COGNITIVE TIMES

WHERE NO DERIVATIVES COMPANY HAS GONE BEFORE: RUMI MORALES AND THE FUTURE OF FINTECH

POLITICAL FORECASTING AND PREDICTING THE 2016 PRESIDENTIAL ELECTION

GREENER FUTURES: HONEST DOLLAR, FINTECH, AND THE FISH THAT'S EATING THE WHALE

MAINTAINING CENTURY-OLD TRUST WITH CUTTING-EDGE COGNITION

Chris Corrado, CTO of the London Stock Exchange Group, on how technology is bringing trust back to the financial industry

VOLUME 3 // 2016

DEEPARMOR®

The world's first fully cognitive anti-malware system leverages machine learning, natural language processing and A.I. algorithms to analyze files and provide signature-free security

ANALYZES THE DNA OF FILES TO IDENTIFY THREATS

SUB-SECOND MALWARE DETECTION

SIGNATURE-FREE SECURITY

SELF-LEARNS AND RETAINS KNOWLEDGE

COMBINES STRUCTURED + UNSTRUCTURED DATA (INCLUDING NATURAL LANGUAGE) TO RESEARCH THREATS

REDUCES FALSE ALERTS

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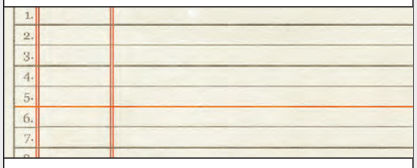

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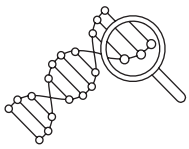

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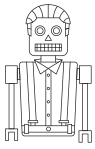
FINANCIAL



FROM THE EDITOR

by **Amir Husain**

AS I WRITE THIS, I am flying home to Austin, Texas from Abu Dhabi, capital of the United Arab Emirates. Wherever my travels take me in the Middle East, Asia, Europe or America, it is hard to ignore the transformative effect AI is having across the world. At this very moment, the news item flashing before me is about President Obama's statement on how our next president will have to lead us in a world increasingly run by AI. A second piece of news explains that United Airlines has delayed a large number of flights due to a suspected cyber attack. A discomfiting notion when one is 35,000 feet in the air! Security from cyber threats is a critical protection which nation states and organizations that bank on trust will have to deliver to their citizens and customers in future. And this safeguard will only be available with the leverage of AI capabilities. Humans can't manage the size or scale of the burgeoning and increasingly automated cyber threat.

If there's one industry that runs almost entirely on the fuel of protection and trust, it is financial services. Financial services is a field ripe for AI leverage, as companies seek to make information more insightful and processes more efficient and secure. The impact of AI on finance is what we're focused on in this edition of Cognitive Times.

We have some great stories for you in the pages that follow, including an enlightening interview with one of the world's top Financial Technology executives, Chris Corrado of the London Stock Exchange Group. In all my interactions with him, I've found Chris keenly focused on making LSEG the world's most secure trading platform. He's been a leader in leveraging Artificial Intelligence for Security.

There's also a fantastic article on Rumi Morales, Managing Director at Chicago Mercantile Exchange's Venture Fund, CME Ventures. Rumi has been nothing less than inspirational in her advocacy for AI in Fintech. She doesn't just talk the talk, but backs it up by presenting a number of success stories she and her fund have been involved with.

There is little doubt that the future of AI and the future of Finance are entwined. AI will transform this space, much as it is shaping other areas, such as energy and defense. Traders will leverage AI platforms to discover counter-intuitive but highly profitable strategies, banks will use machine learning to ensure compliance and lower costs, hedge funds will use predictive capabilities to gauge event outcomes and large exchanges will surveil trades and make their clients' assets more secure with cognitive techniques. And this range of applications presents just the tip of the proverbial iceberg.

We hope you enjoy this edition of the magazine, and–as always–I look forward to your feedback.

Best wishes,
Amir

OCT

Oct
1-31

National Cyber Security Awareness Month

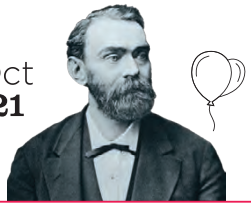
The National Cyber Security Awareness Month is designed to engage and educate public and private sector partners through events and initiatives to raise awareness about cybersecurity, provide them with tools and resources needed to stay safe online, and increase the resiliency of the Nation in the event of a cyber incident.

Oct
14

Apple Introduced Siri

On October 4, 2011, Apple introduced the iPhone 4S with their implementation of a beta version of Siri. Siri is a computer program that works as an intelligent personal assistant and knowledge navigator. The feature uses a natural language user interface to answer questions, make recommendations, and perform actions by delegating requests to a set of web services.

Oct
21



Alfred Nobel's Birthday

Alfred Nobel was a Swedish chemist, inventor, engineer, entrepreneur, businessman, author and pacifist. In his last will in 1895, he left much of his wealth to the establishment of the Nobel Prize for the "greatest benefit to mankind."

Oct
24-27

World of Watson 2016

Unleash your company's cognitive potential at IBM World of Watson 2016, where you will be equipped with the capacity to extract knowledge from data, enhance personal expertise, and outthink the needs of the market at amazing speeds. Become a cognitive business, and see how data, analytics, and Watson can change your world.

Oct
28

Bill Gates' Birthday

Bill Gates was born in 1955.

Oct
29

Willgot T. Odhner

On Oct. 19, 1878, Willgodt T. Odhner was granted a patent for a calculating machine that performed multiplications by repeated additions.

NOV

Nov
4

CBS News Uses UNIVAC Computer to Predict Election

Presper Eckert and John Mauchly developed UNIVAC for the Bureau of the Census. It was the first American computer designed for business and administrative use. In 1952, UNIVAC accurately predicted Eisenhower would win the presidential election, and predicted the final vote within 1 percent.

Nov
8

Integrated Circuit Co-Inventor Jack Kilby's Birthday

The silicon chip was invented in 1961 by two American electrical engineers, Jack Kilby and Robert Noyce. Their creation began a revolution in miniaturized technology and paved the way for the development of the modern computer.

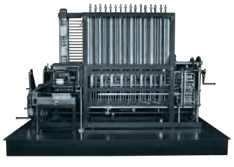
IMPORTANT DATES

Nov
12

Alan Turing Defines the Universal Machine

During WWII, Turing was largely responsible for breaking the German Enigma military codes. In 1936, he introduced the Universal Turing Machine, a hypothetical machine used for computability theory proofs. The Universal Turing Machine is regarded as the first digital computer.

Jan
21



Babbage's Analytical Engine Passes the First Test

In 1822, Charles Babbage began developing the Difference Engine, considered to be the first automatic computing machine. It was capable of computing several sets of numbers and making hard copies of the results. On January 21, 1888 the analytical engine passed it's first test.

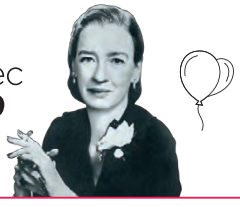
Nov
30

Computer Security Day

During WWII, Turing was largely responsible for breaking the German Enigma military codes. In 1936, he introduced the Universal Turing Machine, a hypothetical machine used for computability theory proofs. The Universal Turing Machine is regarded as the first digital computer.

DEC

Dec
9



Grace Hopper's Birthday

Grace Brewster Murray Hopper, was an American computer scientist and United States Navy Rear Admiral. She was one of the first programmers of the Harvard Mark I computer in 1944, invented the first compiler for a computer programming language, and was one of those who popularized the idea of machine-independent programming languages which led to the development of COBOL, one of the first high-level programming languages.

Dec
14

International Shareware Day

International Shareware Day reminds shareware users of the value of these programs, (most are free or cost very little). And to perhaps inspire them, in the spirit of the upcoming holiday season, to donate to the authors of their favorite shareware apps.

Dec
24

Charles Babbage's Birthday

Charles Babbage was an English mathematician, philosopher and inventor born on December 26, 1791, in London. Often called "The Father of Computing," he was known for his contributions to the first mechanical computers, which laid the groundwork for more complex future designs.

JAN

Jan
8

Stephen Hawking's Birthday

Stephen Hawking was born in 1942.

Jan
15

Wikipedia Day

Wikipedia was formally launched on January 15, 2001 by Jimmy Wales and Larry Sanger. It's the world's 6th most popular website in terms of overall visitor traffic and has a total worldwide monthly readership of approximately 495 million.

from History & Today

The Next Generation of Financial Data is Coming

SparkCognition says A.I. has financial market applications.

by **Peter Shadbolt** **First published on openmarkets.com on July 29, 2016*

Big Data mines don't come much bigger or deeper than MasterCard. The financial services corporation has some 2.3 billion cards in circulation, accepted in 205 countries at 38 million merchant locations generating an average of 160 million transactions an hour.

David Rich, senior vice president of Global Partnerships & Business Development at MasterCard, told CME Group's "Tech Talk 5.0: Next Generation Financial Technology" audience in July that making sense of the numbers requires an equally staggering number of equations. "Each time those transactions come in we process them," Rich says. "We apply about 1.9 million rules and algorithms to make sense of those transactions.

MasterCard has been doing this for so long that it has been able to cleanse and normalize data from a longitudinal perspective going back as far as 40 years. Central to the conversation, however, Rich emphasises, is privacy.

"Privacy by design is a key component of how we look at data," he says. "A significant amount of data analytics are actionable with regards to privacy. No matter what level of privacy you have, you can still provide a very significant level of analytical capability."

The data is used by just about every industry vertical on earth: MasterCard works with 44 of the top 100 retailers in the world, 10 of the top 15 restaurants, 13 of the top 25 hotel chains. The way the company aggregates data, he says, allows analysts to see consumer trends in real time.

"This is very important for financial forecasting when you're looking at it from macroeconomic perspective," he says, adding that the U.S. Department of Commerce figures come out with a significant time lag often in the order of months. "When we look at the gasoline spend, for example, we can see that discretionary spend – the money that was being saved as gasoline prices went down – was not necessarily translating into discretionary retail spending. "We could see this much earlier than market analytics could."

“AI models, he says, have the ability to outperform human models by an order of magnitude and can now accommodate the nuances of language to process meaningful data.”

AI Applied to Finance

Drilling even deeper into next generation data with automated model creation is the work of the cognitive analytics startup from Austin, Texas—SparkCognition. CEO Amir Husain told Tech Talk that its financial platforms are able to spot anomalous patterns in a veritable sea of data.

“We’ve proven that it works and it works very well,” Husain says. “Today we have close to 40 clients, some of them the best-known companies in the world.”

With applications for industry that range from wind turbines to pumps, SparkCognition’s platforms have been able to extend failure predictions from five hours, using human-generated models, to five days using its automated models. He says it’s now time to begin applying these models to financial services.

