

Singularity2030 Dynamic Reference Book

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Introduction

With over 70 essays written since the launch of the 'Singularity2030' website in August 2016, the question often raised is why not writing a book about AI. Well, there are three answers:

First, there are already many fascinating and interesting books available, covering various aspects of AI, ranging from technology, sociology, biology, neurology to psychology etc.

Second, as AI continues to develop exponentially, a book focusing on a specific AI-topic is partially outdated once published.

Third, authors of AI related books are typically experts in a specific area of interest. As AI is expanding into every segment of human life, one book will hardly match the challenge in providing a general overview about the direction where AI is heading.

The goal of the Dynamic Reference Book is to provide a contemporary overview of AI development across the entire socio-economic and technical spectrum based on all essays published. It is updated every two weeks as a new essay is added to the website. The previews (summaries) of the essays make-up the content of the Dynamic Reference Book, providing a means, to easily browse through the AI world without the shortcomings of a static book. Under '[More...](#)' each preview can be linked to the essay as originally published. The order of entry in each subchapter is time-descending, contemplating the development of AI over time and leaving room for repetitive coverage on the same topic. To add structure to the essays and their previews, a classification schema is applied which segments the essays into 3 chapters each of which is divided into 3 subchapters as shown below:

- | | |
|---------------------------------------|--|
| Chapter 1: AI-State-of-the-Art Issues | (Hardware / Software / Applications.) |
| Chapter 2: AI-Research Issues | (Neuroscience / Psychology / Machine Intelligence) |
| Chapter 3: AI-Consequences Issues | (Business / Society / Individual, Ethics) |

Meggen, May 10, 2019

Peter Rudin

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Chapter 1

1.1 Hardware

Neural-Nanorobots to Augment Human Intelligence

26.04.2019

Human knowledge is being digitized at an exponential rate. Our biologically constrained cognitive abilities make it impossible to keep pace. Hence, as some see it, it is essential that we develop a secure real-time interface between the human brain and the data storage and processing systems that reside in the cloud. To others, numerous ethical implications clearly prohibit interfacing the brain with an intelligent machine connected to the cloud. Neural-nanorobots are expected to provide a non-invasive, secure and virtually autonomous real-time interface between the brain and the cloud. They can be applied via injection into the vasculature system to monitor the information passing between synapses and neurons.

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New Hardware-Technology will accelerate AI Progress

01.02.2019

To advance AI and Deep-learning further, three issues need to be addressed:

Time: It can take weeks to train deep-learning networks, engaging high-salaried individuals.

Cost: Computer time on hundreds of Graphic Processing Units (GPUs) for weeks is expensive.

Data: In many cases the lack of enough labelled data simply makes it impossible to carry out the project.

To handle the raising complexity to solve these problems requires increased hardware performance. A three-way race is on the way, employing the following hardware technologies:

-High-Performance Computing (HPC), -Neuromorphic Computing (NC), -Quantum Computing (QC)

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A Computer Chip in your Brain is no longer Science Fiction

24.02.2017

In an interview by CNBC on February 13, 2017 the well-known visionary and entrepreneur Elon Musk made the statement that humans must merge with intelligent machines or become irrelevant in the age of artificial intelligence (AI). To follow up on Elon Musk's vision, a brain-computer interface (BCI) is required as a communication pathway between the brain and an external device. Kernel Company, a U.S. science start-up founded in 2016 with an initial venture funding of USD 100 Million is building a tiny computer chip that can be implanted into the brain to help people suffering from neurological damage caused by strokes, Alzheimer's or concussions. Top neuroscientists who are building the chip hope that in the longer term, it will be able to boost intelligence, memory and other cognitive tasks.

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Quantum Computing, who wins the race for Supremacy?

