Good morning everyone! Today we will talk about AI and machine learning.

For a start ML and AI are the hot topics in every trending article since 2017 and rightfully so it is much like how internet emerged as a game changer in everyone’s life.

First let’s talk about what is AI. If we divided the word.

The definition of Artificial is made or produced by human

While intelligence is the capacity to learn and solve problems.

When we combine this together, we get Artificial Intelligence

A machine that can solve and act like humans

AI is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans.

Some of the activities computers with artificial intelligence are designed for include:

* Speech Recognition - youtube cc
* Facial Recognition - facebook profile picture
* Weather / Temperature Recognition-
* Pattern Recognition -

Let’s have a discussion to the core of an AI. If we have an AI Robot and put it in a field despite of the variation in lightning landscape and dimensions of the field the AI Robot must perform as expected, this ability to react appropriately to a new situation called generalized learning.

The robot now is at a crossroads one that paved the other one is rocky, the robot must determine which path to take based on the circumstances, this now portrays the AI robot reasoning ability.

After a short stroll the robot now encounters a stream that it could not swim across, using the plank provided as an input, the robot is now able to cross the stream, so our robot uses the given input and finds the solution for this for problem. This is now the problem solving.

These 3 capabilities make the robot artificially intelligent.

In short AI provides machines with the capability to adapt, reason and provide solutions.

The AI has been around since 1950’s

Alan Turing even publish a landmark paper which he speculated about the possibility of creating machines that think. Then in 1956 in the Dartmouth Conference, scientists debuted and persuaded the attendees to accept “Artificial Intelligence” as a name of the field. The Dartmouth conference was the moment that AI gained its name, its mission, its first success and its major players.

Eventually, the AI winter period comes, for 60 years AI stops growing then after 60 years the AI winter was stop, its been made possible because of key breakthroughs

The first breakthrough is access of better cheaper graphics processing units GPU’s. AI software needs a lot of processors running at the same time, now GPU’s are affordable and available enough that they can be clustered together to build AI software.

The next key is big data. It played a major role in making AI a reality. In order to live, AI needs education, big data is like a university where AI can study and grow. By collecting and absorbing data AI learns at an incredible pace.

The final key to AI is better algorithms, because of algorithms AI learn and react more quickly, algorithms optimize results making the AI faster and smarter.

With these 3 key breakthrough AI trends on the way, AI will continue to improve our lives in more ways than we ever thought

The following are the subfields of an AI

First we have neural networks. Eg. Brain modeling, time series prediction, classification

Vision object recognition, image understanding

Robotics intelligent control

Expert systems decision support systems

Speech processing speech recognition

Natural language processing machine translation

Planning scheduling, game playing

Machine learning

[ICEBREAKER]

So next we will talk about the machine learning.  
When we say machine learning most of the people consider it as AI but its not true.

For a start lets differentiate the two.

Machine learning is a part of AI. As you can see ML is under of AI and DL is under of ML

We will not talk about DL but we can say that DL is the evolution of ML

Actually the term ML start since1950’s, it was mentioned by Arthur Samuel of IBM, Arthur Samuel is part of the Darmouth Conference.

Moreover

One of the definition of ml is

it is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.

If programming is automation, then machine learning is automating the process of automation.

Writing software is the bottleneck, we don’t have enough good developers, so we let the data do the work instead of people. Machine learning is the way to make programming scalable.

This the representation of how traditional programming work and machine learning

[pic]

Key elements of machine learning,

Nowadays there are tens of thousands of machine learning algorithms and hundreds of new algorithms are developed every year.

Types of learning

Supervised learning: training data includes desired outputs.

Unsupervised learning: training data does not include desired outputs.

Semi-supervised learning: training data includes a few desired and undesired outputs

Reinforcement Learning: rewards from a sequence of actions. AI types like it, it is the most ambitious type of learning.

Supervised learning is the most mature, the most studied and the type of learning used by most machine learning algorithms.

Regardless of learning style or function, all combinations of machine learning algorithms consist of the following:

Representation - this is the model, algorithms, code

Evaluation - accuracy

Optimization

**Why consider machine learning in finance?**

Despite the challenges, many financial companies already take advantage of this technology. The figure below shows that financial services’ execs take machine learning very seriously, and they do it for a bunch of good reasons:

1. Reduced operational costs thanks to process automation.
2. Increased revenues thanks to better productivity and enhanced user experiences.
3. Better compliance and reinforced security.

There is a wide range of open-source machine learning algorithms and tools that fit greatly with financial data. Additionally, established financial services companies have substantial funds that they can afford to spend on state-of-the-art computing hardware.

Tanks to the quantitative nature of the financial domain and large volumes of historical data, machine learning is poised to enhance many aspects of the financial ecosystem.

That is why so many financial companies are investing heavily in machine learning R&D. As for the laggards, it can prove to be costly to neglect AI and ML.

# Process Automation

**Process automation is one of the most common applications of machine learning in finance**. The technology allows to replace manual work, automate repetitive tasks, and increase productivity.

As a result, machine learning enables companies to optimize costs, improve customer experiences, and scale up services. Here are automation use cases of machine learning in finance:

* Chatbots
* Call-center automation.
* Paperwork automation.
* Gamification of employee training, and more.

