Linking Many Unusual Co-Incidences

"Puppy Learning"

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Consistent returns from machine learning

The inspirational puppy

A very short story about how a **puppy** teaches us to solve very hard problems in a complicated, changing environment.

Hypothesis: a) In the complex US economy and markets, there exist discoverable, transient sets of prior *unusual events* that can link to subsequent events in that uncertain environment.

b) Those *links* can be used effectively to predict outcomes in a time-lagged re-enforcement learning system. Those links can be distinguished from *spurious "mere-co-incidences."*

Note: we have *no model* of how events may be connected and are *agnostic*.

Goal: Significantly beat an objective stock market benchmark.

Task: Each day, identify 5 largest US stocks
that will go up in price over the next month.

Data: 5000 time series derived from daily stock price
and economic indicator features for 11 years

This is a lot of data. What would a puppy do?

Idea ! Use "puppy learning" !

1. A puppy cannot remember everything, so in the stream of life events it stores in medium term memory what is "unusual." It also discards stale information.
2. A very rare event is not frequent enough to be very useful and is ignored unless it is reinforced enough (to become "unusual" instead of rare).
3. An event is not a trustworthy predictor (a "**link**") unless the subsequent occurs much of the time when the predicate unusual event occurs .
4. When there is some **set** of trustworthy links, a subsequent becomes more likely to occur in some future time window.
5. It is especially worthwhile for a puppy to be alert for and remember events when the subsequent is an unusual reward or penalty.

For the puppy there is also the intervention option: "If I beg from the actor involved with an event, maybe I can get one of the predicates to occur, and then ….". Learning to beg for an item in **predicate set** or for **delayed** reward is an important indicator of greater animal intelligence.

Implicit learning hypothesis: Intelligent animals have evolved to have this "puppy learning" as the baseline learning mechanism to solve problems from birth in a changing environment (*without human directed training*).

Explicit hypothesis: This "puppy learning" can be emulated in a computer to offer a simplified, fast, and effective machine learning method than can be applied to uncertain environments with many things going on concurrently where the data does not satisfy common statistical machine learning requirements.

What if we tried to "go big" and apply puppy learning to the ***entire* US stock market**?

Innovations (inspired by the puppy):

1. Discard all the “ordinary events” and just look at the unusual ones. *(Throw away 83% of the raw data!)*

2. Instead of looking **along one** (or a few) time series to try to predict, look **ACROSS all** of them.

3. Evaluate links for trustworthiness before accepting them for reuse.

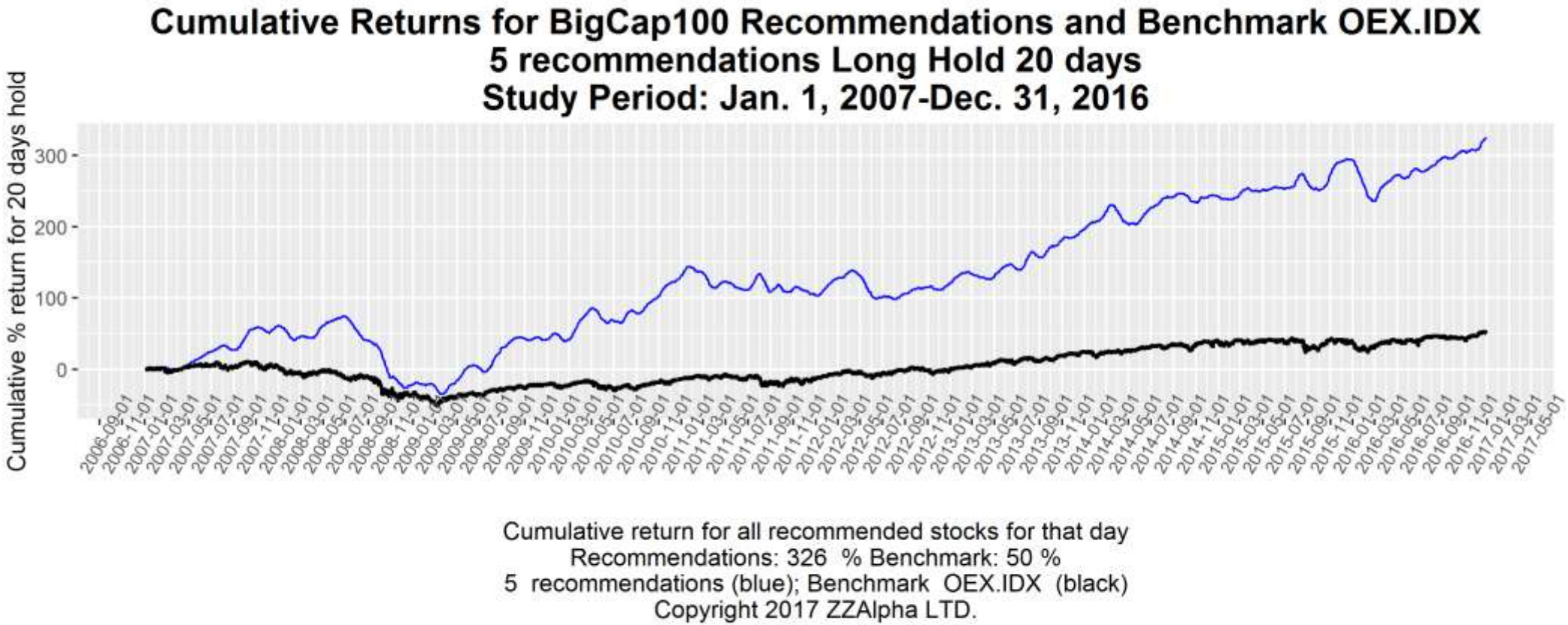
These make everything much easier to compute.

