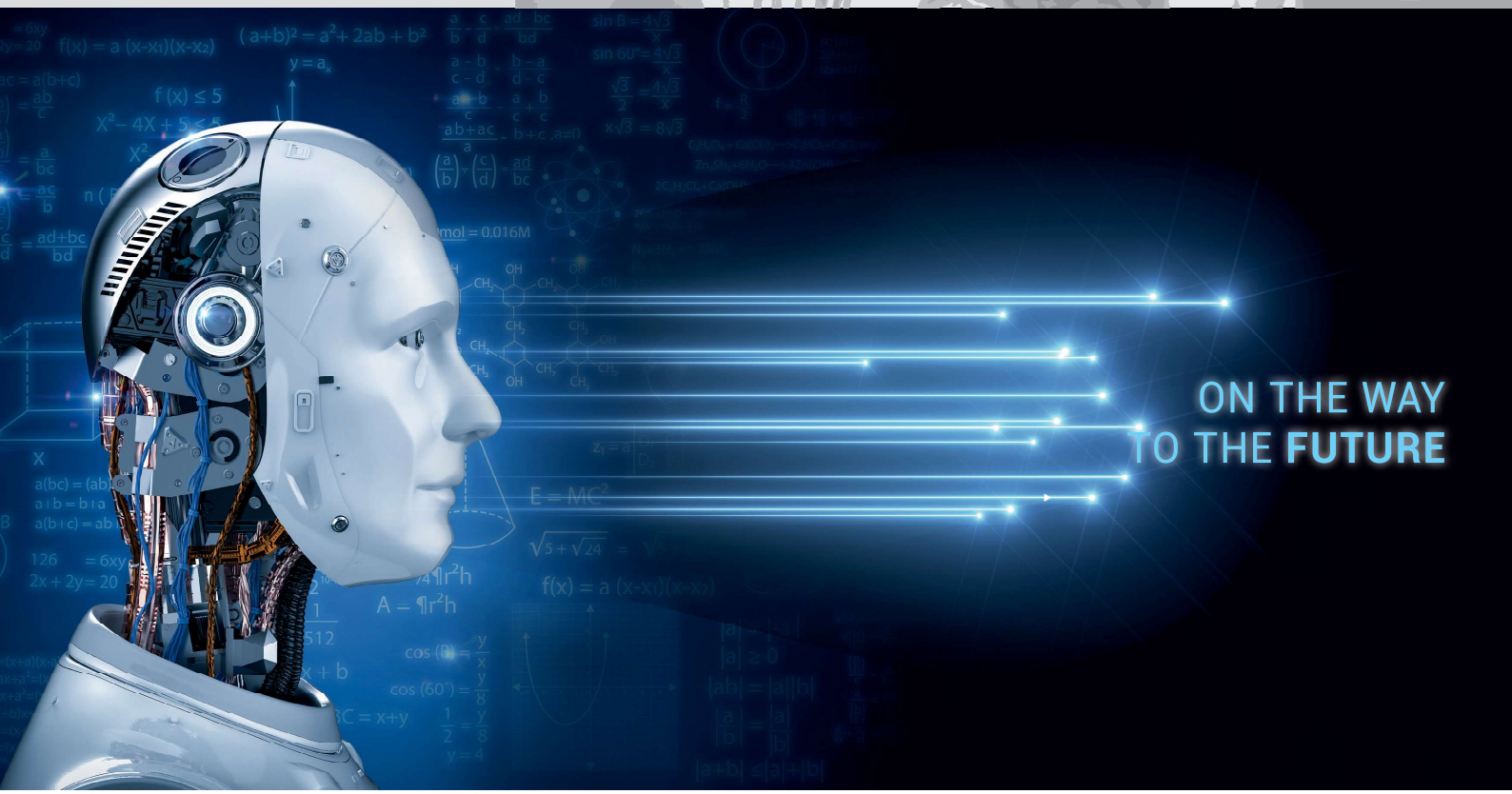


THE TRENDING TOPIC OF AI
QUO VADIS, ARTIFICIAL INTELLIGENCE?