“At first blush, it may appear there’s a huge difference between a machine on one hand and financial markets on the other, but there are a lot of similarities from a mathematical perspective,” Husain says.

AI models, he says, have the ability to outperform human models by an order of magnitude and can now accommodate the nuances of language to process meaningful data.

“What it means is that soon AI services will be able to understand almost at that palpable level.

“When you see a good trader they have a feel for the market, but what is that feel? It’s a collection of patterns in their biological neural network that get triggered when they see something that smells, tastes, looks like something they’ve seen before.

“We are now bringing these aspects, the numeracy and language understanding, and we think this will democratise the way value is extracted from financial data.”

Evolving Culture in the Modern Workplace

by **Kimberly Erler**

We've all heard the stories of some of perks offered at dot coms around the country: Slides, foosball, nap pods, yoga, free food– the lists go on and on. While these things certainly go far in driving a company's culture, are they the things truly driving today's workforce to choose Company A over Company B?

How did this culture shift even happen? Did employees begin demanding more of their employers, or did employers see a need and adapt? Kani Sterling, Director, Human Resources at Statesman Media, had this to say:

"Part of this shift includes the emerging technology tools, where employees are always 'on,' highlighting the needs for wellness and work life initiatives more than ever before. With so many Baby Boomers retiring, we are left with a gap in our workforce overall. This, combined with an incredibly low unemployment rate, makes this a candidate's market. Employees today want more flexibility, and the opportunity to contribute their abilities to society in meaningful ways. Combine these things with companies trying to contain costs, more and more employees are going shorter term or even independent and it eventually leads to what some have referred to as the "gig economy." This perfect storm is making attraction and retention critical metrics for many organizations, and we are having to get more creative in how we approach both."

Gone are the days of people working at one job until they retire, being loyal to the company no matter what. Today's workforce is looking for ways to make a difference, not just at their job, but in the world. They want to know that their contributions are given the recognition they deserve and that their employers are invested in their personal growth and continued well-being. And as Ms. Sterling points out, technology now allows employees to be always on– essentially accessible to their employers and/or clients 24/7, so it only makes sense that technology is playing a role in giving these employees a better work/life balance.

One such tech company, Austin-based Student Loan Genius, finds that 70% of today's graduates carry an average loan debt of $61,223 and that employers who offer to help an employee alleviate some of that debt are much more likely to attract higher caliber talent. Their website, studentloangenius.com, gives individuals various payment options to help them pay off their debt faster. But, more creatively, they also work with employers to tie payments into payroll, taking the onus off of the employee to juggle sometimes multiple payments. And where employers once used 401(k)s or pensions as perks, they can use services like Student Loan Genius and others like it to match an employee's loan payment, or to tie in a matching payment to the employee's 401(k) when that student contributes to his own loan payment.

Employees and management can routinely give kudos and recognition at the moment it's due, not just at annual reviews or occasional company gatherings.

According to a 2012 Study by SHRM/Globoforce, "Companies with peer-to-peer recognition are 35% more likely to report lower turnover" (www.globoforce.com/resources). Addressing that truth is another Austin-based company, YouEarnedIt, which has taken employee rewards and recognition to a new level. By giving businesses an individualized company platform, employees and management can routinely give kudos and recognition at the moment it's due, not just at annual reviews or occasional company gatherings. Employees get to share each other's successes and be recognized for their achievements in real time, and on a public platform. There's even a points system that translates into monetary, charitable, or other fun team rewards, incentivizing peers to recognize each other.

Studies do show that, all other things being equal, potential job candidates will choose a company that has a culture aimed at bettering employees and that shows an interest in their current and future well-being over one that doesn't. And in today's tight job climate, that could make all the difference in a company's future. So, while being able to have a Pajamas Day might be a hip thing to do, it's not going to pull in that programmer three other companies are clamoring over. But explain to her the rewards and recognitions platform you have in place or let her know how much you value her current and future contribution to the team by helping pay off college debt or provide continuing education? Now you've got the competitive edge.

FOUR FINANCIAL TECHNOLOGY TRENDS TO WATCH IN 2016

The technology behind driverless cars, blockchain and messaging apps will find it's way into finance this year.

by **Ari Studnitzer** *First published on openmarkets.com on Feb. 19, 2016

2016 has certainly started off with a bang with increased volatility and uncertainty of future demand. It's hard to focus let alone think about key technology enablers for 2016 in the face of the macroeconomic events. But with uncertainty, comes new opportunity for innovation.

Last year, I wrote about the importance of customer experience, security, democratization (of technology), and data science. Like most technology themes, it takes more than a year to fully implement and optimize enabled business value, and those 2015 highlighted themes are no different. As we look ahead to 2016, one theme remains on the list with security and the increased scope of compliance.

One noteworthy trend that continues to expand is mobility. Much has been written over the years around the need for a new mindset of mobile platforms and designing first for mobile. While not a new theme, 2016 is projected to be the first year since mobile platforms were introduced where CMEGroup.com will have more than 50 percent of its traffic from mobile platforms. Just like security, mobile is going to continue as a critical, global theme and one that will accelerate in lock step with accelerating innovation in mobile platforms.

SECURITY & COMPLIANCE

Last year, I wrote that we're in an increasingly insecure world when it comes to technology. Unfortunately, that hasn't changed and if anything, has continued its trajectory. CME Group continues to focus on its own technology and infrastructure along with continued maturity of the broader connected ecosystems.

Many new technologies are being introduced that enhance security with new integrated machine learning techniques. I talk about machine learning further below, and it's exciting to see new combinatorial innovations being driven. As an example, CME Ventures invested in Fortscale. Fortscale uses machine learning for user behavior analysis. I expect to see continued, especially combinatorial, innovation to further enhance security and compliance at financial firms.

LEDGER TECHNOLOGY

How could I write about 2016 without referencing blockchain and distributed ledger technology? While many became skeptical of the hype cycle that encircled all things ledger-based, I see tremendous opportunity for enhanced efficiency and the enablement of new capabilities.

Firms should not look at ledger technology for its own sake, but in the context of use cases and solving broader ecosystem problems. For example, CME Ventures invested in Digital Asset Holdings who is focusing on syndicated loans as their first set of use cases. There's no doubt this too is a long-term theme that will see continued innovation and course corrections for the coming years.

PRODUCTIVITY & COLLABORATION TOOLS

2016 will be the year exciting tools like Jive, Slack, and Yammer become enterprise hardened and available for use in compliance-focused firms. Facebook is also focusing its priorities on the application of its technology for the enterprise. As an industry, finance has long been focused on email as a means for communication and collaboration. I think we all agree any form of communication dependent on using capital letters to display emotion is likely not an optimal collaboration forum.

I see many use cases that can be solved with the new breed of collaboration software. If you're not already looking at next generation tools, you may find yourself quickly feeling like you're using an Apple Newton. More importantly, increasingly your colleagues will be looking to leverage these next generation tools and prospective hires will be measuring firms by this capability.

MACHINE LEARNING

Last year I wrote about data science as an emerging technology with machine and deep learning. The underlying technology and applicable use cases are exploding where 2016 could be the year commercial, externally-facing applications with machine learning start to emerge in the financial services industry. CME Ventures has invested in SparkCognition and Nervana who both provide very exciting platforms. Between driverless cars and the need for greater automated monitoring, it's clear machine learning is here to stay.

2015 was a year of many exciting technology innovations, and we don't see a slowdown in 2016. These are a few technology themes to keep in mind in the months ahead.

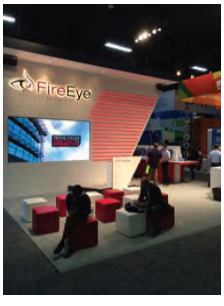
EVENTS

Tech Talk 5.0
Next-Generation Financial Technology **July 5**

CEO Amir Husain was invited to speak at CME Group's Tech Talk 5.0 in London. He spoke about the potential applications for Deep Learning in the financial industry and how SparkCognition's technology could help shape the way we trade and invest in the coming years.

BlackHat **July 30-Aug 4**

Black Hat is the most technical and relevant global information security event series in the world. For more than 18 years, Black Hat has provided attendees with the very latest in information security research, development, and trends in a strictly vendor-neutral environment. These high-profile global events and trainings are driven by the needs of the security community, striving to bring together the best minds in the industry.

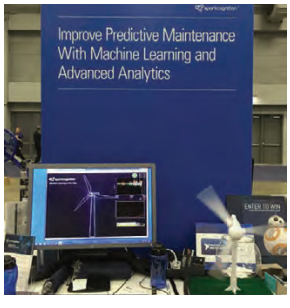


N.I. Week **Aug 1-Aug 5**

N.I. Week brings together the brightest minds in science and engineering, with more than 3,200 leading innovators representing a wide variety of industries.

For the N.I. Week Panel, SparkCognition joined other industry experts in the field of machine learning to discuss how advanced software technology is helping Big Analog Data problems and the Industrial Internet of Things (IIoT)

N.I. Week Panel



American Assoc. of Drilling Engineers Monthly Lunch and Meeting **Aug 24**

The American Association of Drilling Engineers (AADE) is a non-profit, volunteer organization. AADE offers a forum for the exchange of information, among its members and guests, specifically on drilling related topics. AADE chapters generally meet once a month where programs are presented by knowledgeable industry leaders in an informal luncheon or dinner environment. SparkCognition was invited to offer our insights into how machine learning can solve complex O&G problems and improve efficiency.

