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What is artificial intelligence (AI)?

Artificial intelligence is gaining prominence in the public arena. However, this is not just because of Hollywood blockbusters, in which machines are part of new plots to threaten the continued existence of humans. AI is also gaining attention because of its real social impact, economic success, and helpful services that enhance our everyday lives. The year 2016 also marks the 60th anniversary of the Dartmouth Conference held in Hanover, New Hampshire, where the term "artificial intelligence" was coined.

AI focuses on the simulation of human know-how and more specific human cognitive abilities. These include the production and recognition of speech, an understanding of language, the interpretation of pictures, scenes, prosody, and gestures, and behavior in complex social situations. The aim of AI and the vision of DFKI are to create intelligent software systems that assist humans to reach their creative goals.

Please describe a few exciting projects that the DFKI is currently working on.

Projects at DFKI are numerous and cover a broad spectrum of application-oriented AI research. We are working on novel wearable computing systems that unobtrusively collect information and feedback from and for the user. We are addressing "Industrie 4.0," the fourth industrial revolution, on the basis of the Internet of Things and cyber-physical systems – in the context of planning, running, controlling, and analyzing flexible manufacturing processes. Furthermore, we are implementing prototype applications for companies in the field of the Internet of Things.

We are developing self-learning augmented reality handbooks for training and we are also designing smart services that will open up entirely new business sectors, enabling predictive and preventive maintenance, and will contribute to sustainability and resource efficiency.

We are working on underwater, space, and safety robotics, cognitive robotics, rehabilitation robotic systems, eye-tracking, and attention management for dual reality man-machine collaboration for human-centered jobs of the future. And then there is more!

Come and see for yourself! Meet us at CeBIT in Hannover, Germany (3/14-18/2016), Hall 6, B48.

What do you foresee as the “next big thing” in AI?

Some people are talking about artificial consciousness, digitally enabled “eternal life,” i.e. machines that develop their own willpower and then consequently fight mankind – but again these are plots for Hollywood movies. The actual big thing in AI right now is deep learning, which is based on neural networks and used for the analysis of vast amounts of data. It is successfully deployed for visual sentiment analysis of images, multimedia opinion mining, trend analysis, self-driving vehicles, cancer research, and weather forecasts.

The “next big thing” in AI, in my opinion, will be semantics. To understand what a word means, what a sentence expresses, and what a speaker really wants will enable truly knowledge-based interactions. To know what a gesture is trying to achieve, what an object really is, what a tool is used for, and what an action is part of will enable fascinating new applications and services. In the future, we will need mixed teams of humans and robots in dangerous environments, in production, and in home care, so machines will need to understand what we really mean and what we really want.

Do you believe that AI poses a risk to jobs? (Please explain why or why not.)

The development of computers created a multi-billion dollar industry and generated millions of jobs. However, this was initially received in a very critical fashion because computers were also used to automate assembly lines.

AI basically offers us the opportunity to be more productive, to gain better insights in a shorter amount of time, and to learn more easily and effectively. It also helps machines to better understand our needs and dreams, and to create better services. Some jobs will vanish, perhaps many. After all, machines are very good at counting. But humans are extremely good at caring. We will have to develop scenarios in which the two can work together to build mixed teams of humans and robots, such as in manufacturing or cooperative healthcare situations.

In your opinion, what will be the most significant changes in AI over the next decade?

Probabilistic approaches and neural networks have proved to be very powerful and resilient, e.g. in the fields of speech recognition and machine translation. But in principle it is not possible to prove that the results are correct and in the case of decision-making, that preferred actions are always in our best interest.

Rule-based symbolic approaches, on the other hand, are highly complex to write, difficult to maintain, and in most cases, not flexible enough to cope with the complexity of cases intended for real world use. But it is possible to test and foresee what they do and to verify that, hopefully, nothing will go wrong.

In the coming decade, we will finally have to bring these two worlds together. We will need to build hybrid systems that combine the speed and coverage that is offered by statistical methods with the depth of insight that is offered by symbolic approaches in order to create machines that have both common sense and social intelligence.

For more information, visit: <http://www.dfki.de/>

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