In the context of Industry 4.0 and IoT (Internet of Things), digitalization and autonomization in combination with the future-oriented topic of artificial intelligence are key challenges for innovations. The application of state-of-the-art technologies combined with the ingenuity of innovative companies form the basis for continual success.

GEMÜ works on these challenges in the context of forward-looking projects to actively contribute to the development of the technology. Predictive maintenance, artificial intelligence (AI) and autonomous production are terms that hold plenty of promise. But they also provoke plenty of questions, such as: Is artificial intelligence merely an over-hyped concept? How ready are the technologies to be actually used in applications? And which tasks are they able to solve?

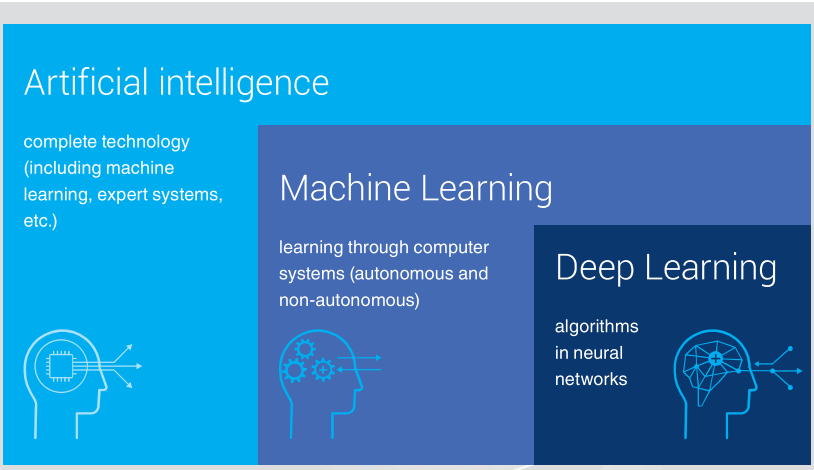
Is artificial intelligence merely an over-hyped concept?

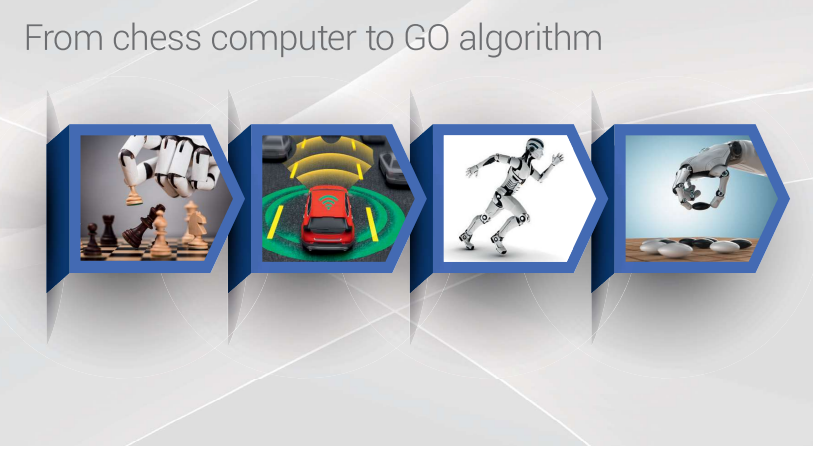
Artificial intelligence solutions have already been around for a long time. The adjacent timeline shows examples of this, from the chess computer produced by IBM to the humanoid robots of Boston Dynamics and Google's Go algorithm. Miniaturizing the required performance capability and making a wide range of applications available has taken some time to implement. This experience definitively shows that artificial intelligence isn't just a short-term hype.

Experts believe that autonomization – and, by extension, artificial intelligence – will be of benefit to humans, and such solutions are already being deployed in many cases today. The responsible use of artificial intelligence does present a challenge, but these obstacles are not insurmountable.