28.09.2016

Quantum computing chips are made up of devices called qubits that represent digital data using quantum effects. In the subatomic realm of quantum physics, particles can be particle or wave or particle and wave. This is what's known in quantum mechanics as superposition. As a result of superposition, a qubit can be a '0 or 1' but also a '0 and 1'. That means it can perform two equations at the same time. Two qubits can perform four equations. And three qubits can perform eight, and so on in an exponential expansion. Scott Aaronson, an associate professor at MIT, says a collection of just 50 qubits will likely be the first computer to demonstrate "quantum supremacy"—the power to solve a computational problem immensely difficult for conventional machines.

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Moore's Law coming to an End? Yes and No!

25.06.2016

For 50 years the exponential growth of computer performance and inversely reducing its cost per chip has proven to be a reliable path for assessing the trend of hardware development and Machine Resources. Now due to limitations of silicon-based chip design this trend also defined as Moore's law is coming to an end. What happens next? In summary, it will be renewed by chips incorporating new materials and architectures, possibly outpacing the speed of change we have experienced in the last 50 years. This development will be largely fuelled by Artificial Intelligence applications and its requirement to handle and analyse huge data sets to support the Singularity- Ecosystem.

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1.2 Software

From Data to Predictions to Decisions

31.08.2018

Recent developments in artificial intelligence (AI) and machine-learning in combination with large data-libraries significantly improve the quality and cost generating predictions. Prediction is one of the possible objectives of mathematical modelling in fields such as healthcare, economics and finance. Decision-making is the process of identifying and choosing alternatives based on the values, preferences and beliefs of the decision-maker. To get started with AI, the challenge is to identify the key decisions where the outcome is tied to uncertainty. While experts are mostly in agreement about the benefits of AI in healthcare, some doctors and academics are wary we could be headed in the direction of data-driven medical practices too fast.

[More...](#)

Design Issues of Conversational Expert-Avatars (CEAs)

13.07.2018

In a bold move that could redefine the delivery of advice and the future of work itself, UBS has created a digital clone of its Swiss chief economist, Mr Kalt. The event marks the first time that a global bank has created a CEA by cloning a human staff member to be presented to clients to answer their questions. A CEA's level of expertise will eventually be superior to the expertise a human can comprehend. However, the human's ability to think across multiple layers of knowledge will remain unique. Once true Artificial General Intelligence (AGI) becomes available, this scenario might change as CEAs will be able to cover a broader range of expertise. So far however, we have a long way to go to reach AGI.

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AI-Empathy Improves Communication Skills of AI-Machines

29.06.2018

Our ability to understand and relate to other people is, in part, a function of an empathetic process. According to Wikipedia, empathy is the capacity to understand or feel what another person is experiencing from within their frame of reference. Researchers and developers are creating algorithms that try to determine the emotional state of a human being, based on input such as gestures, facial expressions, text, and tone of voice. As AI rapidly advances its communication skills, persuasion and empathy are no longer an exclusive human asset. Artificial empathy is about to overthrow the idea that to communicate expertise and advice is best performed by humans.

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1.3 Applications

AI to Strengthen Consciousness and Decision-Making

12.04.2019

In our decision-making process, we seek external information to guide us. This includes the advice and opinions from people we know, people with expertise in the field or people we can trust. To foster consciousness is vital if we are to maintain our mental independence in a digital world where fake information and malicious influencing are threatening the very foundation of our democratic society. Augmenting humans by applying interactive Generative Adversarial Networks (GANs) can improve conscious experience as a means of making sound decisions against the destructive use of AI. Individuals who consistently make good decisions may not be the ones who are the smartest or the luckiest. They are the ones who thoroughly understand themselves.

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The Human Brain and Neuromorphic Computing

29.03.2019

Neuromorphic systems offer two major promises: First, because they are pulse-driven, potentially asynchronous, and highly parallel, they could be a gateway to an entirely new way of computing at high performance and very low energy. Second, they could be the best vehicle to support unsupervised learning—a goal that may prove necessary for key applications such as autonomous vehicle navigation in uncharted areas or natural-language comprehension. What neuromorphic chips can do is to provide self-learning without requiring large datasets as in convolutional artificial networks. The system learns similar to the way humans learn.