CMEGroup ✓
@CMEGroup
3:13 PM - 14 Jul 2016

Rumi Morales, our Exec. Director of Strategic Investments speaks at the @MarketsWikiEdu intern series today

IMFahad
@thefadkhan
12:49 PM - 22 Aug 2016

The smartest minds in #FinTech talk about how #WallStreet will change http://read.bi/2b1RGzo #blockchain #AI #Tech #fintech #Techchilla

PANcomm
@PANcomm
03:30 PM - 16 Aug 2016

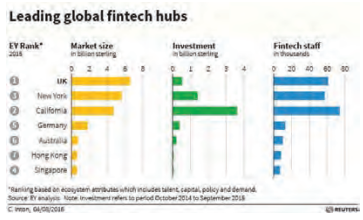
How do you reach #Millennials with #FinTech? @Cybzy shares how: http://bit.ly/2bkOfz0 via @pancomm

SparkCognition
@SparkCognition
10:57 AM - 13 July 2016

Our CEO, @amirhusain_tx speaking @CMEGroup #CMETechTalk 5.0 on Cognitive Analytics for Financial Platforms

Kirk Borne
@KirkDBorne
10:53 AM - 16 Aug 2016

What's driving the amazing rise of #fintech? http://shar.es/1ZMM5d #IoT #blockchain #BigData #Analytics #Cloud



World Economic Forum ✓
@wef
2:33 AM - 23 Aug 2016

These are the world's #fintech hubs http://wef.ch/2buGg31

A.I. IN SOCIAL MEDIA

AP Guha
@APGuha
8:41 AM - 13 Jul 2016

@amirhusain_tx, CEO speaks on cognitive analytics for finance...next frontier for SparkCognition, @CMEGroup TT5.0

Wall Street Journal
@WSJ
8:08 AM - 23 Aug 2016

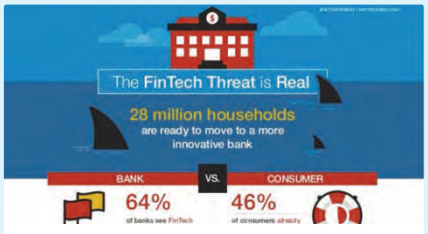
BOJ encourages fintech, remains wary of threat from hackers http://on.wsj.com/2bRws5W

IBM Partners
@IBMPartners
7:20 AM - 24 Aug 2016

#LinuxONE News: IBM launches cloud services for #blockchain on industry's most secure server http://ibm.co/2bnd6GE

Tom Grant
@thomaslgrant
9:33 AM - 23 Aug 2016

#BOJ may apply ' #fintech ' to operations in future: Kuroda - Greater competition and transparency @Reuters http://goo.gl/eyD3jx #Japan



Oliver Bussman
@obussman
2:15 AM - 9 Jun 2016

The #FinTech Threat is Real: 28m Households are Ready to Move to a More Innovative Bank http://americas.nttdata.com/news/news . . .

CFO Essentials
@CFOEssentials
9:05 AM - 27 Jun 2016

#ArtificialIntelligence Finds Its Place in Finance #AI http://buff.ly/298Ki0M

Michael Krigsman
@mkrigsman
9:37 PM - 20 Aug 2016

Robo-advisors have a $2 trillion opportunity in front of them #fintech

Finding Financial Exfiltration Using SparkSecure®

by **Jerry M. Schirmer, PhD**

One of the scariest scenarios for any company that is exposed to the internet is the lingering threat of data exfiltration. All of your data, from passwords and usernames, to actual trade secrets and market strategies are contained on computers. If these computers are going to be able to communicate with each other, whether to conduct trade-floor execution, strategic discussion amongst humans, or for myriad other reasons, it is necessary that they be on internet-connected devices. But if a device is on the internet, then it is vulnerable from a security perspective. And when compromised, the data exfiltration may happen silently, with the breach only discovered when the leaked information has been acted upon. This is where SparkSecure® can actively come to work.

Traditional security measures rely on a basic approach:

1. Put a filter between your device and the outside world
2. Build a list of the possible ways that compromises can happen
3. Generate a set of blocking measures that can be automatically implemented
4. Set your filter to execute this set
5. ***Hope for the best***

The problems here are obvious. Most notably, they are static. System administrators are constantly updating their list of vulnerabilities, and the actual people doing the exfiltration just need to be conversant about what is being looked for in order to avoid the known traps. This is where SparkSecure's Profile Based Threat Detection system comes in. Rather than look for static signatures and blocking them, Profile Based Threat Detection looks over all of the logs that have come in over the life of the SparkSecure® deployment. From here, it generates a set of statistics[1]. Using these statistics, we can split the "normal" behavior of each user or IP in the system, dynamically.

Then, knowing the "normal" behavior through the system, SparkSecure® can look for known instances where the system has been attacked or compromised.

From here, the system is capable of building up a profile of bad behavior–whether the user is installing malware, visiting compromised sites, or exfiltrating data, SparkSecure® constructs a profile. Then, when new data comes in, that new data can be checked against the existing model, and in close to real-time, users can be flagged as behaving in a manner consistent with these various profiles, or even in a way that is simply anomolous. And as the exploits change, so do the models. So, when a rogue trader stops connecting to their normal set of sites, and uploads marketing strategies via seldom-used-by-them FTP, the system can identify it, and flag them.

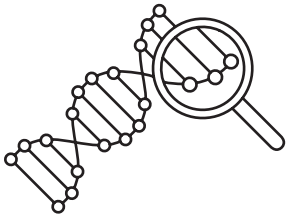
For instance, take the recent Swift messaging breach that affected the Bangladeshi Central Bank, amongst other Southeast Asian institutions. This hack was possible because the internal systems that used Swift were configured to trust all traffic once they had gotten through the authentication system. Had SparkSecure® been running against the outbound firewall logs of the Swift system, the system would have been able to flag the illicit transfer in near real-time by detecting a new IP connecting to the system, initiating new, anomalous traffic. This would have more of a chance of success than the pure signature-based methods of the past, because it would be calibrated, specifically, to Swift's traffic, which makes the detection of anomalous behavior more consistent and less prone to the false positives that break security experts' confidence in a tool.

[1] i.e., how many times has this user connected to port 80 in the past half hour? How many distinct URIs have they requested per second?

DeepArmor and the Future of Cyber

by **Keith Moore**

Modern-day antivirus has become the equivalent of the Windows '98 avatar Clippy–you see it all of the time, but you're not really sure how it helps you. In fact, over 78% of security professionals no longer trust antivirus simply because it is not able to keep up with the state-of-the-art in malware.



Instead of looking at static signatures, or even exploding files in a sandbox, DeepArmor® looks at the DNA of every file to identify if any components are suspicious or malicious in nature.

Things like Domain Generated Algorithms and obfuscation have far surpassed the detection capabilities of the signature-based tools that we all use today. This is the bad news.

Even worse news is that cyber crime is growing. According to the Singapore Minister of Home Affairs, Law Shanmugam, an estimated $2 Trillion will be lost through cybercrime by 2019. This is a recipe for disaster, and the major reason why both state and federal governments are making cyber security the top priority.

To combat this growing problem and technological deficiency, SparkCognition is proud to release the first cognitive antivirus solution to the market, DeepArmor®. DeepArmor® takes a unique approach to endpoint protection by leveraging neural networks, advanced heuristics, and complex data science to find and remove malicious files. Instead of looking at static signatures, or even exploding files in a sandbox, DeepArmor® looks at the DNA of every file to identify if any components are suspicious or malicious in nature. DeepArmor® uses cognitive algorithms to constantly learn new malware behaviors and recognize how polymorphic files may try to attack in the future! This keeps every endpoint safe from malware that leverages domain-generated algorithms, obfuscation, packing, minor code tweaks, and many other modern tools. Better yet, this is the perfect defense against terrorizing Zero-Day threats, which can never be captured using existing tools.

DeepArmor® is powered by cutting-edge technology that is light-years ahead of those used for malware generation or propagation. Pulling from many patented, patent-pending, and proprietary SparkCognition automated model-building techniques, DeepArmor® starts by looking at every unscanned file on a user's desktop or laptop. It breaks each file into thousands of different pieces for initial review. It then elevates the features using an advanced feature derivation algorithm known as SparkArtemis to turn those thousands of pieces into tens or even hundreds of thousands of individual components. All of these individual components are then run through cognitive and adaptive neural networks to find patterns that may be malicious in nature. Because these cognitive neural networks are trained on a bevy of threat types, from Worms to Ransomware, any threatening patterns present will be unearthed and called out immediately.

DeepArmor® has been tailored to operate seamlessly behind the scenes on each endpoint, and to only identify real threats without calling out false positives. This gives any user the freedom to do what they would like without the fear that their computer may become infected.

Atlas Wearables:

The Personal Trainer That Fits On Your Wrist

by **John King**

Jillian Michaels is one of the leading health and wellness experts in the world. She is a television personality, entrepreneur, life coach, nutrition and wellness consultant, motivator, and a New York Times best-selling author. Jillian is a multi-millionaire personal trainer who is best known for her appearance on different television shows such as Losing It with Jillian, The Doctors, and The Biggest Loser.

Michaels is an expert who truly knows her field. Like Jillian, the best of the best know their field better than their peers and colleagues. They do this by immersing themselves in their industry, by going deeper than others are willing to go. They read libraries of books and reports, they talk to as many industry veterans as are willing, they understand the history of their industry, and they pay attention to the present trends of their trade.

In essence, they immerse themselves in the data of their industry. They take in as much data as they can find, and process it. The most successful people in any industry understand that data and are able to see the future through it. Whether Warren Buffet in finance, Oprah Winfrey in media and entertainment, Tony Robins in behavioral psychology, or Jillian Michaels in personal fitness, industry leaders see what is coming and act faster and more creatively than others. They observe the data and compute it into action.

According to Marketdata Enterprises, a market research firm that specializes in tracking niche industries, Americans spend north of $60 billion annually on fitness and weight loss. With CNN Money putting the median salary of a personal trainer at $56,000, with top pay of $128,000 (in 2012), it's likely that a significant portion of that $60B goes to paying professionals and experts to assist us in our attempts to beef up or slim down.

The hourly cost of a personal trainer can vary from around $50 an hour, to upwards of hundreds per hour. In Jillian Michael's case, you'd probably need to pay her thousands to work with you.

We pay experts because they know what they're doing. They have spent more time understanding the data of their industry than anyone else and they can process that data into actionable insights, which produce results.

Experts are paid at the highest levels in their field because they understand and apply the knowledge (data) they have acquired in the most effective and efficient methods possible. We pay them to utilize their knowledge, incorporate the data we create, and process that into actionable insights that will make us better and produce the results we desire.

Like human intelligence, gathering and analyzing data to understand the best path forward is a key element of machine learning today. And like human intelligence, through data, machine learning can find the strongest indicators of causality.

With a background in biomedical engineering, Peter Li, Founder and CEO of Atlas Wearables, was exposed to many different startup ventures within fitness, healthcare, motivation during his time at Johns Hopkins as he earned his bachelors, then masters degrees. Atlas Wearables' co-founder, Mike Kasparian, was working at Philips Healthcare while Peter was researching at Johns Hopkins.

It was through those experiences that they were exposed to the core problem of advanced machine learning for attracting 3D motion and how it could be applied to the fitness world.

At the time, Peter and a friend had started a program called the Sound Body Challenge. It was a three month program, very similar to other motivational challenges that are commonplace today: an individual would come in once a week, maybe on a Saturday, and a personal trainer would take them through a standard set of exercises and routines, grade their form, and give them feedback to improve.

What Peter and his team began to notice was those individuals who could compel themselves to come in every Saturday would be much more motivated to have better outcomes.

Through gauging intrinsic motivation (self-motivation), extrinsic motivation (a prize or reward for completion), and social responsibility present in fitness teams, iterative testing and observation demonstrated the vast potential to implement intrinsic motivation in a digitized workout regimen.