The acatech (Deutsche Akademie der Wissenschaften [German Academy of Sciences] / Kagermann et al. 2016b) substantiates this view with specific forms of intelligence that technical systems do not possess:

> *"Despite their capabilities, autonomous systems are only able to support humans in many areas of decision-making and problem-solving, and will by no means replace them. This is because, in all significant technical advances, they lack everyday intelligence, social-emotional intelligence and intuition. Humans specify the main goal, and the system then independently plans and executes the necessary steps according to the situation and within its scope of action in order to achieve this goal."*



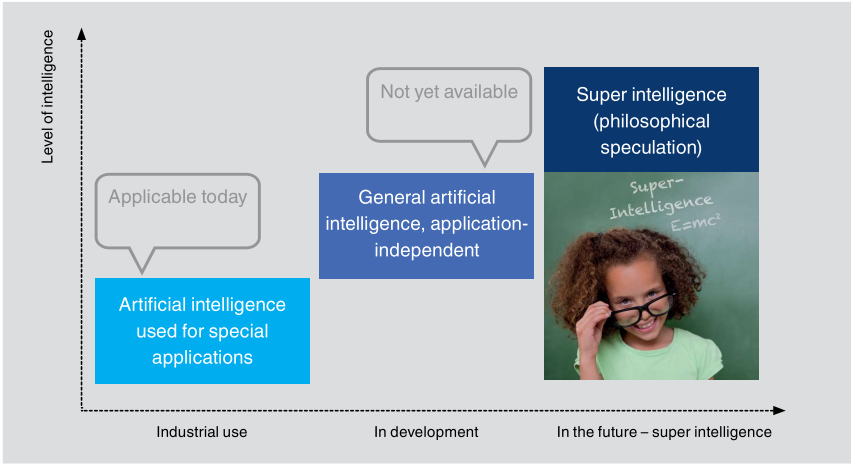


In doing so, decisions taken by machines, in autonomous production and by artificial intelligence systems, are based on one thing above all: Data, data and yet more data. It can therefore be justified that data capture, data analysis and the targeted selection of data from representative data for the training of neural networks are expected to become permanently required components of future work.

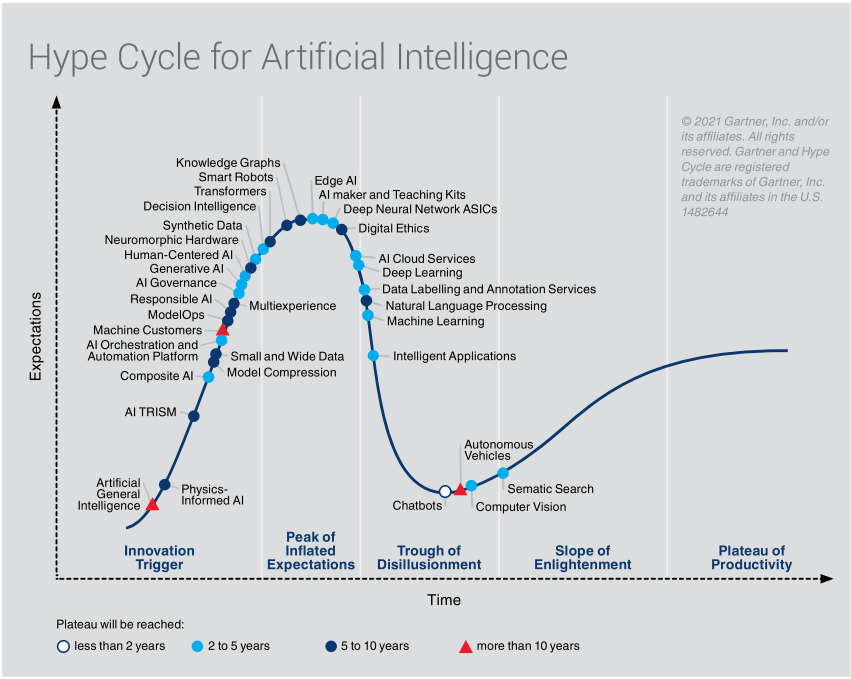
Artificial intelligence requires representative data

Without representative data that is used responsibly, AI and automation would be scarcely conceivable.
"Representative data" means that the data for training neural networks must have an intersection with the subsequent application that is representative for the corresponding application.

