Georgetown Students turn $1 Million into $383 Billion in University Challenge.

A Georgetown McDonough team won the “Best Hedge Fund Strategy Award” in the Peeptrade Challenge, a simulated investment competition, the event was hosted by the University of Chicago. The students set up a global record with a 38 million percent return.
FX Traders Are Going to Be Hooked on Algos

In a few years, currency traders will be hooked on algs like their stock-market colleagues.

That’s the view of David Stryker, a principal at consulting firm Greenwich Associates LLC, who sees foreign-exchange markets following equities in the widespread adoption of computerized trading.

While only one in 10 FX traders currently uses algs to execute trades, the adoption rate is higher at the largest institutions, with one in four deploying the systems, according to a Greenwich study released Thursday. In comparison, in equities more than half of volume is done through an algorithm. The firm surveyed 79 currency-market participants at hedge funds, asset managers, corporations and other financial institutions in the U.S. and Europe.

“Given the myriad benefits that algs offer, FX traders currently not using algs (and not considering them) may soon have to determine whether they’re putting themselves at a disadvantage,” Stryker wrote in the study. “With all of the data available demonstrating the benefits/cost savings, the ability to execute a trade with an algo will soon become a ‘need’ as opposed to a ‘nice to have.’”

Almost 60 percent of respondents said algs had materially cut trading costs, according to the survey. The push to save money, combined with stricter regulation, will boost the appeal of trading software, Greenwich concluded.
AGENDA

- Introduction
- Data-Driven Finance
- AI-First Finance
- Example Strategy
- The AI Machine
- Outlook
Introduction
SERVICES for financial institutions globally

EVENTS for Python quants & algorithmic traders

TRAINING about Python for finance & algorithmic trading

CERTIFICATION in cooperation with university

PLATFORM for browser-based data analytics

BOOKS about Python and finance

OPEN SOURCE Python library for financial analytics

http://tpq.io
Apple Inc.

United States | NASDAQ Global Select Consolidated | Computer Hardware

BUSINESS SUMMARY

Apple Inc. designs, manufactures and markets mobile communication and media devices, personal computers and portable digital music players. The Company sells a range of related software, services, accessories, networking solutions, and third-party digital content and applications. The Company’s segments include the Americas, Europe, Greater China, Japan and Rest of Asia Pacific. The Americas segment includes both North and South America. The Europe segment includes European countries, India, the Middle East and Africa. The Greater China segment includes China, Hong Kong and Taiwan. The Rest of Asia Pacific segment includes Australia and the Asian countries not included in the Company’s other operating segments. Its products and services include iPhone, iPad, Mac, iPod, Apple Watch, Apple TV, a portfolio of consumer and professional software applications, iPhone OS (iOS), OS X and watchOS operating systems, iCloud, Apple Pay and a range of accessory, service and support offerings.

NEWS

28-Dec-2016
10:24:36
Apple dominarade juhandain mitti antatel aktiverade enheter
FNW

10:15:18
UPDATE 3-Korea fines Qualcomm $854 mn for violating competition laws
RTRIS

09:42:52
Corea del Sur mutuala Qualcomm con BS4 mlns dr por violpar leyes de competencia
RTRIS

06:06:10
RPT-Wall Street calle una fois de plus an seuil des 20,000 points
RTRIS

03:30:18
Aumento del gasto de último minuto impulsa a temporada de ventas de fin de año ...
RTRIS

01:50:14
Last-minute spending surge lift U.S. holiday shopping season
RTRIS

27-Dec-2016
10:33:16
Reuters insider - Tech stocks could take the Dow to 20k
CNBC

10:32:28
Reuters insider - History suggests Dow could hit 20k by Friday: Technician
CNBC

22:55:29
LEAD 2-Wall Street calle una fois de plus an seuil des 20,000 points
RTRIS

22:09:39
Apple, Cisco lead DJA Higher Tuesday
RTRIS

EVENTS

24-Jan-2017 + 30-Jan-2017
NTS Q1 2017 Apple Inc Earnings Release

24-Feb-2017 + 28-Feb-2017

FUNDAMENTALS

AAPL

Gross Margin | 38.02% | (4.71)% | 4Q | 38.91%
Operating Margin | 25.10% | (11.59)% | 4Q | 5.75%
Tick Data

In [23]:
```
tick = ek.get_timeseries(['AAPL.O'],
                        fields='*',
                        start_date='2017-07-11 16:00:0000',
                        end_date='2017-07-11 16:15:0000',
                        interval='tick')
```

In [24]:
```
tick.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 1898 entries, 2017-07-11 16:00:00.686000 to 2017-07-11 16:14:59.708000
Data columns (total 2 columns):
VALUE  1892 non-null float64
VOLUME 1898 non-null float64
dtypes: float64(2)
memory usage: 44.5 KB
```