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From Emotional AI to Artificial Human Avatars

28.09.2018

Trust and empathy are the key quality factors in conversational avatar communications. While trust is associated with the credibility and data-security of the avatar service provider, empathy relates to the communication skills of an avatar. An avatar in his role as an artificial human has a distinct personality, possibly virtually copied from a real-life individual. The personality of the avatar must convey sympathy and competence and match the role a human would have in the "real"- world. The conversational avatar, acting as an artificial human, defines a new scenario of intelligent machine communication, possibly as far reaching as the launch of the internet 25 years ago.

[More...](#)

Conversational Avatar-Experts are about to arrive!

20.04.2018

Intelligent avatars as virtual copies of experts, conversationally sharing their knowledge, have enormous potential. With a total value of around \$250 billion in 2016, the global consulting sector is one of the largest markets within the professional services industry. A machine-driven expert and his ability to appear in multiple copies via internet, will bring down the cost of professional advice to a fraction of what it is today. The first movers of an avatar-based consulting company are likely to disrupt the entire global consulting sector.

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What happens when my Digital Assistant has an IQ of 300 12.01.2018

To enhance human intelligence with machines to reach an IQ level of 300 is a thought-model which does not imply a God-like internet or Superintelligence as discussed in Nick Bostrom's book. The IQ is an index by which we measure cognitive intelligence. The availability of AI tools to augment human intelligence towards a higher IQ level has primarily economic consequences, for example disrupting the billion-dollar consulting industry of McKinsey and Co. A similar disruption occurred when the introduction of mechanical machines and systems enhanced the physical limitation of humans as it happened to the farming industry around 1920.

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AI for Automated or Augmented Decision-Making 29.12.2017

Artificial intelligence is more than the simple automation of existing processes: it involves, to greater or lesser degrees, setting an outcome and letting a computer program find its own way to get there. It is this creative capacity that gives artificial intelligence its power. Generally, we can expect that AI supported decision-making will lead to better decisions, provided that the data used by machine learning is trustworthy and ethical standards are met. To define these standards and to implement controls of adherence and data quality are fundamental for reaping its potential benefits.

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With Neuroscience and AI to Conversational Learning 25.08.2017

Classroom teaching with the large amount of knowledge educators have to transfer leaves little room for conversations. Yet it is widely recognized that formal lecturing and reading has a combined learning retention level of less than 20%. As neuroscience and AI are beginning to complement each other, new learning algorithms like 'reasoning' and 'relationship learning' or new brain-inspired neural learning models are being developed. Imagine you have a 24 hour/7-day access to an artificial personalized coach, answering questions about a topic you just learned in school or via MOOC- learning will be much more fun. The retention level will substantially increase and your motivation for life-long learning will remain high.

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AI to Support Personal Development 16.06.2017

Deep machine learning, speech recognition, emotion and body sensing have dramatically progressed, empowering voice activated PDAs such as Amazon's Alexa, Apple's Siri, Google's Now, and Microsoft's Cortana. These virtual assistants will continue to improve until they become hard to distinguish from real people. Interacting with 'humanized' technology in the context of therapy and coaching will turn our devices into 'identity accessories': they will become tools to actively guide our behavior and identity based on goals we provide. The availability of virtual assistants that interact on issues we so far considered uniquely human will raise profound scientific, psychological, philosophical, and ethical questions.

[More...](#)

AI and the Sensing of Human Emotions

19.05.2017

Emotion sensing can enhance personal profiling applied in business applications such as marketing, health care, education or consulting. Machine emotional intelligence is still evolving, but the future could soon see targeted ads that respond to our current emotional state as well. In addition to business applications, emotion sensing also provides input to the emerging field of personal analytics empowering individuals to analyse and exploit their own data to achieve a range of objectives and benefits across their work and personal lives. As systems take on new therapy and coaching functions collecting an increasing amount of personal data about us, concerns about privacy and ethics will grow.

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Who will provide your Virtual Personal Assistant (VPA)?