This is also evident in the dominant trends of the Gartner hype cycle for AI. The Gartner artificial intelligence hype cycle for 2021 outlines AI-specific innovations that are in various phases of maturity, adoption and hype. (Image: Gartner).



The graphic shows the degree of artificial intelligence in relation to availability (timeline)



Gartner sees four dominant trends here:

⇒ Operationalization of AI initiatives
⇒ Efficient use of data, modelling and data processing
⇒ Responsible AI
⇒ Data for AI

Gartner sees the driving force and reason behind these trends as companies' key focus on increasing the speed with which PoCs (proofs of concept), i.e. the feasibility of an idea, are carried over into production.

Why AI and AI solutions are only now becoming practicable

The representation of the hype cycle and dominant trends of AI match other estimates from experts.

There are three conspicuous changes in this regard that positively influence an AI application:

⇒ **Speed:** The increase in Industry 4.0 practices and IoT solutions is simplifying the possibilities for generating large quantities of data in an adequate amount of time.
⇒ **Certainty:** Relates to the quantity of determined data that has since become available for real objects/products, in order to achieve the required level of detail for the digital reproduction.
⇒ **Ability to learn:** The presently available machine learning techniques now allow learning from available data records and the opportunity to refine models. This makes it possible to develop a general model that can then be individualized through learning.

For general reference, the area of industrial use circled in light blue is already proving to be helpful and supportive. Put simply: Existing knowledge can be prepared for specific areas of application and the algorithms can be made available for evaluation. The next step involves researching and developing solutions for how new knowledge can be economically acquired in a purely machine-based fashion. What is correct and what would be incorrect? These are the things that are being worked on and researched.

One practical example of this is support for servicing. With sufficient data and selected application-specific algorithms, it is possible to create added value and benefits for the maintenance sector, such as predictive maintenance for smart valves for the detection of wear. The evaluation of operating data for the valves combined with representative data for the application environment can provide timely information regarding predictive maintenance, which in turn optimizes production uptime.

And what lies ahead – quo vadis, artificial intelligence?

Autonomous production is the primary objective of Industry 4.0 activities. Artificial intelligence provides the required assistance here to allow machines to make decisions in a trustworthy, organized and coordinated manner.

This nevertheless requires organizations and employees to adapt and participate in the development process. For the employees of the future, data handling will be even more important than is already the case today. Data engineers, data analysts and data scientists will be required to efficiently process the stages of data acquisition through to its processing and use this to produce solutions and added value for users.

Companies are being confronted with an unprecedented abundance of technological, social and regulatory influences. For example, artificial intelligence, autonomization, the Internet of Things and 5G (fifth-generation mobile networks) are becoming ubiquitous and influencing existing architectures, since they are having to develop alongside the new technologies of the future. Or, to put it another way: The time has now come to lay the foundation for next-generation architectures that will be compatible with the new developments.
The digitalization of the last few years will make way for the potential of the data that has become possible with these rapidly growing technologies. This will also stimulate the "cognitive enterprise".

Exciting times lie ahead.
We too are making use of state-of-the-art technical solutions to open up added value for users – the likes of which have never been witnessed before – and to solve the challenges and problems posed by the future applications of GEMÜ's customers.

We are already making use of artificial intelligence – sometimes deliberately, sometimes without even knowing it. It is palpable, and has already been playing a role in our lives for some time. If used responsibly, it can support us in our work and prove a helpful companion.

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