Below are some examples of process automation in banking:

**JPMorgan Chase** launched a Contract Intelligence (COiN) platform that leverages Natural Language Processing, one of the machine learning techniques. The solution processes legal documents and extracts essential data from them. Manual review of 12,000 annual commercial credit agreements would typically take up around 360,000 labor hours. Whereas, machine learning allows to review the same number of contracts in a just a few hours.

**BNY Mello** integrated process automation into their banking ecosystem. This innovation is responsible for [$300,000 in annual savings](http://www.reuters.com/article/us-bony-mellon-technology-ai-idUSKBN186253) and has brought about a wide range of [operational improvements](https://www.bnymellon.com/us/en/who-we-are/people-report/innovate/the-rise-of-robots.jsp).

**Wells Fargo** uses an [AI-driven chatbot](https://www.wellsfargo.com/about/press/2017/chat-bot_0418.content) through the Facebook Messenger platform to communicate with users and provide assistance with passwords and accounts.

**Privatbank**is a Ukrainian bank that implemented chatbot assistants across its mobile and web platforms. Chatbots sped up the resolution of general customer queries and allowed to decrease the number of human assistants.

# Security

Security threats in finance are increasing along with the growing number of transaction, users, and third-party integrations. And machine learning algorithms are excellent at **detecting frauds**.

For instance, banks can use this technology to monitor thousands of transaction parameters for every account in real time. The algorithm examines each action a cardholder takes and assesses if an attempted activity is characteristic of that particular user. Such model spots fraudulent behavior with high precision.

If the system identifies **suspicious account behavior**, it can request additional identification from the user to validate the transaction. Or even block the transaction altogether, if there is at least 95% probability of it being a fraud. Machine learning algorithms need just a few seconds (or even split seconds) to assess a transaction. The speed helps to prevent frauds in real time, not just spot them after the crime has already been committed.

**Financial monitoring** is another security use case for machine learning in finance. Data scientists can train the system to detect a large number of micropayments and flag such money laundering techniques as smurfing.

Machine learning algorithms can significantly enhance **network security**, too. Data scientists train a system to spot and isolate cyber threats, as machine learning is second to none in analyzing thousands of parameters and real-time. And chances are this technology will power the most advanced cybersecurity networks in the nearest future.

**Adyen**, **Payoneer**, **Paypal**, **Stripe**, and **Skrill** are some notable fintech companies that invest heavily in security machine learning.

**Underwriting and credit scoring**

**Machine learning algorithms fit perfectly with the underwriting tasks** that are so common in finance and insurance.

Data scientists train models on thousands of customer profiles with hundreds of data entries for each customer. A well-trained system can then perform the same underwriting and credit-scoring tasks in the real-life environments. Such scoring engines help human employees work much faster and more accurately.

Banks and insurance companies have a large number of historical consumer data, so they can use these entries to train machine learning models. Alternatively, they can leverage datasets generated by large telecom or utility companies.

For instance, **BBVA Bancomer** is collaborating with an alternative credit-scoring platform Destacame. The bank aims to increase credit access for customers with thin credit history in Latin America. Destacame accesses bill payment information from utility companies via open APIs. Using bill payment behavior, Destacame produces a credit score for a customer and sends the result to the bank.

**Algorithmic trading**

In algorithmic trading, **machine learning helps to make better trading** **decisions**. A mathematical model monitors the news and trade results in real-time and detects patterns that can force stock prices to go up or down. It can then act proactively to sell, hold, or buy stocks according to its predictions.

**Machine learning algorithms can analyze thousands of data sources simultaneously,**something that human traders cannot possibly achieve.

Machine learning algorithms help human traders squeeze a slim advantage over the market average. And, given the vast volumes of trading operations, that small advantage often translates into significant profits.

**Robo-advisory**

Robo-advisors are now commonplace in the financial domain. Currently, there are two major applications of machine learning in the advisory domain.

**Portfolio management** is an online wealth management service that uses algorithms and statistics to allocate, manage and optimize clients’ assets. Users enter their present financial assets and goals, say, saving a million dollars by the age of 50. A robo-advisor then allocates the current assets across investment opportunities based on the risk preferences and the desired goals.

**Recommendation of financial products**. Many online insurance services use robo-advisors to recommend personalized insurance plans to a particular user. Customers choose robo-advisors over personal financial advisors due to lower fees, as well as personalized and calibrated recommendations.

# How to make use of machine learning in finance?

In spite of all the advantages of AI and machine learning, even companies with deep pockets often have a hard time extracting the real value from this technology. Financial services incumbents want to exploit the unique opportunities of machine learning but, realistically, they have a vague idea of how data science works, and how to use it.

Time and again, they encounter similar challenges like **the lack of business KPIs**. This, in turn, results in **unrealistic estimates and drains budgets**. It is not enough to have a suitable software infrastructure in place (although that would be a good start). It takes a clear vision, solid technical talent, and determination to deliver a valuable machine learning development project.

As soon as you have a good understanding of how this technology will help to achieve business objectives, proceed with idea validation. This is a task for data scientists. They investigate the idea and help you formulate viable KPIs and make realistic estimates.

**Note** that you need to have all the data collected at this point. Otherwise, you would need a data engineer to collect and clean up this data.

Depending on a particular use case and business conditions, financial companies can follow different paths to adopt machine learning. Let’s check them out.