After their initial experience with the Sound Body Challenge, Peter got on the phone with Michael and through a series of Google Docs exchanges, they

launched Atlas Wearables.

Peter, Michael, and their team started with an idea to help motivate people in the same way a personal trainer or fitness challenge program would, and they built an augmented personal trainer for your wrist.

Now in an advanced iterated version, the Atlas Wristband2 is the first workout tracker that learns to track your form for various exercises. It can automatically recognize most exercises and even help you target Training Zones optimized to burn fat, tone, or bulk. It's a waterproof device worn on your wrist, with a smartphone app and online portal to sync your personal data.

The technology that sets Atlas Wearables apart from other wearable technology is the machine learning tracking capability. Essentially, you're able to put this device on, do jumping jacks or any of their 100+ exercises, and Atlas will know that you're doing that specific exercise. So pushups, triangle pushups, military pushups, Atlas can tell the difference between even the most incrementally differentiated movements.

Atlas uses motion sensors on the wristband: a three-axis accelerometer, and a three-axis gyroscope. If you imagine a paint dot on your wrist moving around in 3D space, Atlas tracks that path, and each motion has a definitive fingerprint that they're able to identify. It's similar to what makes Siri run, but instead of looking at voice, Atlas is looking at a completely different dataset—motion. How does Atlas differentiate between movements? Machine learning.

The problem other wearables have (those not utilizing machine learning) is in the similarity of movements. A pushup and power clean look nothing alike, so they have no issue. But what about a normal pushup versus a triangle pushup? Visually, as a human, they look very similar with the slightest variation. Atlas Wearable picks up on those variations.

So Atlas has applied machine learning to elevate precision beyond that of other wearables. But what are the motivation factors built into Atlas technology, and how might that look to the regular user?

Intrinsic motivation is the core of their technology. Atlas is focused on augmenting the real-world experience of a personal trainer and client–movement + motivation.

Like a trainer, Atlas will keep track of different types of goals and metrics for you. It's sort of like a GPS; it will provide a roadmap to where you want to go, even if you want to drive somewhere you've never been. You just put your GPS on and you don't even think twice.

By looking at the Atlas wearable model, it's clear the Atlas team have dared to do things differently. Pedometer technology has made a strong name and case for itself in the fitness market, especially alongside the rise of wearable step-counting fitness brands like Fitbit.

Right now, the market is beginning to see a trend towards consumers who have used a pedometer for a while and are now beginning to look for more, as they are realizing that there may be more to their activity than just the step count. Atlas looks ahead to a fitness horizon where a wearable is just as informative to the user as that user is to the wearable.

In the constantly evolving intersection of fitness and technology, developers are often faced with expansive problems and no one clear solution. The success of Atlas is attributable to its unique design, both inside and out. With its "Tetris-like" look, the interactive elements present in its user experience, and the presence of high-level machine learning elements to produce a truly unique experience, the Atlas wristband truly is one-of-a-kind. As the needs and wants of consumers change, Peter foresees many opportunities to expand into solution-oriented tweaks.

Atlas is already collecting a huge amount of data to best optimize consumer experience, and the wearable's loyal community embraces plenty of opportunities to customize their wearable to the nth degree. Peter tells Cognitive Times that the data collected by the Atlas wristband is "only the surface" of the potential for future expansion.

THE TECHNOLOGY THAT SETS ATLAS WEARABLES APART FROM OTHER WEARABLE TECHNOLOGY IS THE MACHINE LEARNING TRACKING CAPABILITY. ESSENTIALLY, YOU'RE ABLE TO PUT THIS DEVICE ON, DO JUMPING JACKS OR ANY OF THEIR 100+ EXERCISES, AND ATLAS WILL KNOW THAT YOU'RE DOING THAT SPECIFIC EXERCISE.

As is the case with machine learning technology, the development of Atlas' technology is iterative. They start with regular people (who represent and provide data), and move up from there. Although the product might be great for professional athletes, Atlas would rather build it for the masses.

Anyone concerned with fitness would love to work with the world's top fitness experts. However, very few of us can afford to. Yet, that may be changing as we move toward machine learning that can augment what has historically been relegated solely to the realm of human expertise.

At the end of the day, Peter and his team want to be able to have the expertise an industry veteran like Jillian Michaels offers. They want to be able to capture her expertise and apply it to your unique goals, movements, and motivations. By leveraging advanced technologies and machine learning, they're well on their way to building it onto your wrist.

To pick up an Atlas wristband, check out Atlas Wearables on Amazon, at Dick's Sporting Goods, Luke's Locker in the Austin area, or at www.atlaswearables.com.

The Digitization of Banks A History

1697 — The first known futures market established in Osaka, Japan. The market was legalized in 1730

1792 — The Buttonwood Agreement was signed, which laid the foundation for what would become the New York Stock Exchange

1826 — The first known transaction on a futures basis occurs in England

1864 — A commodities exchange called The Chicago Butter & Egg Board is founded. This would become the Chicago Mercantile Exchange, the largest futures and options marketplace in the world

1950 — First universal credit card was established in 1950 by the Diners' Club, Inc.

1950s — The Electronic Recording Method of Accounting (ERMA) was created and streamlined into the US banking system by SRI International

1969 — The world's first ATM is installed in a branch of Barclays in Enfield, London

1995 — Wells Fargo is the first major bank to offer online services

Cofinity®

1998 — Confinity is founded, as a security software developer for handheld devices, which became PayPal in 1999

2005 — FFIEC begins more stringent regulation of financial institutions: risk-based assessments, customer awareness program evaluations, and security measures to authenticate remote access of accounts

FFIEC

2008 — Bitcoin, the digital asset and payment system is launched by an unidentified programmer or group of programmers

2015 — Nasdaq announces the use of blockchain technology (the innovation behind Bitcoin) to offer "fully-electronic issue, transfer and management of private company securities"

MACHINES ARE PREDICTING

What You'll Buy

by **Thu Le**

Your favorite retailer already knows what you're going to buy next. Customer spending data are goldmines of intelligent insight. Typically, a company will look at how you spend to determine how you are likely to spend in the future, and thus, how to target their marketing to your likely purchases. All of this is made possible through predictive analytics.

First of all, it's important to note that most predictions are based on the assumption that consumers spend based on their interests. Financial behaviors that companies consider are the types of products customers are purchasing, when they purchase, and where they are spending their money. Having access to this kind of information allows companies to improve their value proposition by personalizing product offerings and delivering them to you when you're most likely to need or want them.

The story of Target predicting a teenage pregnancy before her father knew has become a classic case study among retailers. Target was sending the teenager coupons for baby clothes and cribs a few months before she was due, while her father was completely unaware of the pregnancy. Based on the daughter's updated spending and browsing behaviors, Target knew she was algorithmically more likely to be a pregnant shopper.

However, there are only so many things retailers can do until a consumer moves on to his or her next major life event - getting married, buying a new house, or getting pregnant. That's when the consumer's usual routine breaks, and retailers need to adjust. To account for this, retailers have statisticians like Andrew Pole, who created what he called a 'pregnancy-prediction model' for Target. This model was built from an existing database associated with their customer ID numbers which included their historical transactions through credit cards, coupons used, opt-in survey responses, emails, demographics, and various other types of data. Using these data, the system can predict which females are most likely to be pregnant, and Target can start placing ads and offerings for an array of maternity products to those customers, while not making it intrusive.

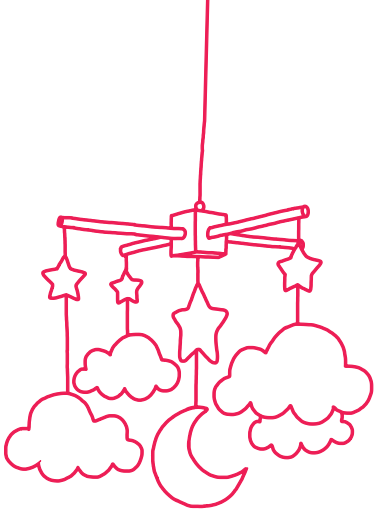
The act of following a consumer's spending pattern does not occur solely on the retail floor.

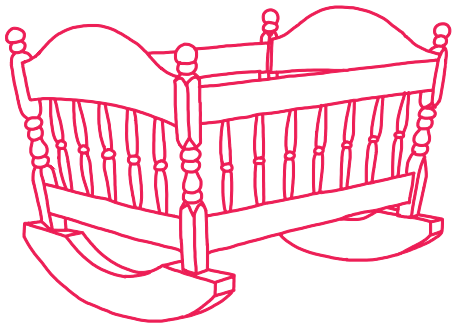
Recently, The University of Texas at Dallas published a study that shows how companies can target consumers based on the amount of money they have already spent elsewhere. This model requires a new kind of methodology--instead of looking at how a consumer buys at their own stores, companies can now examine share-of-wallet, or the amount of a consumer's spending in a defined product category that a business captures. For instance, if a customer spends a total of $100 on toiletries every month, with $60 of that amount at Walmart and the other $40 at Target, the share-of-wallet for each company would then be 60% and 40% respectively.

This method makes sense as it also looks at a consumer's total size of wallet, which means how much they can afford for a specific product category alone. If a consumer owns a wallet size of $100 for toiletries per month compared to those who can only afford $50 for the same products, then Target and Walmart would want to put more efforts into the former customer. The same goes for banks. A customer can either decide to put 100% of his or her savings into a bank, or split them at 50/50, or whatever proportion that they'd like. If a bank can entice the customer with a certain size of wallet into putting more of their savings into that bank's system, then it subsequently gains a higher level of profit.

However, getting competitive data can be challenging as it isn't always available. Without accessible data, companies can turn to predictive models to gain an estimation of their customers' spending. Most of the data feeding into these models originates from past surveys or information aggregators, as well as historical transactions and approximated customer average income within a demographic or geographic segment.

