Robots and Machine Learning Applied to Finance

Robots have become part of our daily lives. We interact with them every day and give them our most personal data. But robots are not all the same and they don’t all raise the same issues. Here is an overview, in simple terms, of what robots really are, and what they can bring to the finance function.

A concept that portrays a powerful and ever changing image

We tend to imagine robots based on cinematic depictions of them (the first was arguably Frankenstein, which was created 200 years ago). The robots in our imagination are mechanical beings who have been given a form of intelligence which helps them to carry out tasks that are usually labour intensive. One development is significant, however. Just ten years ago, robots were used for ‘4Ds’ work, i.e. work that was dangerous, dull, dirty and dumb. With the advances made in artificial intelligence, robotics must address four new needs, the ‘4Es’: everyday, e-health, educational, entertainment.

Today, the robot is a facilitator. Some people fear that ‘super-intelligent’ robots could seize power. The robot would therefore become our competitor. Let us begin by distinguishing between an automated machine and a robot with artificial intelligence.

What are the differences between a ticket machine and Sophia, the first humanoid robot that has held Saudi nationality since October 2017?

An automated machine is controlled by computer programs. All of its actions are predetermined by a logical sequence. The robot, for its part, involves a more complex set of factors. Its sensors enable it to interact with its environment. It is characterised by the following components:

- Sensors which enable it to be aware of its surroundings: camera, temperature, brightness, moisture, accelerometer.
- An IT system housed in a set of electric circuits, and microprocessors for carrying out the robot’s tasks.
- Mechanical systems creating motor actions (with tactile components in order to grasp objects).
- Batteries for autonomy and energy.

The humanoid robots also possesses intelligence known as artificial intelligence (AI). AI allows for actions that resemble advanced choices, which in turn alter its environment. Without its physical shell, the robot is reduced to an IT application corresponding to an action oriented system or decision-making system containing rules initialised with parameters.

In short, artificial intelligence goes beyond an expert system (traditional IT development) in which a series of static rules determine the robot’s actions. AI has this ability because it relies on a method of learning known as machine learning (ML), which creates dynamic rules depending on the goal and the environment.

Recently, AlphaGo by DeepMind, the most highly publicised example, learned to play Go by analysing past matches, and AlphaGo beat the champion of this strategic game. The new version, AlphaGo Zero, learned directly by playing matches via simulation (without human assistance), and it outperformed its big brother (without having played against a single opponent).

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- Marc Atallah

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How can machine learning be useful in more abstract areas such as finance?

Currently, two technologies can be used. Using semantic analysis, data scientists can, for example, develop tools to carry out reconciliations between invoices and contracts in real time (based on analysing the meaning of words and sentences) and invoices from a service provider. This tool is of course useful when the process involves a large volume of invoices and contracts. With a machine learning approach, finance departments can more easily identify drivers of important financial developments by analysing the correlations proposed by AI in order to identify root causes.

Machine learning has the ability to base its decisions on all available data. In the world of finance, data is generally structured. There are even more data from upstream systems and today it is not being used to its full potential. If we add exogenous data to this financial environment, such as data relating to human behaviour, the possibilities become endless.

Let us take loan risk analysis, for example. When a customer asks for a loan, the AI requests the amount of the loan and asks all the usual loan questions. It immediately compares the responses to the available digital data of the consumer which is accessible online, and then it calculates the cost of the loan depending on the amount of risk. At first, the methods for calculating risk will be previously determined, using data from previous loan applications, based on data about cases of default/non-default and any other available and relevant data, however personal. Then AI continues to learn independently with the new cases it encounters.

Marc Atallah
Founder of Zettafox

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Machine learning is not incapable of making mistakes

Data is to the egg what the model is to the chicken. All of these examples draw on dynamic rules. The rules in question are determined by data science and machine learning which is applied to these areas.

Data associated with algorithms produces a predictive and/or prescriptive model – and this model will determine the machine’s actions. These elements are regularly updated (and soon will be updated in real time!) to ensure there is consistency between the situation and the clients.

What is the essential part of this process? The data obtained by sensors, of course!

However, there is a link between the quality of the data and the quality of the model. In this context, the data must be accessible, legal to use, specific and statistically correct. Otherwise, AI recommendations will be of mediocre quality and could call into question its systemic model. Remember Microsoft’s AI chatbot ‘Tay’ that displayed ‘inappropriate’ behaviour after its model was based on social media conversations?

In summary, ML models running performing AI applications must at all times be cross-analysed with validated and appropriate data inputs using, at a minimum, a representative data sample.

1 G.A. Bekey, Robotics: State of the Art and Future Challenges, Imperial College Press, 2008