Banking on AI
A glimpse into the future
An aerial view of the AI landscape
Emerging trends in AI - Reinforcement Learning
Emerging trends in AI - RL applications
Emerging trends in AI - Generative Adversarial Networks
Emerging trends in AI - GAN applications
AI in banking
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AI across the banking spectrum - Retail banking
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Why BootUP?
An aerial view of the AI landscape

Artificial Intelligence is no longer a buzzword. Investment in AI had already reached around $39 billion in 2016 alone, as per a McKinsey report. Around 60 AI startups have been acquired in just the first six months of 2017. In a time when investment growth across industries has been dismal, throttling innovation and eroding shareholder value, AI is being seen as a disruptive factor of production that has the power to harness economic opportunities and create sustainable growth by extending human capabilities.

*AI technologies are projected to increase labor productivity by up to 40%. They are also expected to boost profitability by 38% on average across 16 industries and lead to an economic boost of US$14 trillion by 2035.*

- from a report by Accenture and Frontier Economics
Reinforcement learning (RL) is an area of machine learning inspired by behaviorist psychology, concerned with how software agents ought to take actions in an environment so as to maximize some notion of cumulative reward. Reinforcement learning enables a software application or physical device to find the most efficient out of a variety of approaches that can be followed to get a specific result.
Some practical applications of Reinforcement Learning include:

**Manufacturing**
Robots assigned to shift an object from one container to another can memorize this object and by analyzing data about their successful and unsuccessful attempts, train themselves to do this job with great speed and precision.

**Inventory management**
Reinforcement learning algorithms can be configured to reduce gaps in inventory stocking as well as warehouse space and operations optimization.

**Delivery management**
Reinforcement learning is used to solve the problem of Split Delivery Vehicle Routing (SDVR). Q-learning is used to serve appropriate customers with just one vehicle.

**Power systems**
Here, reinforcement learning can assess the security of electric power systems and enhance microgrid performance.

**Finance sector**
Reinforcement learning has immense applications in stock market trading where Q-Learning algorithms can learn an optimal trading strategy with one simple instruction: maximize the value of a portfolio.
Emerging trends in AI (contd.)

Generative Adversarial Networks

Generative adversarial networks (GANs) are a class of artificial intelligence algorithms used in unsupervised machine learning, implemented by a system of two neural networks contesting with each other in a zero-sum game framework. Thus, one network generates new data after learning from a training set, and the other tries to discriminate between real and fake data. By working together, these networks can produce very realistic synthetic data.
Some practical applications of Generative Adversarial Networks include:

Creating photorealistic images
By using deep learning nets to differentiate the style of a piece of art from its content and to apply that style to other content representations, GANs can help create unique images that represent a combination of different components and styles from multiple images.

Retrieving images for historical archives
Adversarial nets make it easier to work with documents of historical importance by extracting and learning features from existing images. After the representation of each mark is learned, the visual search on scanned documents can be processed.

Generating videos with scene dynamics
A GAN for video with a spatio-temporal convolutional architecture can untangle a scene's foreground from its background. This model can generate tiny videos up to a second at full frame rate better than simple baselines, and can be used to predict the plausible futures of static images.

Text translation into images
With GANs, it's possible to use the descriptive properties of natural language to generate corresponding images. Using mathematical vectors to understand the relationship between different words in an image description, and by modifying generator architecture, GANs can create images of varying quality with a single text description.
The application of artificial intelligence in banking goes back all the way to the 1950s. The benefits of AI in banks and credit unions are widespread, reaching back office operations, compliance, customer experience, product delivery, risk management and marketing to name a few. Suddenly, banking organizations can work with large histories of data for every decision made.

**32% of financial services executives surveyed confirmed using AI technologies such as predictive analytics, recommendation engines, voice recognition and response. For those firms not adopting AI, challenges such as fear of failure, siloed data sets and regulatory compliance were cited.**

- from a 2017 survey by Narrative Science in conjunction with the National Business Research Institute
AI applications in banking

AML pattern detection
- Transaction profiling
- Customer behavior sorted lists
- Self-calibrating models

Chat bots
- 24/7 customer support
- Real time learning
- Ease of use

Algorithmic trading
- Modeling component
- Execution component
- Monitoring component

Fraud detection
- Anomaly detection
- Time series/Sequence analysis
- Real time AI/Machine learning
AI across the banking spectrum

Wealth Management

Wealth management is one area of the financial services industry that has long encouraged a hands-off approach to the use of technology to make investment decisions. However, AI has immense possibilities in this area, the highlights of which are:

**Information processing at scale**
One of the biggest advantages of AI in the finance sector is the ability to scour mass amounts of text, image and video content, including news shows, articles, and stock ratings. This raw information can then be consolidated and filtered, giving humans an overview of multiple data sources.