28.10.2016

The race is on among the big tech companies like Google, Microsoft, Apple, Microsoft and Amazon to become the preferred supplier of your VPA. Who controls the VPA gateway will greatly influence the relationship to all services a customer might want. Like the browser wars of the 1990s, the outcome will lead to settling the balance of power in the next phase of the internet. By channelling attention and making decisions on behalf of their users, VPAs will have a significant impact to make or break other businesses already engaged in providing internet services. One key in this development towards a VPA is the application of machine learning to language comprehension both in respect to content and context and the support of voice assistants to provide the interface to language-oriented services.

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Cognitive Computing and Decision-Making

01.06.2016

Daniel Kahneman, one of the first researchers engaged in Neuro Economics was awarded the 2002 Nobel Prize in Economic Sciences based on his findings challenging the assumption of human rationality prevailing in modern economic theory. Since this time, efforts to understand the functioning of the human brain also in respect to decision-making have increased exponentially. With 'deep-learning' algorithms we are capable of interpreting textual content and to propose answers to questions raised. The term 'Cognitive Computing' defines a new era of computing which combines AI with big data analytics. It can be a very powerful tool to improve our decision-making process and to support leaders to plot a successful future in a complex economic environment.

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Can AI judge our State of Happiness?

15.06.2018

Even though AI systems are no substitute for interactions with a real human, they could have the potential to improve our quality of life and enhance our emotional intelligence. The 'happimeter' app is a new player on the block of personal analytic service providers. New is the combination of a smart watch with a smart phone and the focus on happiness with an algorithm that executes input data provided by the sensors of the smart watch combined with environmental information from the smart phone. The 'happimeter' and its analytical capability evokes the question if AI's current development path is approaching a brick wall.

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Chapter 2

2.1 Neuroscience Research

Advancing AI with Neuroscience

12.10.2018

Today, most AI systems are based on layers of mathematics that are only loosely inspired by the way the human brain works. Different types of machine-learning applications require different mathematical structures, and the resulting algorithms are only able to perform very specific tasks such as speech recognition or the identification of objects. While there are many domains where AI is superior, humans still have an advantage when tasks depend on the flexible use of memory. If we can understand that mechanism, the hope is that we can replicate this process with a new generation of neuroscience-inspired AI systems for rapidly solving novel problems.

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Has Machine-Learning Become Alchemy?

23.03.2018

With this provocative title, Google's Ali Rahimi gave a critical assessment of the state-of-the-art in machine-learning at the 2017 Conference on Neural Information Processing (NIPS). There are increasing signs from the machine-learning community that AI needs another wave of innovation. This wave should include contextual intelligence beyond the current statistical, algorithmic interpretation of data. Common-sense is regarded as the holy grail of AI and it is the precondition to reach Artificial General Intelligence (AGI).

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Reverse Engineering the Human Brain

22.09.2017

The human brain is the most elementary biological component of our socio-economic system yet very little is known as to how it functions. Some researchers believe that it makes no sense to reverse engineer something we don't understand. Regardless of these critics, heavily subsidized efforts are in full swing to crack the neural code and to find out how our brain works. Today's neural networks as applied in AI machine learning software have little in common with biological neural networks. In the context of AI, neural networks provide the software architecture to process huge amounts of data concurrently, while mathematical techniques and algorithms are used to extract 'knowledge' from this data, mimicking some limited functions of biological neurons.

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Unlocking Knowledge Silos with Neuroscience

10.02.2017

Extending scientific analysis to every subject and opening a potentially unlimited succession of research activities is producing a steadily growing number of hierarchical knowledge silos. The continuous progress in neuroscience will accelerate artificial intelligence research and the continuous creation of accessible machine knowledge. This knowledge is mapped in networks equivalent to the brain hence hierarchical knowledge silos are no longer needed. We must learn to open our mind asking the right questions as opposed to cramming silo-knowledge into our overloaded brains. The brain's capacity has limits and it makes far more sense to employ human brains with knowledge tied to emotions and leave rational and logic-based memory up to machines.