In addition, interrelationships between product spending behaviors can also be used to facilitate cross-promotional efforts. If customers tend to spend more on soaps after buying shampoos, but not quite the reverse, then companies might





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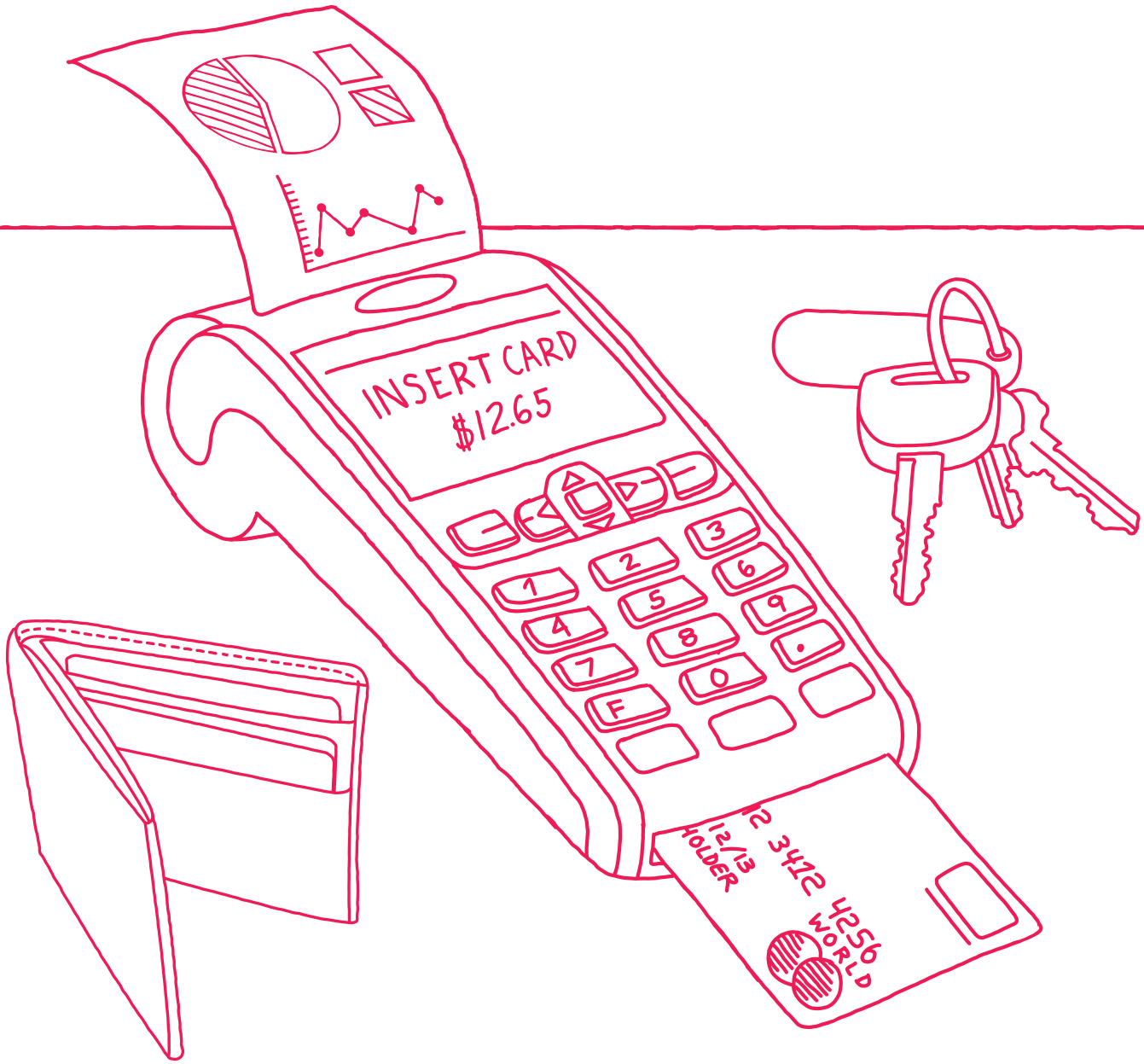


want to promote shampoos more heavily.

Using consumer data for retail is one thing, but aggregating life patterns is quite another. Banks in this modern era are in a tremendous position of power to understand, predict, and exploit customer trends.

There is a lot of value that a bank can derive from your monthly bank statements. For example, Kasisto developed KAI, an Artificial Intelligence based conversational platform with an 'expertise' in finance, to help consumers with managing money and tracking expenses through simple messaging. The bot can also show you bargains that you might be interested in based on your spending history and geography (for example, deals from the exact store you're standing in).

Furthermore, even the banks that you are connecting with can tap into your data and offer additional banking services when it makes sense. By combing through your statements, credit scores, reviews, and many other streams of resources, banks can start offering deals and saving options that not only match your interest, but also know when you need them most.

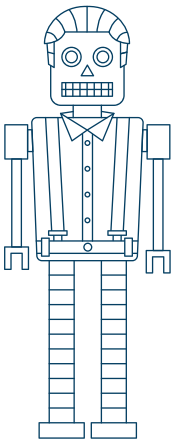
For such a long time, banks, retailers, and companies have retained a fluid amount of data streams that have gone untapped. With Artificial Intelligence, machine learning, and predictive analytics advancements, companies can now put these data into use–not only to increase profits, but also to improve processes, and in turn, benefit their customers.

Four Ways A.I. is Being Used

DATA IS EXPLODING

AND WE NOW HAVE THE TOOLS TO ANALYZE IT

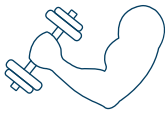
1



WALL ST.

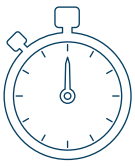
Computer-aided high-frequency trading is becoming more and more common, and

MACHINES NOW MAKE ~70% OF ALL TRADES ON WALL ST.



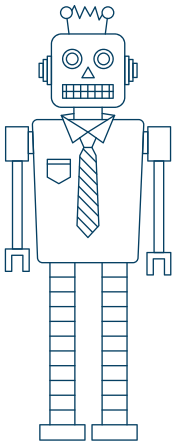
Computer Systems have been trained thoroughly to predict when to sell or buy shares to maximize profits or even minimize losses.

The algorithms seek out and exploit small windows of trading opportunities, often measured in minute fractions of a second. Trading times have been diminished from seconds to milliseconds.

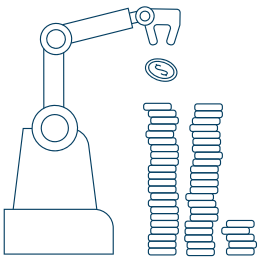


In 2014 more than 40% of new hedge funds were "systematic," meaning they used computer models for the majority of their trades, according to data provider Preqin

2

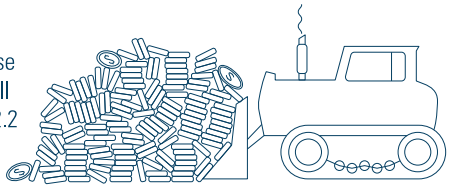


Machines are acting as FINANCIAL ADVISORS



Assets in automated portfolios (managed by robo-advisers) rose 210% last year

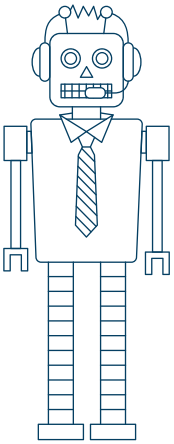
it's estimated that these automated services will manage as much as $2.2 trillion by 2020



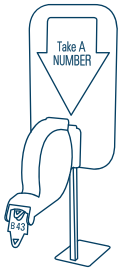
in the Financial Industry

Computers are cheaper and more powerful than ever. The prevalence of mobile and wearable devices, and the popularity of social networks (and internet use in general) have collected massive amounts of data. Algorithms are just now becoming sophisticated enough to analyze these troves of data.

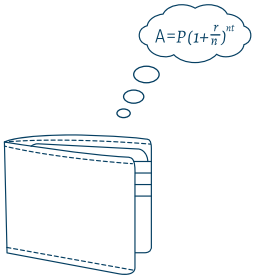
3



A.I. will improve CUSTOMER SERVICE

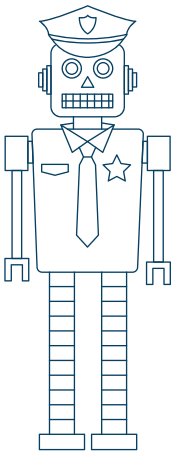


As speech processing and natural language processing technologies mature, we are closing in on the day where computers can handle most customer service questions for us. this means shorter wait times and happier customers.

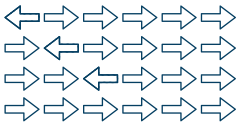


Smart wallets will monitor & learn user habits and needs. They will alert and coach users to show restraint and to alter their personal spending and saving behaviors.

4

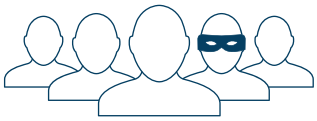


A.I. can increase online transaction SECURITY



Machines can search troves of data to identify patterns that might signify fraudulent activity.

The technology can even try to predict when your card is stolen.



Threats can be prioritized using Natural Language Processing.

Maintaining Century-Old Trust with Cutting-Edge Cognition

by **John King**

According to a recent Accenture report, global investment in financial technology (fintech) ventures in the first quarter of 2016 reached $5.3 billion, a 67 percent increase over the same period last year. At the same time, consumer faith in financial institutions has been low for years. This loss of confidence has the potential to eventually undermine financial growth. However, the rise of fintech provides new opportunities to regain and maintain the centuries-old trust in financial institutions.

The 2008-2009 financial crisis started an unprecedented regulatory response across the globe with a focus on risk management. It had wide-ranging implications for financial services including technology and the response to regulation. Regulatory, consumer, and cost pressures have meant that capital market firms needed to look beyond traditional technologies in this new era.

As the financial sector continually evolves, trust is becoming more important than ever. Technologies like blockchain are providing trust through a transparent and federated digital ledger system. Artificial intelligence is providing next-generation cybersecurity and surveillance solutions to reduce risk and curtail illicit activity in financial markets.

In a world where trust is being associated with uncrackable crypto algorithms and artificial intelligence, the role of trusted banks and institutions is evolving, and for the third-largest stock exchange in the world, The London Stock Exchange Group (LSEG), trust is being maintained by applying cutting-edge technology.

Chris Corrado was working at IBM as a programmer when he was approached by a recruiting firm specializing in placing mathematically minded personnel in financial services firms. They were looking for a quant. If you've read the book, "Flash Boys", you know that large financial organizations, in addition to spending big on the best hardware, have been scooping up the very best computer science and data analytics talent for some time. But it would be almost 30 years until Michael Lewis would write "Flash Boys"–this was in the mid-80's. Morgan Stanley had already seen the writing on the wall.

Corrado joined Morgan Stanley as a programmer when it was exclusively a capital markets firm. But he rose through the ranks to eventually become Morgan Stanley's CIO of International IT.

After a decade of covering applications development and infrastructure in Europe and Asia for Morgan Stanley, Corrado served in CTO or CIO roles with Deutsche Bank, Merrill Lynch, AT&T, eBay, Asurion, UBS, and MSCI.

Banks know what they need. And what Corrado offers is at the top of their list. No surprise, then, that once he had amply proved his mettle, the global financial icon, London Stock Exchange, brought him on as their COO and CIO. At LSEG, Corrado's mission includes providing access to capital formation, intellectual property, and risk and balance sheet management.