Long story short (after lots of data science)

Puppy learning works!

Puppy learning results:

predictions compared to objective stock market benchmark



Puppy Learning
("Linking Many Unusual Co-Incidences")
in production:

Sample commercial product:

Thank you.
And thanks to the inspirational puppy!

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10 stocks for trading on Nov 29 2017

LONG Portfolio BigCap100 Lg for 20 days

List of today's FRESH recommendations:
AAPL,ABBV,AVGO,BA,BAC,C,CAT,MCD,NFLX,NVDA, Total stocks recommended LONG today: 10

REMINDER: do not use yesterday's recommendations that have now gone stale and can lead to trading errors!

		Cap	Sector	Industry	SIC	Vol(10d)	Last EA	Liq	Trnd	Rec	Score	Close
AAPL	Apple	$898299 m	Technology	Communications Equip	3663	22261 k	2017-11-02	$3895 m	9.9	C	4.9	173.07
ABBV	AbbVie Inc	$150594 m	Health Care	Biotechnology & Drugs	2834	4055 k	2017-10-27	$384m	6.5	C	5.0	95.42
AVGO	Broadcom Ltd	$112345 m	Technology	Semiconductors	3674	2320 k	2017-08-24	$655m	13.8	C	5.1	277.40
BA	Boeing Co	$157917 m	Capital Goods	Aerospace and Defense	3721	2062 k	2017-10-25	$548m	3.4	C	5.1	267.99
BAC	Bank of America Corp	$278080 m	Financial	Regional Banks	6029	53632 k	2017-10-13	$1426 m	-0.4	C	4.7	27.64
C	Citigroup Inc	$191055 m	Financial	Regional Banks	6029	11477 k	2017-10-12	$826m	-0.1	C	4.8	73.70
CAT	Caterpillar	$82106 m	Capital Goods	Construction & Agri Machinery	3531	2600 k	2017-10-24	$357m	1.5	C	4.8	138.99
MCD	McDonald's	$136929 m	Services	Restaurants	5812	2433 k	2017-10-24	$411m	4.5	C	4.2	171.34
NFLX	Netflix	$84953 m	Services	Broadcasting & Cable TV	4841	4514 k	2017-10-16	$883m	2.0	C	6.0	199.18
NVDA	NVIDIA	$130247 m	Technology	Semiconductors	3674	12892 k	2017-11-09	$2797 m	7.7	C	15.5	210.71

RECENT PERFORMANCE	5 Yr(annualized)	One Yr	Yr to Date
BigCap100(Top 5 Score)	19.3	27.2	20.9
BigCap100(10)	16.2	22.2	16.9
Benchmark: OEX.IDX	12.5	19.0	16.2