

MACHINE LEARNING IN ACTION

Artificial intelligence technologies such as machine and deep learning are bringing insight and precision to two big brands in very different industries — healthcare and insurance

Theories about the future impact of artificial intelligence (AI) on business and society are everywhere. But the reality on the ground today among the companies and leaders applying technologies such as machine and deep learning to their core challenges is exciting enough. Business models are being reformed around the insight springing from powerful cognitive capabilities. New products and services are improving the customer experience — one could even say the human condition. In a very real and significant sense, AI is changing the world for the better.

Look at healthcare and insurance, two industries where success is largely determined by the ability to make sense of complex environments. The Dutch health technology giant Philips is a prime example of a global firm building a new business from an AI-based ecosystem that connects medical devices and data to personalized diagnostics and treatment. Aon Benfield, the reinsurance and capital advisory arm of U.K.-based Aon, developed an AI platform around cloud-based computing to manage one of the most complex retirement products with embedded financial guarantees — variable annuities.

Just what are the technology leaders in these firms doing to put AI into action?

MACHINE LEARNING PREDICTS ILLNESS

Philips is known for its vast array of products, which include workhorse imaging, patient monitoring devices, IT solutions such as CT scanners and MRI machines, Image Guided Therapy solutions, advanced image analysis and quantification platforms. All of

these generate massive data flows. “Now these products are becoming building blocks for solutions that are configured to our customers’ needs,” says Jeroen Tas, chief innovation and strategy officer of Philips. “If we stream information from different devices and combine it with a patient’s medical profile, feeding the profiles with real-time data, we can become much more accurate in predicting whether a patient is deteriorating and needs an intervention.”

DEEP LEARNING BRINGS DEEP UNDERSTANDING

Philips started connecting its medical devices on a platform called HealthSuite in 2014 to generate a common view of data that can be accessed and shared by extended medical teams, who can then analyze the information and decide what action to take. The goal was to make the devices smart, to feed patient profiles with ever-more data from its Internet of Things (IoT) approach, and to deploy AI to improve and interpret the results. “Now doctors can get a deeper view of the patient, which leads to more precise and timely action,” Tas says. “It can help them apply the right therapy.”

This strategy is in action today as Philips hones deep learning systems, algorithms based on biology-inspired neural networks that can learn on their own from input data. They can make inferences, uncover patterns and store the knowledge hierarchically. It is these deep learning networks that Philips is using to analyze and categorize images, helping medical teams improve diagnostics and treatment. From a grainy ultrasound, “we can get a live-looking, real model of your heart,” Tas says. “If you quantify what you see on that image, you can also start comparing it to previous studies and see how things have evolved. Artificial intelligence can help interpret that image in

the context of what we know about that patient. The more we know about this person, the better we can understand what we are seeing and what we should be looking for.”

THE CLOUD ENABLES THE PLATFORM

The rise of AI in recent years into the realm of real and practical action occurred with the emergence of high-bandwidth networks, graphic processing units (GPUs) and cloud computing. It is the cloud that enables the Philips platform. As Tas notes, you need computing power to interpret data spun from a vast ecosystem of devices and data. “It comes together in the cloud. Using a complex cancer case,” Tas says as an example, “we accumulate a terabyte of data per patient because we have lab tests, digital pathology, images and other data from medical records. You need an environment where you can securely aggregate the data and do the large-scale computation on it, and then pass back the results to medical professionals at the point of care.”

MACHINE LEARNING CRUNCHES THE NUMBERS

Talk to Peter Phillips about the insurance business and you’ll hear a lot about the challenges around variable annuities, which invest in equities and bonds to offer policyholders potentially higher returns than fixed annuities. But a staggering number of variables influence the payouts, creating an enormous challenge for insurers and regulators.

“At the center of managing variable annuities lies data,” says Phillips, president and CEO of the PathWise Solutions Group at Aon Benfield. The company’s insurance clients might have to calculate monthly payouts for 30 years, or 360 cash flows to model for one scenario. They could have up to 10 different stock indices to model. And they also need to consider interest rates, which involve modeling for volatility in both the rates themselves and the equity component. “Some insurers have 3 million to 4 million

individual policyholders,” Phillips says. “You’re talking big data problems if you have to store every cash flow from every policyholder. How do you manage this big, difficult mess?”

AI SEES THROUGH THE BLACK BOX

Insurance companies have long struggled with the data tiger. Even with the rise of neural networks, a central concern for Phillips was the black-box aspect in which the process and “thinking” behind a system’s output — call it a decision — is opaque. “You can’t see every step of every calculation,” Phillips says. “You’ll see parts of the calculation, but you won’t see every step. I was determined to put an end to that by building a paradigm where you can see absolutely everything. It’s super important to have trust and faith in the numbers that are coming out.”

“

Big data and machine learning married together can really provide insight into what’s happening at the policyholder level. It’s like there’s a cave and we haven’t even put a flashlight in it.”

PETER PHILLIPS
PRESIDENT AND CEO,
PATHWISE SOLUTIONS GROUP
AT AON BENFIELD

One way to gain trust, says Phillips, is to follow the calculation and data flows from beginning to end. He envisioned a solution where insurance clients could input assets, liabilities and scenario generators to understand risk at time zero and through time, and trust the output of AI systems. He sees neural networks having a key role to play in several areas, such as

predicting policyholder behavior. “Big data and machine learning married together can really provide insight into what’s happening at the policyholder level,” Phillips says. “It’s like there’s a cave and we haven’t even put a flashlight in it.”

THE CLOUD IS COMPUTING POWER

Machine and deep learning will help the industry shine a light on its core table stakes, claims management and fraud detection. And Phillips sees AI’s role extending into underwriting and client support, enhancing the client experience. Getting the computing power to crunch an almost incalculable number of simulations, however, requires the cloud.

Phillips says that PathWise does trillions of simulations that could not be done effectively without the cloud. “If I want 100 GPUs [graphics processing units] for 48 hours, I can get it in minutes on the cloud,” he says. “If you had to do this inside of a company, it can take six months for the equipment to show up, then another

three months to put it all together. The advent of GPUs and the cloud has really helped our business and our clients grow. You can figure the cost to run just one GPU, and there’s huge savings because the hardware is purpose built for massive Monte Carlo simulations. You could look at situations where, in terms of dollar performance, we’re just way ahead of our competitors.”

AI IN THE FUTURE

Phillips and Tas strongly believe that AI technologies are just beginning to take root and that whole industries will be disrupted. Indeed, Tas says his organization is building the plumbing of the future. Even now, with all that’s being written about AI, Phillips thinks too many leaders fail to realize that we are in the age of accelerated computing. Both leaders speak as disruptors with learned advice about the sea change being wrought as machine and deep learning transform society and business for the better.

“

The advent of GPUs and the cloud has really helped our business and our clients grow. You can figure the cost to run just one GPU, and there’s huge savings because the hardware is purpose built for massive Monte Carlo simulations. You could look at situations where, in terms of dollar performance, we’re just way ahead of our competitors.”

PETER PHILLIPS

PRESIDENT AND CEO,
PATHWISE SOLUTIONS GROUP
AT AON BENFIELD