**Knowing what to invest in**
An extension of AI-based bots’ ability to scour large volumes of data includes the ability to profile this information to figure out what is best for the client at hand, and trends in the general market. This is especially beneficial for high worth clients wanting high-risk investments.

**Preparing for investment**
Clients would be able to speak to an AI chatbot in their own time and at their own pace before meeting with a wealth management advisor. This would allow the client to ask any questions about investing, being shown simulations of what may happen to their money, and what’s right for them.

**Predicting the markets for effective private wealth management**
Predicting markets is no easy task. This is equally true for AI systems as well, though they’re able to give better predictions from the mass amounts of raw data and analytics. That information can also be processed at a faster rate than what a human can do while spitting out visual charts and graphs.

According to PricewaterhouseCoopers, 26% of asset and wealth management firms globally use AI to inform their next ‘big decisions’.

Within five years robo advisers are forecast to reach $2.2 trillion (£1.7 trillion) in assets under management, while by 2025 hybrid ‘robo-human’ services in wealth management are expected to run $16.3 trillion, according to research by financial consultancy Synechron.
AI across the banking spectrum (contd.)

Retail Banking

According to Cisco there is £326 billion at stake through digital transformation in retail banking. That's either in revenue opportunity or cost savings. With the profound shift in consumer behavior and the growth of social messaging channels as a business to consumer tool, there is an opportunity to enable intelligent, personalized customer interactions with an increased focus on service automation. With advanced capabilities powered by Natural Language Processing (NLP) and Machine Learning (ML), chatbots are poised to change the face of retail banking for good.

Here are some ways in which chatbots can bring about significant changes in the banking industry:

**Facilitating one-on-one interaction**
The industry is moving towards an intuitive system from the existing reactive ‘if-then-else’ approach demonstrated by the current crop of ‘half-baked’ bots. Instead what is needed is the intelligent bot - one that can understand both the intent and the context of the customer rather than serving them pre-cooked solutions.

**Providing round-the-clock support**
Chatbots can provide 24x7 support and continuously mine and analyze data from all users for better financial recommendations and quick actions.

**Offering personalized financial advice**
As a direct benefit of continuous analysis of data, chatbots should be positioned to provide personalized guidance and smart insights on various investment options available to the customer after carrying out the spend analysis.

**Enhancing security**
Chatbots can help in improving security and preventing fraudulent practices prevalent in the industry by implementing various authentication and authorization techniques such as end-to-end encryption, self-destructing messages, and authentication timeouts.

**Cross-selling financial products**
Chatbots are a great tool to cross-sell and up-sell financial products in a user-friendly conversation. They can replace the calls where banks offer their products and services that at times annoy people and instead bring in systemic and high-touch communication mechanisms in place.

Gartner expects 85% of customer interactions to be automated by 2020, while Oracle suggests that 80% of brands will be using chatbots by the same year.

The chatbots that will become most successful will be those that resolve customers’ issues accurately while meeting their needs for speed and convenience.
AI across the banking spectrum (contd.)

Money Laundering Prevention

As financial institutions monitor billions of transactions a day, the data mined from each creates a silo of information and data that any person would find overwhelming to sift through. If intelligently analyzed, these vast stores of data can prove invaluable to these institutions by helping them uncover financial crimes risk. Anti-money laundering (AML) pattern detection helps intelligent systems zero in on anomalies in transaction patterns that might point to money laundering activity. These assessments can also assist U.S. government agencies in carrying out financial crime investigations.

Some AI and machine learning techniques that are employed to identify transactional anomalies worthy of further investigation include:

**Collaborative filtering**
This helps in finding transactions with missing, matching and/or odd information.

**Feature matching**
This ability is utilized to identify transactions below a specific monetary threshold.

**Fuzzy logic**
This is used to find data matches with slight changes to names or addresses.

**Cluster analysis**
This can detect abnormalities in transactions benefiting a single person or entity.

**Time series analysis:** detects transactions benefiting a person or entity over an extended period.

**Focused keyword searches**
This is the ability to dynamically monitor, screen and filter transactions based on keywords from high-risk AML, CTF (Counter-Terrorist Financing) and financial crimes typologies.

