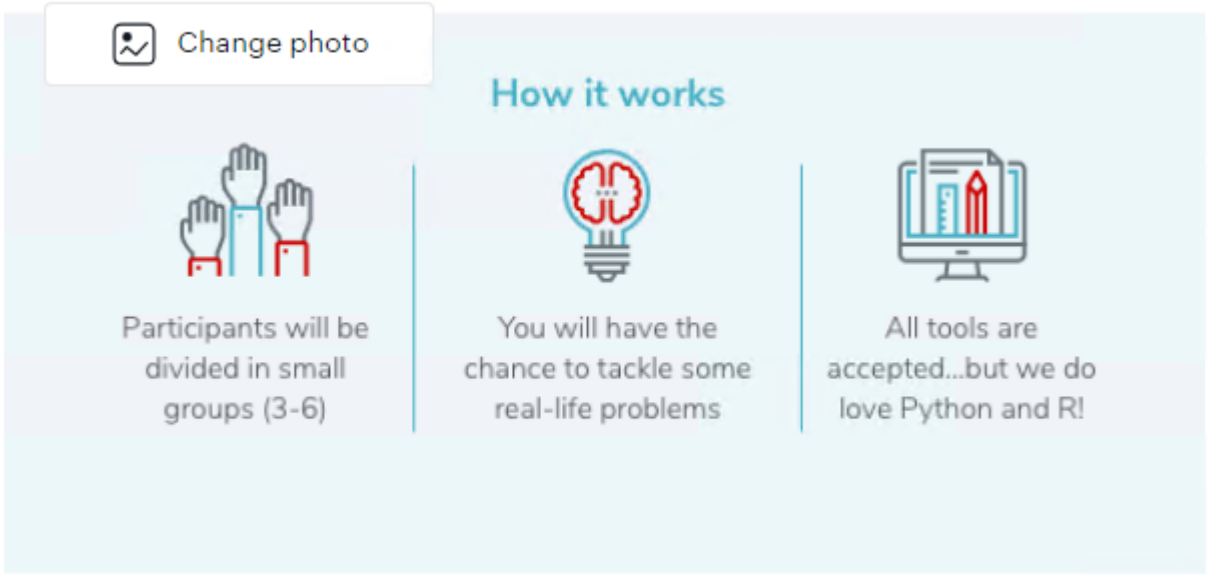
Next Steps

More data Already connected the new database (250k individual trades) to a API provider

More features Connection the API will allow us to obtain company specific metrics (past performance, financials, etc) – big data!

Better models There is good scope for improving models

Join us on meetup.com



Data Science for Finance Coding Dojo

London, United Kingdom
674 members · Public group
Organized by **Paulo Rosario**

Share:

- **Free beer**
- **Free pizza**
- **Testing environment**

- **…..**

- **And real world Data!**

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