For a leader like Corrado who is always focused on innovation, the union of finance and technology is blended into a very effective gradient, propelling his industry to new heights through streamlined technology and a client-oriented experience. And Corrado is putting his experience to work, leveraging the latest innovations to ensure that LSEG, which maintains a $6 trillion short scale market capitalization, remains one of the most trusted financial organizations in the world.

So, just how, specifically, is Chris Corrado redefining trust in an industry enveloped in transformation?

"LSEG is a leading developer and operator of high-performance technology solutions, including trading, market surveillance and post trade systems for over 40 organizations and exchanges globally, including the Group's own markets–London Stock Exchange, Borsa Italiana and Turquoise," Corrado explains. "We are building trust through this resilient exchange technology and an operational focus on clearing and the quality of indexes we provide as well as platforms for efficient and high-quality trade reporting."

An important facet of the drive for change is understood by paying attention to the underlying drivers. The rate of change in fintech is nothing short of breakneck. While industry transformations in finance are often driven by endogenous factors, they are more

often brought on by specific exogenous catalysts. And in considering the global transition to a risk-based focus in finance, post 2008, this trend proves true: Corrado isolates the 2008-2009 financial crisis as a chief driver underlying a rethink of the notion of risk as it existed before the crisis.

In a paper prepared for the 2010 Financial Crisis Inquiry Commission by the Booth School of Business at the University of Chicago, the problem of poor risk management was apparent in actions leading to and evident through the crisis. Research and insights acquired by subpoena revealed that in many financial firms, the "preferred explanation for why bank balance sheets contained problematic assets, ranging from exotic mortgage-backed securities to covenant-light loans, is that there was a breakdown of incentives and risk control systems within banks."

The opportunity to learn from the crisis and re-orient finance came about in the aftermath of 2008. Leaders looked for opportunities to grow without committing the mistakes that had led to the previous disaster. An eye for innovation was instrumental in ensuring a positive growth curve on the way forward–and innovation is what Corrado lives for.

"Innovation is essential to service clients' needs, so startups and fintech companies are a vital part of the financial services sphere–they complement and support the ecosystem in achieving efficiencies and cost reductions," he says, referring to leverage of technology to mitigate losses while supporting the link between clients and partners and engendering trust.

With great hopes being tied to new technologies such as the secure, distributed ledger system, blockchain, Corrado is focused on leveraging what is working, albeit with caution.

"Blockchain is an early stage technology that has the potential to drive change across the industry. We are excited about it but believe that the technology needs to be developed in a considered and rigorous manner, in partnership with clients, to provide the right service and benefit to them," Corrado says. "Amongst other initiatives, we are contributing to a market-wide steering group comprised of clients and other partners to look at the key challenges and opportunities that blockchain and distributed ledger technology more generally offers."

London Stock Exchange Group has significant technical expertise to bring to the discussion and Corrado sees real opportunity for the technology in trading, particularly in risk management. As has become clear with the meteoric rise of the fintech sector, "driving innovation and developing new products will significantly reduce risk and margin requirements while delivering the opportunity for deeper regulatory oversight."

One of LSEG's unspoken goals also includes providing and protecting the relationship of trust between all players within its federated network. As a leading developer of high-performance technology solutions for over 40 organizations and exchanges globally, Corrado tells Cognitive Times that LSEG is committed to a collaborative, open source industry effort to advance distributed ledger technology, "as a trusted institution with expertise in post trade and risk management we feel we have a lot to offer the exciting debate that is currently taking place."

With security being front and center in LSEG's operations, Corrado references the importance of building secure and dependable relationships, and applying the most cutting-edge available technology.

"This is the future," he points out. "Essentially, we operate in a sector that can attract bad behavior and it is getting worse. To live safely, we need to proactively predict what undesirable behavior could happen next, and prevent it from happening and/or to ensure that this behavior cannot impact us, or our clients. That is our responsibility, and to do so requires advanced analytics applied through a variety of

WITH A CLEAR UNDERSTANDING OF THE CAPABILITIES AND SCALABILITY THAT A.I. BRINGS TO FILTERING OUT SCAMS, SPOOFING, AND OTHER UNWANTED ACTIVITY, CORRADO BELIEVES, "THIS IS THE FUTURE."

machine learning algorithms."

Security is becoming more important than ever. Risk management falls on the shoulders of automated systems, with higher-level validation and investigations becoming the primary duty of analysts. System monitoring is a tedious responsibility where potential for human error and exhaustion is vast. When technology takes on the job of cogency and mitigating risk–whether in fraud, error, or otherwise–the burden of security becomes a little easier to manage.

In handling partner-client relationships as well as monitoring the transition of capital, Corrado says it is imperative for modern-day financial firms to maintain security as a top priority in mitigating the potential threats brought on by high levels of risk. In order to maintain the highest levels of security, Corrado, as he has throughout his career, is staying ahead of the technology before the technology gets ahead of his organization.

Predictive analytics in machine learning and artificial intelligence have been instrumental in scaling the security component of financial risk management. The speed and effectiveness of monitoring risk is extremely important to large digital infrastructures such as those within finance. As the publication, TechEmergence, reported earlier this year, "systems using machine learning can detect unique activities or behaviors ("anomalies") and flag them for security teams. The challenge for these systems is to avoid false positives–situations where "risks" are flagged that were never risks in the first place."

To stay ahead of technological trends, LSEG has been working with SparkCognition, a leading artificial intelligence startup, to develop next-generation surveillance solutions. With a clear understanding of the capabilities and scalability that AI brings to filtering out scams, spoofing, and other unwanted activity, Corrado believes, "this is the future."

Always honoring the trust between LSEG, their clients, and the market at large, security is top of mind for Corrado. Understanding, avoiding, and preventing cybersecurity and fraud "is our responsibility and to do so requires advanced analytics applied through a variety of machine learning algorithms," states Corrado. Machine learning technologies address the question of speed and efficiency by isolating system anomalies and learning continually from existing financial activity–whether internal or external to a group's digital infrastructure–this technology ensures a baseline of security previously unattainable by human standards alone.

By coupling AI and machine learning with the underlying power of computing platforms (hardware, large-scale data analytics infrastructure), Corrado indicates that an investment in providing the necessary infrastructure to enable "that level of scalability" is certainly worthwhile.

"There are a number of areas where AI can offer significant benefits," he tells us. "Cybersecurity comes to mind: predictive analytics around maintaining resilient operations, improving the quality or our financial data. Ultimately, this affords us the opportunity to make our people smarter and to make decisions faster."

Humans will perhaps always be needed to provide strategic guidance, and bear the ultimate responsibility, but the efficiency enabled by AI has proven instrumental in allowing human analysts to provide improved services and support ever-more-complex risk management needs. Algorithms, with their extensive exposure to the inner workings of such a complex system make the perfect information "sponges" that learn, adapt and implement security and trust at machine scale for large organizations such as LSEG. With much more to come in the AI revolution, and AI-accelerants like quantum computing on the horizon, Chris Corrado is making absolutely certain that the only direction risk management and financial security has to go is up.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AUSTIN STARTUP SPOTLIGHT

Greener Futures: Honest Dollar, Fintech, and the Fish That's Eating the Whale

by **John King** and **Caroline Lee**

We met Whurley on a Friday afternoon at WeWork, one of the national co-working franchises that have exploded in popularity over the past few years. Housing individual consultants, entrepreneurs, and startups, the office buzzed with activity.

Yet the Honest Dollar founder–despite his own packed schedule, from conference calls to addressing a deluge of emails armed only with a mobile keyboard–was cool, completely at peace.

Whurley, a successful serial entrepreneur and inventor, along with his most recent startup, Honest Dollar, fit in well with the hopeful, bright-eyed, and in many cases inexperienced, entrepreneurs at WeWork. The difference is, Whurley is leading a fintech startup which was acquired within one year of launch by global financial behemoth, Goldman Sachs.

Whurley, who goes by what was originally his Unix username, an abbreviation of his full name, William Hurley, is famous. He started his career as a touring musician–"as everyone now knows," he points out with a smile, "because someone put it on Wikipedia."

He never went to college, and he's accomplished more by the age of 45 than most do in a lifetime. If you follow him on social media, you'll see him hanging out at the White House for state dinners, visiting with President Obama, leading The Global Partnership for Gender Equality in the Digital Age, advocating for open source, or rubbing elbows with Presidential candidate Hillary Clinton.

Whurley started his career in Austin at Apple, then went on to IBM as a Master Inventor. It was then that he got the startup bug. He has seen success and failure as an entrepreneur, yet has never stopped creating. He is the author of two books and various articles, holds over ten patents, fundraises for political causes, has founded multiple non-profits for social good, and has been a producer for two-award winning films. All of this while launching companies and building game-changing technology.

His first really successful venture was a mobile software design and development company. In 2010, along with Ben Lamm and Mike Erwin, Whurley founded Chaotic Moon Studios. Chaotic Moon developed the first iPad-only digital newspaper, built applications for Microsoft, CBS Sports, Sanrio, Pizza Hut and others, developed products such as a Microsoft Kinect-controlled skateboard (which the company named the "Board of Awesomeness"), a shopping cart that follows a shopper around the store, and a bicycle helmet fitted with seven cameras that begin recording on impact, functioning like an airplane's black box in case of a hit-and-run (the "Helmet of Justice"). And in July of 2015, Chaotic Moon was acquired by Accenture.

Sitting at the helm of another successfully acquired company, Honest Dollar, Whurley continues to have an outsized impact on the industry he's chosen to displace.

When it comes to the charge for starting a company like Honest Dollar, Whurley makes it clear that the company was a problem-oriented response to a clear need. "There's a savings crisis in America," he explains. "If you're an average American citizen and a $400 unexpected expense arises, it could potentially bankrupt you."

This number isn't arbitrary–in January of this year, Princeton Survey Research Associates International conducted a survey that reported only 37% of Americans have enough savings to cover a $500 or $1000 expense, such as an emergency pet surgery or a washing machine repair. The other 67% resort to spending cutbacks (23%), charging expenses to a credit card (15%), or borrowing funds from friends or family (15%). In addition to this, the survey found that 4 out of 10 Americans surveyed ran into an unexpected major expense last year, which is a testimony to Whurley's point: the savings crisis is a problem that has existed without being properly addressed for some time now. "And that should worry everyone, right?"

Interestingly, the problem became more complex as it was considered further–a fact that doesn't come as a surprise, especially given the historical focus of current personal finance

research. Unemployment statistics are often too insular to provide insight into the how and why of personal finance, even though the two may be linked. According to David Johnson from the University of Michigan, "people have studied savings and debt, but this concept that people aren't making ends meet or the idea that if there was a shock, they wouldn't have the money to pay, that's definitely a new area of research"–especially since the Great Recession.