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How to communicate with our future personal assistants? 30.08.2016

The idea that a computer takes on the role of a personal assistant has been around for many years. The smartphone and its internet access to 'the cloud' has become our mobile companion with Apps available to provide instant personal advice ranging from travel planning all the way to health issues to name just a few. A truly personal assistant, however, has to be able to communicate like a human being in a language that is considered agreeable. Today we lack the algorithms that enable Artificial Intelligence Machines to handle this task. However, as neuroscience and brain research progress at such a rapid pace we will eventually understand how human language comprehension is built up and maintained.

[More....](#)

2.2 Psychology/Philosophy Research

As Machines Get Smarter, Evidence Grows They Learn Like Us 15.02.2019

Back in 2017 Denis Hassabis of Alphabet's Deep Mind suggested intensifying the cooperation with Neuroscience to advance AI towards Artificial General Intelligence (AGI). Now, two years later, Artificial Neural Networks (ANNs) have made significant progress both in respect to diversity as well as quality. Humans have a powerful "physical intelligence" to infer physical properties of objects and predict future states in complex, dynamic scenes. This "abstract system of knowledge" is based on physics (for example forces or masses) and psychology (for example desires or beliefs). As new computational methods continue to be provided by research, intelligent machines are likely to match humans in learning, possibly within the next ten years.

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AI and the Future of Education

21.12.2018

Progress in language translation provokes the question if it still makes sense to learn a foreign language. Taking this thought a step further, we must raise the question, if our educational institutions are ready of adjusting their learning concepts. Personalized learning provides the freedom to learn in one's own time and learning at one's own pace. Humanity has the unique chance to replace the inefficiency of hierarchical class-room learning with individualized concepts employing AI technology. Adolescence is the time to foster human values. By combining science and humanities as part of a new educational concept we set the stage to unlock the potential benefits of future AI-applications driven by the three C's: Curiosity, Consciousness and Creativity.

[More....](#)

Creativity is at the Core of Humanity; AI is just a Tool!

07.12.2018

Homo sapiens first appeared some 100'000 years ago in Southern Africa. There is evidence that this species was of basically modern intelligence. However, Homo sapiens at that time was crucially lacking in creative imagination. About 40'000 years ago Creativity 'burst' onto the planet as can be observed from remarkable cave paintings or the invention of new stone-tools. There is no consensus among the research community why this happened so suddenly and much remains a mystery. Following the path of evolution, one can consider AI as a tool invented by humans, which can augment our lives both emotionally as well as logically. However, AI-machines have no intrinsic capability to sustain Creativity without incorporating human values and adherence to the laws of natural sciences.

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AI and Free Will, a Rising Concern

26.10.2018

For centuries, philosophers and theologians have held the view that civilization, as we know it, depends on a widespread belief in free will. The growing impact of AI in our daily lives adds an additional dimension of concern to this ongoing discussion. Systems specifically designed to form relationships with a human will have much more power. AI will influence how we think, and how we treat others. Unfortunately, the commercial forces driving this technology are not always benevolent. Corporations at the forefront of AI drive the value of their shares by increasing traffic, consumption, and addiction to their technology.

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Will Quantum Physics Support Humans to Manage AI?

09.14.2018

AI has made rapid progress by leveraging enormous amounts of human expertise and data. However, for some problems this human knowledge may be too unreliable or simply unavailable. As a result, a long-standing ambition of AI is to create algorithms capable of achieving superhuman performance with no human input. Ever since the mathematician / physicist Sir Roger Penrose published his best-selling book "The Emperor's New Mind", there is an intense discussion going on about the effect quantum theory could have for AI. Penrose essentially believes that current day computers and hence AI can never reach the highest levels of human intelligence because human understanding is non-computational and hence exceeds the capabilities of machines.

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Will AI Achieve Human Consciousness?

