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The centaurs

Germany wants to use artificial intelligence to reinforce its position as a leader of global industry. Porsche is promoting the use of centaur systems that combine capabilities of people and machines. What's the potential?



Current AI systems are highly specialised: some have learned to analyse images of human faces, while others recognise the meaning of spoken commands. Still others comb through massive reams of data for meaningful correlations.

In some areas, this "weak" artificial intelligence equals or even surpasses human intelligence. "Strong" artificial intelligence, by contrast, operates on at least the same level as the human brain – imaginable, but still in the distant future. "It will probably be a matter of decades before machines have even re- motely the motor and cognitive capabilities of humans," says Frank Kirchner of the German Research Centre for Artificial Intelligence (DFKI) in Kaiserslautern.

Humans routinely work hand in hand with robots in hybrid teams



Take the example of motor racing: in June 2018, a Porsche 919 Hybrid Evo pulverised the 35-year-old lap record for the Nurburgring's Nordschleife by almost a minute in spite of changes to the "green hell" in the intervening years that made it even more demanding than it already was. Spoilers on the rear of the race car that could be adjusted on the fly ensured optimal downforce in every section of the track. Simulating in advance all of the geometries and adjustment options of the spoilers, not to mention their reciprocal effects on each other, as well as the course characteristics using conventional methods would push even high-performance computers to the very limits of their capabilities. Porsche developers therefore rely on machine learning – and are making motor racing history in the process. Data determines many management decisions

The procedure, tested on the toughest race track in the world, says Ulbrich, will eventually be applied to the management of the entire company. Data already determines many management decisions. In most cases, those decisions are based on the past or uncertain forecasts. Real-time data can enhance the quality of those decisions. In view of the abundance of information, such a system to assist top management would be unthinkable without AI methods.

Another form of support for human work is being investigated by Porsche Digital Lab. One of the research specimens in this case is a coffee machine. The background: AI-based image-recognition software is highly developed. However, the sounds that a system makes often reveal more about its condition than its appearance. If you seed an AI system specialised in pattern recognition with typical sound patterns, it can detect deviations and sound the alarm. Just as a careful driver stops as soon as the engine starts making odd sounds, a system of this sort provides a warning before damage occurs.

A system for sound analysis

There is, however, a critical difference between physical and digital prototypes. A real car hits the race track for dynamic testing. In crash tests it hits the wall – it's an all-rounder, a jack of all trades. Digital prototypes, by contrast, are specialists. For crash tests, for example, so-called finite element models are used. In finite element models, all of the vehicle's components are broken down into very small geometric elements. This makes it possible to calculate with great precision the forces within the vehicle structures in an impact with a defined obstacle. For vehicle dynamics development, a complete chassis is mapped in a multi-body simulation and then tested on virtual circuits. In this manner, developers build 18 different digital prototypes for each new Porsche model.

AI systems gain currency particularly in scenarios involving large volumes of data, which is a defining characteristic of virtual development. It begins as soon as the data is gathered. A Porsche consists of 10,000 to 15,000 individual components, manufactured by individual departments and a multitude of suppliers. The design data for each individual part is stored in a file management system, with qualified engineers entering and structuring the data – a tedious and unproductive job. "What if we automated such processes using artificial intelligence?" asks Deisinger. "We're creating space for creativity."

Multitude of potential AI applications

Johannes Winterhagen is a journalist specialising in energy and mobility. He doubts that machines aided by artificial intelligence could write texts as well as professional journalists.

Info

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