Of all the potential savings-related spheres of the financial industry, the area of focus that Whurley landed on was retirement. "I look at retirement as kind of the Achilles' heel of the financial system," he says. "There are so many areas of our lives that are touched and dominated by finance. And what do people do? They choose not to think about it." This became a root cause analysis that would eventually lead to Honest Dollar's inception as a web-based way to make retirement investing easy and accessible to everyone, allowing individuals to create and manage their own IRAs.

Honest Dollar's initial charge was to find insight that would better answer these questions. Several of the essential inciting topics included a basic understanding of financial behavior: if people aren't thinking about their future financially, what are they thinking about?

Essentially, Honest Dollar offers Individual Retirement Accounts (IRAs) designed for the way people actually live and work. Retirement accounts are set up for an industrial era where workers stayed with the same company for most of their lives, contributing equally to a long-term savings account. Today, two years seems to be a long tenure for younger generations. Saddled with college debt and stagnant wages, these younger generations are forced to put off savings for longer periods of time.

In early September, The Pew Charitable Trusts released an analysis of access and participation in retirement savings plans that found Americans on average haven't actively saved for retirement. The reasoning for this observation envelops a variety of catalysts: from enrollment variations based on industry and region, to access differentials based on age, gender, education, and ethnicity.

Honest Dollar, Whurley tells us, aims to simplify the process and generate wider access to retirement under the customer's own terms. The company's recent acquisition by Goldman Sachs, announced at SXSW 2016, will ideally achieve this goal even faster than before.

When asked about working with Goldman Sachs, Whurley is quick to answer with two questions of his own. "Are we now a part of Goldman?", leaning back with a smile. "Or is Goldman now a part of us?" His point holds true – the knowledge exchange incited by the company's acquisition of Honest Dollar in May holds potential for innovation beyond any current offerings for the financial services industry. "Think of it as a financial company that has been transforming itself into a tech company, and is now becoming a software company," he concludes decisively.

Given the track record of Honest Dollar's development, it's likely that Whurley plans to make the most of Honest Dollar and Goldman Sachs' partnership, but he's not yet saying how.

Historically, SXSW has spelled major announcements for Honest Dollar. "The idea is to continually top everything, right? This year at SXSW will be the answer to questions like "how have they fared?", "did the big company crush them?", or "did they make the big companies super innovative" – but between now and then, it will be a whole series of new people that we brought on, the humans we brought on, and creative, innovative projects making their way into the public sphere."

From mere observation of the company's past track record paired with the enthusiasm in Whurley's words, it seems like Honest Dollar has its sight set on rocking fintech with no sign of stopping. Though he wouldn't dare give away any teasers as to what to expect from Honest Dollar next, Whurley did, with the same cool he carried walking into the room, leave interested spectators one important piece of advice: "Just wait and watch."

Where No Derivatives Company Has Gone Before:

Rumi Morales and the Future of Fintech

by **John King** and **Caroline Lee**

"When you think about a bank, or when you Google one, what's the image that comes up?"

"Usually a Greco-Roman temple. But when's the last time you went to a bank that looks like that?"

Ripples of laughter move through the audience before she moves to her true question: "When's the last time you went to a bank?"

In a talk delivered to the MarketsWiki Education (MWE) World of Opportunity Education Series, Rumi Morales demonstrated a charge to rethink ways in which the Chicago Mercantile Exchange (CME) Group has engaged with the financial ecosystem of the future, and to go where no derivatives company has gone before.

While speaking to the audience of young professionals in Chicago, Morales established the trajectory of financial technology, or fintech, through its early and most well-known iconography.

As Executive Director of CME Ventures, Rumi Morales is charged with the execution of venture investment in emerging technology worldwide, so she knows a thing or two about the history and trajectory of fintech. Morales graduated magna cum laude from Wellesley College and has an MBA from NYU. She's worked with personnel and portfolio companies around the world, including the Global Markets Institute at Goldman Sachs, and international corporate development strategy with the CME Group. Morales is such a mover and shaker in her industry that she was named to Crain's Chicago Business 2014 Tech 50, Institutional Investor's 2015 Fintech Finance 35, and Crain's Chicago Business 2015 40 Under 40 lists.

Rumi Morales knows banking. She knows fintech. And according to Morales, the growth of online banking and mobile transactions are just two of the factors relegating brick-and-mortar banks to relics of the past.

Even the most iconic trading ecosystems are giving way to new technologies and digital renovations: "If you go here today," Morales begins, showing an image of a massive floor at Stamford UBS teeming with trades, "most of this is shuttered for a number of reasons - whether it's the increase in regulations, the pretty banal trading environment we've seen so far, but also because of this." She switches to a slide featuring a mosaic of different financial services apps displaying trending projections rising and falling on a digital dash. "You don't need all the hardware since we're becoming increasingly mobile."

In thinking about the future, Morales isolates the importance of recognizing the origins and importance of a basic need when considering the future of a solution. The trajectory of the futures market through history is no stranger to this concept: the world's first recorded futures exchange was organized in Japan in 1697. The process behind such a market has undoubtedly grown in

complexity throughout the last three hundred years, but the concept itself - much like the best ideas, Morales asserts - harkened to a need, and that need was to protect and manage capital.

Digitization, advanced security systems, and the next generation of big data are the three areas that Morales believes have the power to transform the financial services industry landscape.

"We feel that these are the three things that not only keep us up at night because we're scared," she says with a smile, "but they keep us up at night because we're excited." Fintech, like many major industries today, is an amalgamation of many elements combined to create a well-running machine.

The interest that CME Ventures keeps in mind while seeking out new areas of innovation parallels the mission of emerging technologies themselves: how might one improve an existing system to better address a need and allow for more accessible future innovation?

In an industry built on change, Morales sees each of CME Ventures' partner groups as an opportunity to propel fintech into a more secure future; but most of all, one that channels more effective communication between people, finance, and technology.

New technologies have historically ushered in change. In an increasingly digital age, this change happens with more haste and expanse than ever before. Morales pauses at a point in her timeline to examine the transformation of CME Group's famed Merc Club into an Innovation Lab, designed to foster collaboration and the exchange of ideas. "You think about the evolution of finance over time and how things continued growing, and you can become humbled because things can change."

But the changes don't stop there. One of the most pervasive technologies of the day is artificial intelligence, and it's quickly making its way into the financial industry.

Morales highlights artificial intelligence as a key player in the future of the derivatives market, since a change to automation could usher in new potential for growth, resources, and development. She gives an example from SparkCognition's CEO, Amir Husain, in understanding the intersection of a trader's feel for the market and a computer's ability to recognize patterns. Posing a question to the audience, Morales challenges the group to consider what comprises the expertise within the overlap: "If you're a really good trader and have a feel for the market, where does that feel come from?"

The answer that Husain offers, Morales says, is multifaceted: experience, a knack for recognizing patterns, and the ability to process what's happening around you.

Much like a seasoned trader, a computer is able to achieve each of these prerequisites to effectively learn the markets and offer predictive analysis to rival human experts, while still mitigating human error and completing onerous tasks in a fragment of the time.

"We're at a stage today where computers have access to far more historical data and analysis than we can hold in our heads," Morales explains. "Computers are getting a feel of the market now." And much like the neural network of a human being, the "feeling" computer is able to problem-solve in ways previously unimaginable. This level of critical thinking is "not about machines becoming better machines," the executive director concludes, "but instead about machines becoming better brains."

An ongoing dialogue between the needs of corporations and the solutions of the startup world has occurred on a resoundingly silent level. Rumi Morales believes that establishing a dialogue will allow more solutions like artificial intelligence and machine learning to affect the derivatives industry in focused, pertinent areas that will drive the financial services sector into the digital age, full speed ahead.

One of the most pervasive technologies of the day is A.I., and it's quickly making its way into the financial industry. Morales highlights the technology as a key player in the future of the derivatives market, providing an example from SparkCognition's CEO, Amir Husain.

Political Forecasting and Predicting the 2016 Presidential Election

by **Ashvin Govil**

We are in the midst of an election season that has rewritten the way politicians view the history books, shifted how Americans look at their fellow citizens, and created seemingly unsurpassable rifts between them. However, regardless of whether a voter is riding the Trump Train, feeling (felt) the Bern, or is with Her, one basic curiosity looms at the back of their mind: who's going to win?

It's a question that has long drive people in political science and statistics to find models, polling methodologies, and patterns in history to create models that can accurately and consistently predict the results of presidential elections. More recently, people in computer and data science have started to enter the field, wielding new tools, such as neural networks, machine learning, or advanced statistical analysis, to harvest new kinds of information from the same old data.

Predicting an election is not an easy task. It requires foretelling the beliefs and the intentions of well over 100 million people, months in advance, well before many of them have even made up their minds on who they will vote for.

The first step in creating an accurate prediction model involves choosing the appropriate data source. In a standard election, political forecasters like to use historical economic data to predict the outcome, often with good results. For example, in 1988, Michael Dukakis led in the polls against George Bush Sr. for much of the campaign season. But models considering the strong economy at the time and the fact that Bush was the Vice President of a popular incumbent president, Ronald Reagan, predicted that Bush would eventually come up on top and win the election (which he did).

But of course, there is hardly anything that could be considered "standard" about this election.

Thanks to a full year that has thoroughly broken all traditional theories on political science and is beckoning an entirely new era in American political history, predicting based on the past has suddenly become much less reliable.

Due to the historical unpopularity of both major candidates for president, these traditional avenues of prediction have been deemed inapplicable to this cycle, even by their creators. As a result, we have to turn to sources of data from the present, rather than from the past, to try predict the future.

The most well-known political forecaster actively predicting this year's election is Nate Silver, thanks to his past successes in predicting elections. After being named one of the World's 100 Most Influential People in 2009 for correctly predicting the results of 49 out of 50 states in the 2008 presidential election, he went on to predict the 2012 election without missing a single state.