In [25]:
```
tick.tail()
```

```
  AAPL.O  VALUE  VOLUME
Date
2017-07-11 16:14:59.693  144.9900  100.0
2017-07-11 16:14:59.693  144.9900  100.0
2017-07-11 16:14:59.693  144.9900  100.0
2017-07-11 16:14:59.707  144.9899  400.0
2017-07-11 16:14:59.708  144.9899  1305.0
```
News

In [29]:
news = ek.get_news_headlines('R:.SPX AND "Trump" AND Language:EN', count=5)

Out[29]:

<table>
<thead>
<tr>
<th>versionCreated</th>
<th>text</th>
<th>storyId</th>
<th>sourceCode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017-08-18 16:46:19</td>
<td>U.S. STOCKS EXTEND GAINS AFTER NEW YORK TIMES ...</td>
<td>urn:newsml:reuters.com:20170818:nL4N1L44L9:1</td>
<td>NS:RTRS</td>
</tr>
<tr>
<td>2017-08-18 15:16:27</td>
<td>US STOCKS-Wall St lower on growing concerns over ...</td>
<td>urn:newsml:reuters.com:20170818:nL4N1L44F2:5</td>
<td>NS:RTRS</td>
</tr>
<tr>
<td>2017-08-18 11:24:30</td>
<td>US STOCKS-Futures flat amid growing concerns o...</td>
<td>urn:newsml:reuters.com:20170818:nL4N1L43R6:5</td>
<td>NS:RTRS</td>
</tr>
<tr>
<td>2017-08-17 17:09:05</td>
<td>US STOCKS-Wall St extends losses on Trump poll ...</td>
<td>urn:newsml:reuters.com:20170817:nL4N1L34N1:5</td>
<td>NS:RTRS</td>
</tr>
</tbody>
</table>

In [30]:
storyId = news.iloc[4, 2]

Out[30]: 'urn:newsml:reuters.com:20170817:nL4N1L34N1:5'

In [31]:
from IPython.display import display, HTML

In [32]:
display(HTML(ek.get_news_story(storyId)))

- Gary Cohn resignation rumors knocked down
- Wal-Mart drops after reporting margin fall
- Indexes down: Dow 0.81 pct, S&P 1.03 pct, Nasdaq 1.39 pct

Updates to early afternoon

By Sruthi Shankar and Tanya Agrawal

Aug 17 (Reuters) - U.S stocks hit session lows in early afternoon trading on Thursday as investors worried about President Donald Trump's ability to
AI-First Finance
“The essential tool of econometrics is multivariate linear regression, an 18th-century technology that was already mastered by Gauss before 1794 … It is hard to believe that something as complex as 21st-century finance could be grasped by something as simple as inverting a covariance matrix.”

“… what if economists finally started to consider non-linear functions?”

“An ML algorithm can spot patterns in a 100-dimensional world as easily as in our familiar 3-dimensional one.”

“Econometrics might be good enough to succeed in financial academia (for now), but succeeding in practice requires ML.”

Marcos López de Prado (2018)
“Today’s algorithmic trading programs are relatively simple and make only limited use of AI. However, this is sure to change. Artificial intelligence is beneficial in any domain where patterns have to be found in large quantities of data and effective decisions have to be taken on the basis of those patterns, especially when the decisions have to be taken rapidly.”

Murray Shanahan (2015)
Particle physics

Fundamental physics is frustrating physicists

No GUTs, no glory

DEEP in a disused zinc mine in Japan, 50,000 tonnes of purified water held in a vast cylindrical stainless-steel tank are quietly killing theories long cherished by physicists. Since 1996, the photomultiplier-tube detectors (pictured above) at Super-Kamiokande, an experiment under way a

The beauty myth

One such is Sabine Hossenfelder of the Frankfurt Institute for Advanced Studies, in Germany. She argues that the appeal of GUTs, supersymmetry and the like rests on their ability to explain “numerological coincidences” that do not need to be explained. Perhaps, to take one example, the universe simply started out with more matter than antimatter in it, rather than this being a consequence of its subsequent evolution. As she points out, no theory precludes this possibility—it is just that it is not very elegant. Similarly, she says, “It’s not like anybody actually needs supersymmetry to explain anything. It’s an idea widely praised for its aesthetic appeal. Well, that’s nice, but it’s not science.”
Financial Markets

\( x \)

\( y \)

“non-linear, complex, changing”

Finance History

\( f(\cdot) \)

\( f(x) \neq y \)

“brain-driven & beauty myth”