**Suspicious pattern-based learning**
This refers to the ability to learn from an AI-identified suspicious activity to enhance transaction monitoring and KYC (Know Your Customer) platforms.

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The United Nations Office on Drugs and Crime (UNODC) estimates that the amount of money laundered globally in one year is two to five percent of the global GDP, or $800 billion to $2 trillion in U.S. dollars.

According to a report published by WealthInsight, global AML spending will exceed $8 billion in 2017 alone.
AI across the banking spectrum (contd.)

Risk Management

External and internal pressures are nowadays requiring financial institutions to reevaluate the cost efficiency and sustainability of their risk management models and processes. Some of the pressure comes, directly or indirectly, from regulators; some from investors and new competitors; and some from the financial institutions’ own customers. AI uses predictive algorithms combined with big data to model risk in relation to VaR, credit ratings, economic capital, predicting borrowers’ behaviors, portfolio tail risks, KYC and anti-money laundering, etc., to determine risk probability.

Here are some ways in which AI can assist risk management processes:

**Investment analysis**
AI can also be used to help the risk analyst or underwriter in unfolding information that would be (intentionally) buried, and thus provide reassurance that the investment that the firm is going to make is a wise one.

**Underwriting**
AI will help the risk analyst/ underwriter/ portfolio manager to analyze a vast array of information that would instantly test a proposed deal structure for stress, head winds, impact of loan restructurings, etc.

**Credit risk management**
Hotspot profiling analysis drills down data systematically and detects important relationships, co-factors, interactions, dependencies and associations amongst many variables and values accurately using Artificial Intelligence techniques to identify profiles of high (and low) risk loans accurately.

**Tail risk management**
AI tools such as Reinforcement Learning techniques, by virtue of their ability to adapt to a stochastic environment, have the potential to advance the financial services portfolio optimization task by delivering superior solutions in the face of uncertainty.

Risk managers believe the skills required for good AI reside in the IT department (30%), in various lines of business (14%), in specific businesses within the group (13%), in a research department (17%), or nowhere (26%).

In the risk management profession, 33% of respondents believe AI is just one more innovation, while 67% see it as a foundational change.
Banking in 2025

CLIENTS
- Automated client advisory via digital bots
- Hybrid, multiple provider client interaction
- Outside-in client profiling and service matching

VALUE CHAIN
- Non-banks emerge as new competitors in multi-banking, co-investing and investment services
- Cross-industry ecosystems that will enable an 'internet of values'
- Regulatory compliance strategies including industrialization and innovative solutions

OPERATING MODELS
- Increasing regulation, with the highest regulatory investment for IT/BPM
- Increasing decentralization, shifting from vertical integration to hyperspecialization
- Increasing industrialization, including end-to-end process automation

DATA-DRIVEN BANKING
- Build customer knowledge through unstructured client-generated data
- Innovative IT tools based on IoT technologies to analyze massive amounts of data
- Building new business models and becoming data brokers through data-driven banking

DIGITAL BANKING PLATFORMS
- Digital banking services such as co-investing, P2P lending, etc.
- Opening banking APIs for third party service providers
- Standardization to enable multi-provider and multi-application access

DIGITAL BANKING PLATFORMS
- More, new, and other potential revenue streams
- Shrinking revenues due to commoditization of products
- Increased importance of revenues over electronic channels
Why BootUP?

Serial Entrepreneurs
A majority of the founders working at BootUP are serial entrepreneurs who have built multiple companies and achieved no less than a few exits. The BootUP experience is personal and high-touch, providing the opportunity to interact with seasoned entrepreneurs who have built numerous high-impact startups.

Traction-Focus
Unlike many Silicon Valley accelerators, BootUP is not a standard 3-month mass production pitch training program followed by a Demo Day to investors. Instead, BootUP has a boutique approach focused on helping more mature startups gain and sustain traction over 6-24 months to generate tangible results.

Corporate Innovation
BootUP drives innovation for leading corporations by scouting for emerging technologies and by running vertical acceleration programs. This provides opportunities for BootUP startups to do pilots, drive sales, access corporate venture capital funds and potentially become acquired.

Global Reach
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Network
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High-Power Events
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Clients