Nate Silver's models mostly use poll data to calculate the probability of each candidate winning, as laid out in these steps:

Step 1: *Collect, weight and average polls.*

Step 2: *Adjust polls.*

Step 3: *Combine polls with demographic and (in the case of polls-plus) economic data.*

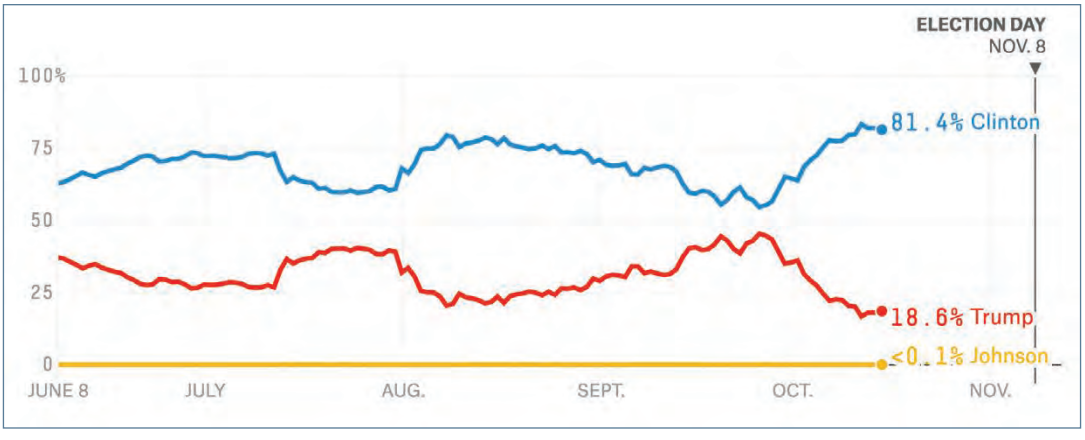
Step 4: *Account for uncertainty and simulate the election thousands of times.*

The most important factor here is the averaging of the polls. Media outlets love to report outlier polls showing one candidate or another up in the polls by a surprising amount, implying that something significant has changed about the election based on just one poll.

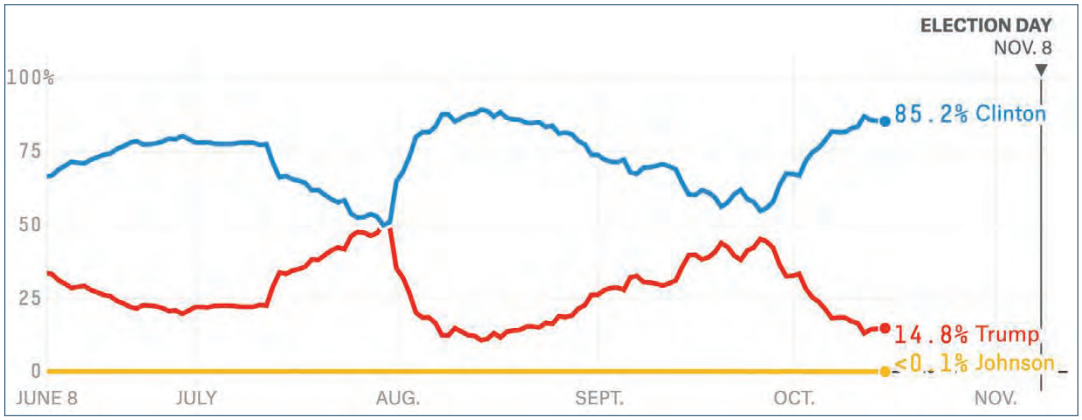
However, due to the uncertain nature of polling, it is expected for individual polls to sometimes be wildly apart from one another, in the same way you would expect that in a random group of people, some of them are much taller than others. Averaging polls helps eliminate these statistical errors and allows for predictions that have a smaller margin of error than the polls on which they are based.

However, even Nate Silver's models, and therefore the polls, have had trouble making sense of this election.

This entire election cycle has been wrought with endless scandals, controversies, and leaks draping negativity over both candidates. Public opinion polls have shifted rapidly as news cycles shift from one candidate to the other, one scandal to the next, giving a very noisy picture of the race over time.



Nate Silver's Polls Plus predictions from June 8th through October 12th



Nate Silver's Polls Only model, which doesn't account for convention bounces or economic factors, has had an even bouncier cycle.

This isn't a fault of Nate Silver or his models, but rather the nature of the poll data they rely on. Rapid-speed news cycles combined with the abnormally high number of undecided and third-party voters that will eventually support one of the mainstream candidates creates a huge amount of ripples in public opinion and the polls.

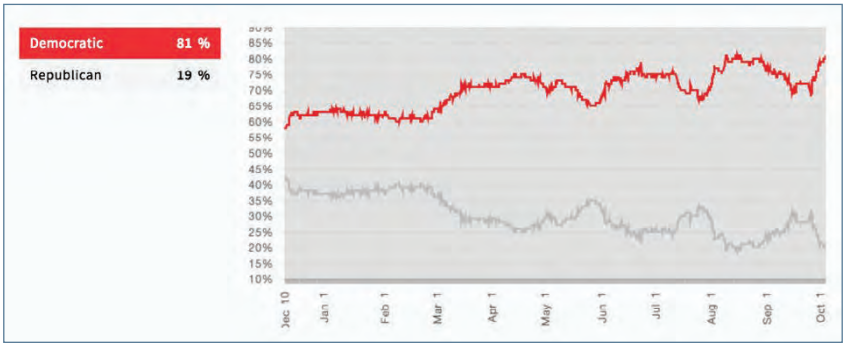
But what if we want a crystal ball that looks past all that volatility and makes a concrete prediction of the future that we can trust now, and two weeks from now as well?

PREDICTION MARKETS

Prediction markets are these peculiar online websites where thousands of traders place bets on elections or other political events in the same way a gambler might bet on a certain horse winning a horse race. Betfair and PredictIt are two of the more popular prediction markets.

Through the power of the financial incentives created by these websites, prediction markets offer a powerful way to calculate the true odds of an election. They operate as data aggregators in similar fashion to Nate Silver's models in order to create predictions. However, instead of crunching raw numbers to create the probabilities of each candidate winning, they are powered by thousands of people crunching a combination of data, news events, and personal perceptions.

These markets tend to be more stable than polls or poll-based markets. The graph below taken from PredictWise, a website that aggregates prediction markets into actual predictions, shows just how stable these markets are even in the face of multiple conventions, scandals, and blunders taking up the news cycles for weeks on end.



Compared to the data from Nate Silver's Polls Only model over the time frame, these predictions are practically flat for much of the race, until both started converging towards Clinton after a series of leaks and accusations of sexual assault dramatically hurt Trump's standing with women voters in the last few weeks.

So now we can predict the election in a relatively consistent manner (prediction markets), and directly see the beliefs and opinions of the public (polls). But still, both polls and prediction markets have their flaws. Polls are slow to show changes in opinion, prone to bad methodology, and are not very useful individually. Prediction markets are able to update their odds in real time and are able to stabilize themselves despite large changes in the polls. But at the end of the day, they don't offer any actual new data, merely a new option to consolidate what we already have into an actual prediction. What if we wanted to find a new data source that could tell us something that history, polls, and prediction markets could not?

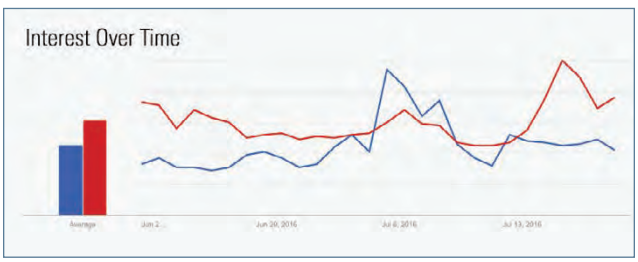
The answer is simple–social media. The internet has exploded in the last few decades, with the last ten years bringing the rise of social media. Even since the first election of President Obama in 2008, the percentage of adults who use at least on social media site has skyrocketed from 25% to 65%, and social media grew from being just another distraction in our lives to an extension of our personalities. A useful side effect of all this growth has been an exponential increase in the amount of data people create, share, and enjoy with each other using social media websites such as Google, Facebook, and Twitter.

Political discourse wasn't left out of this growth, making social media has a potentially ripe source for real time data on how people think and feel about certain politicians at any given time. Although social media's demographical bias towards younger people makes it a challenge to extrapolate trends to the general population, it can provide a window into how people's thoughts, beliefs, and actions are changing in real time in a way polls never could.

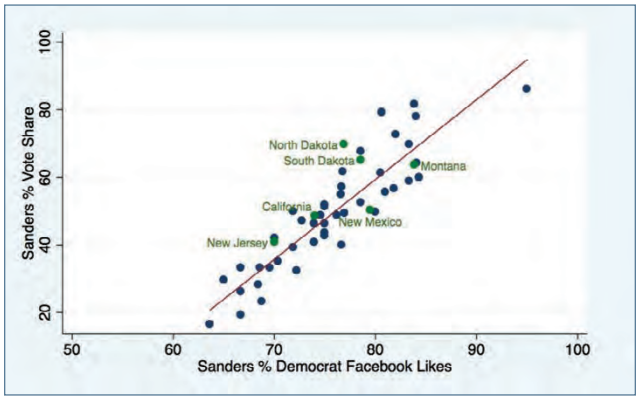
The tricky part is teasing out the data from the unorganized mush of words that makes up what people say on the internet--people describe their feelings using words and links to articles mirroring their opinions, rather than the discrete and easy-to-understand data a poll or a prediction market provides.

This is where the technology and data analysis experts come in. With the use of cutting-edge natural language processing (NLP) techniques such as sentiment analysis, a sequence of words in a tweet, Facebook post, or Reddit comment that would otherwise be meaningless to a computer can be converted into a discrete numerical representation of how a certain person feels about a certain candidate based on that post. This representation could then be aggregated and fed into a model that could show changes in how candidates are perceived over time by tracking changes in the average tone used about that candidate on social media. The data could even be trained to predict the results of new polls that are still being conducted, by training a model through supervised machine learning to predict them based on how older social media data correlated to old poll data.

Google Trends, a service provided by Google that aggregates and displays the relative popularity of any given search queries over time, provides a different lens on the same concept. Instead of seeing what people are saying, Google Trends shows us what people are trying to learn. When a large news event about one candidate happens, search queries about that candidate tend to increase proportionately to the magnitude of the event. The graph below comparing search trends of Donald Trump (red) and Hillary Clinton (blue) shows this in effect--queries of Hillary Clinton surged as the FBI investigation surrounding her private servers wrapped up, and interest in Donald Trump similarly spiked during the Republican Convention.



Social media platforms also provide more simple ways to view data about certain candidates that can be predictive. The graph below shows how the number of Facebook likes Bernie Sanders had in a particular state corresponded to his vote share in that state's primary or caucus, with a surprisingly strong correlation.



https://twitter.com/tylerpedigoky

Despite the advantages of using social media as a data source, hardly anyone has been using it to make meaningful predictions.

With the continued emergence of new and robust data sources such as social media, breakthroughs in cognitive algorithms such as Natural Language Processing and Machine Learning, and increased computing power, it is now possible to create predictive models that approach problems with more complete perspective, and ultimately, human intelligence at machine scale.

For now, we'll continue to follow Mr. Silver's work while pushing the limits of cognitive security and predictive analytics in energy, security, and finance.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