AI in Finance

\( m(\cdot, a, b) \)

\( m(x, a^*, b^*) \approx y \)

“data-driven & AI-first”
Example Strategy
STRATEGY IDEA

- **instruments:** single instrument (FX), leveraged
- **positions:** long and short
- **financial data:** mid-frequency (5 or 10 mins)
- **algorithm:** classification (Bayes, LR, LR and similar)
- **goal:** alpha = outperformance + positive return + low correlation
- **robustness:** acceptable performance independent of parameters
- **programming:** Python, NumPy, pandas, scikit-learn
PARAMETERS

- EUR_USD, 5min bars
- sequential training/backtest
- 40% to 60% train-test split
PARAMETERS

- EUR_USD, 5min bars
- randomized training/backtest
- 40% to 60% train-test split
PARAMETERS

• EUR_USD, 10min bars
• randomized training/backtest
• 40% to 60% train-test split
• 288 algorithm configurations
PARAMETERS

- EUR_USD, 10min bars
- randomized training/backtest
- 40% to 60% train-test split
- 288 algorithm configurations
The AI Machine
A bit of background and some general thoughts

• On the way from The Python Quant to The AI Quant …
• “Do you trade? Do you do algo trading on your own?”
• Many people fail deploying their algo trading ideas
• Walk the talk … and come up with a proof-of-concept
• Robust, reliable execution as a condition sine qua non
• Fascination for markets and betting — getting direct feedback
16 week program

150+ hours of instruction

5,000+ lines of code

1,200 pages PDF

http://certificate,tpq.io
The Last Mile Problem

Deployment gap

Skills
Budget
Time

Brokers & platforms
Infrastructure
API & wrapper
Education

Traders & researchers
Research
Practice
Training
The AI Machine

- **Tick Data Streamer**
  (retrieval, processing, storage, etc.)

- **Signal Generator**
  (prediction, positions, signals, etc.)

- **Trade Event Streamer**
  (order information, stop events, etc.)

- **Signal Listener**
  (signal pick-up, order execution, etc.)

- **Portfolio Monitoring & Risk Management**
  (unrealized P&L, aggregated P&L, stop outs, trade visualization, etc.)

**AI-based, Algorithmic Trading Strategies**

**Multiple Trading Platforms**
The Machine

brokers & platforms
  infrastructure
  API & wrapper
  education

research
practice
training

traders & researchers

deployment
data processing
strategy life cycle
AI-based, Algorithmic Trading Strategies

The AI Machine
The AI Machine
standardized deployment of AI-based algorithmic trading strategies
INDUSTRIAL CHAIN

- **data sources:** platforms (Oanda, FXCM) and TR Eikon Data API
- **feature analysis:** any time series based features that are helpful
- **strategies:** long only, long and short
- **backtesting:** sequential, randomized, robust configuration
- **deployment:** The AI Machine, full automation, audit, report
- **portfolio oversight:** multiple configurations for multiple FX pairs & CFDs
Skynet begins to learn at a geometric rate. It becomes self-aware at 2:14 a.m. Eastern time, August 29th.

— *The Terminator ( Terminator 2)*
exponential forces at work:
- technology improvements
- capital accumulation
- talent accumulation
“Go-playing programs have been improving at a rate of about 1 dan/year in recent years. If this rate of improvement continues, they might beat the human world champion in about a decade.”

The story of AlphaGo so far

AlphaGo is the first computer program to defeat a professional human Go player, the first program to defeat a Go world champion, and arguably the strongest Go player in history.

AlphaGo's first formal match was against the reigning 3-times European Champion, Mr Fan Hui, in October 2015. Its 5-0 win was the first ever against a Go professional, and the results were published in full technical detail in the international journal, *Nature*. AlphaGo then went on to compete against legendary player Mr Lee Sedol, winner of 18 world titles and widely considered to be the greatest player of the past decade.

AlphaGo's 4-1 victory in Seoul, South Korea, in March 2016 was watched by over 200 million people worldwide. It was a landmark achievement that experts agreed was a decade ahead of its time, and earned AlphaGo a 9 dan professional ranking (the highest certification) - the first time a computer Go player had ever received the accolade.

During the games, AlphaGo played a handful of **highly inventive winning moves**, several of which - including move 37 in game two - were so surprising they overturned hundreds of years of received wisdom, and have since been examined extensively by players of all levels. In the course of winning, AlphaGo somehow taught the world completely new knowledge about perhaps the most studied and contemplated game in history.

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**40 days**

AlphaGo Zero surpasses all other versions of AlphaGo and, arguably, becomes the best Go player in the world. It does this entirely from self-play, with no human intervention and using no historical data.
The Python Quants GmbH

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