ATHANASSIOS KALIUDIS

Interview: The machines program themselves

How will AI transform industry? We got the developers' perspective from AI expert Christin Schäfer and KIT robotics professor Torsten Kröger.

What's the current status of AI in industry?

Schäfer: All these machine learning technologies are unbelievably powerful, especially if you can process sensor data such as image files, for example. Some companies can already point to flagship achievements in certain areas, while others are still in the starting blocks. I think the biggest potential lies in streamlining production processes and administration and in developing new services and products. We're also gradually starting to see people using data-driven algorithms directly in the manufacturing process.

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>
> Christin Schäfer, expert for Artificial Intelligence

Kröger: In terms of motor skills – for example a robot acting autonomously in a real environment and learning as it goes along – things are still in their infancy. But in recent years we have seen a huge leap forward in the realm of perception, such as identifying conditions and patterns.

What potential do you see?

Kröger: To be frank, many of the automated systems in factories are poorly programmed. There is definitely potential for supervised machine learning to significantly accelerate all the production processes in sectors such as the automotive industry. That could really boost efficiency. The same point actually applies to smaller companies, too. Programming has always been one of the big hurdles that stops smaller businesses from purchasing machines and robots. But now it's getting easier all the time, especially with support from AI. Anyone in the small batch, low-volume business can slash their operating costs if they can make reprogramming quicker and easier, or even automate it entirely.

So where are the stumbling blocks at the moment?

Schäfer: I always tell people to take a really close look at the problem they want to solve. Right now, many companies are focusing on deep neural networks and are determined to put them to use. The problem is that these methods require huge quantities of data. For learning to take place, you typically have to feed the neural network with millions of pieces of data, and sometimes that is simply not available. Unfortunately, when they do snap out of the neural network pipedream, many people end up dismissing it as a load of nonsense, which is definitely not the case. We still have traditional statistical methods that can be used to achieve major efficiency gains with comparatively little effort. Neural networks are definitely the way forward, but only in cases where they actually make sense!

Kröger: I agree. The problem is the quantity and quality of the available data, plus the effort it takes to make it usable.

So how do you go about solving that data problem?

Kröger: Using simulations. In industrial settings you can't simply come along and produce a few million faulty parts before the algorithm finally learns what works. But there are plenty of processes in industry that are easy to simulate, and that provides synthetic data that we can use to train algorithms.

Schäfer: Cooperation is another option, in other words companies sharing their data. You can't get enough data for a neural network from one company alone, but you can get a lot more by combining data from all the companies within a certain sector. That means companies taking a long, hard look at their USP. In most cases, I doubt that their USP lies in their production data. Once companies are ready to join forces in evaluating and labelling data, they will gain immense benefits from the results that AI can offer.

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> Torsten Kröger, robotics professor at KIT

Where do you think we will be in ten years' time?

Kröger: We will gradually reach a point where machines can program themselves. Humans will simply tell the machines what part they need and what features it should have. The software will create a full-fledged design and the machines will be able to get straight down to work. So the level of automation on the shop floor will be much higher than it is today, and manufacturing will be tremendously efficient.

Schäfer: I expect to see huge changes in the supply chain, and equally big changes in capacity utilization. There will be online platforms where individual machines and entire companies will automatically post their available capacity in real time and accept orders. A self-learning AI will manage production planning, submit the corresponding orders to suppliers and handle the logistics. The infrastructure for all that is already in place.

A statistician who developed AI solutions for Deutsche Bank before founding her own company□—□acs plus□—□in 2016. The services she offers include the development of machine learning applications, a field in which she collaborates with TRUMPF. Schäfer has been a member of the German federal government's Data Ethics Commission since 2018.

Kröger is professor of computer science and director of the Intelligent Process Control and Robotics Laboratory (IPR) at Karlsruhe Institute of Technology (KIT) and a visiting scientist at Stanford University. He founded a robotics start-up that was acquired by Google in 2014. He was subsequently appointed Head of the Robotics Software Division at Google's parent company Alphabet. Kröger has been working with TRUMPF on AI solutions since 2018.

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