04.05.2018

The issue of artificial consciousness and the possible behavior of conscious, intelligent machines will fuel the ongoing debate about the future of humanity. To achieve Artificial General Intelligence (AGI), consciousness has to be part of the equation. If we want to move AI towards AGI, we will need our computers to become more like our brains. To crack the neural code of intelligence and consciousness, neuroscience research needs to uncover the functionality of a neurons behaviour coupled to its synaptic network.

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Issues about the Rise of Emotionally Intelligent AI

09.03.2018

Emotions are a key asset of humans. They provide the link between the body and the brain. Consequently, sensing emotions with AI provides access to a person's feelings and subsequently his mind. Sensing technology and emotion recognition software is continuously improving. Besides its ability to track basic facial expressions for emotions such as sadness, happiness, anger, surprise, etc., emotion recognition software can also capture what experts call "micro-expressions" or subtle body language cues that may betray an individual's feelings without his/her knowledge.

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Has Homo sapiens reached the End of Life?

23.02.2018

In his best-selling book 'Homo Deus', Professor Yuval Noah Harari makes the case that humans are close to facing an existential revolution. As we are in the process of decoupling intelligence from consciousness, collecting data in digital form across all facets of life, the economic value of humans will diminish. So far, we live with the conception that a high degree of consciousness is required to perform demanding tasks. In neuroscience, a great deal of effort has gone into investigating how the perceived world of conscious awareness is constructed inside the brain. While science is advancing AI, the value of consciousness needs to be reassessed. It is an integral of Homo sapiens.

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AI and the Mystery of the Human Brain

30.06.2017

In the mid-1940s Alan Turing, John von Neumann and a few other brilliant people, drew up the basic blueprint of the computer age. A key feature of conventional computers is the physical separation of memory storage from logic information processing. The brain holds no such distinction. Although machine-learning techniques such as deep neural networks have recently made impressive gains, they are still far from providing human intelligence, modelling features like consciousness or creativity. Trying to create machine consciousness may turn out to be the way we finally begin to understand this most mysterious human attribute. Neuroscience 'software' in combination with neuromorphic systems 'hardware' could finally unlock the secret of human intelligence.

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Is AI changing Maslow's Pyramid of Needs?

05.05.2017

Abraham Maslow's theory of human motivation, now over 80 years old, continues to have a strong influence on the world of business. The 'explosion' of science since the 1940's, largely fuelled by economic incentives, has resulted in an unprecedented expansion of scientific knowledge on an exponential trajectory. Humanistic psychology with its focus on self-actualization has taken a back-seat. However, learning and experiencing both worlds -science and humanities - will set free the energy, joy and creativity needed to lead us towards a positive vision of life. Incorporating AI as a scientific tool to enhance our existence coupled with humanitarian self-awareness and mindfulness is likely to support this vision.

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Can Artificial Intelligence replicate Human Consciousness?

24.03.2017

The debate among neuroscientists, AI engineers and philosophers over one of the most ultimate of scientific questions - the nature of human consciousness - is gaining momentum. In response to many unanswered questions regarding the future of AI some of today's top techies and scientists like Stephen Hawking, Elon Musk, and Bill Gates express concerns over apocalyptic scenarios that are likely to arise as a result of machines with their own consciousness. Today our will provides the key to differentiate us from machines. However, we are also aware of the fact that humans are potentially 'corruptible', not just with money but also increased comfort reducing the effort to perform a task.

[More...](#)

Thoughts on Human Learning vs. Machine Learning

13.01.2017

Both human as well as machine learning generate knowledge, one residing in the brain the other residing in the machine. This fact raises the question how we apply what kind of knowledge and how we balance these knowledge resources for optimal results. The application of so-called neural network software, mimicking functions of the human brain coupled with the availability of low-cost powerful computational hardware resources, provides opportunities to solve problems which so far have relied on human brain-power. With machine learning a new tool has emerged which is likely to raise our capacity to learn if applied in an ethically responsible way. The consequences are far-reaching as continuous brain research will advance machine learning over the years to come.

[More...](#)

Emotional Intelligence and the Aging Brain

14.09.2016

In a corporate business context, as Singularity is coming closer, we can expect that Artificial Intelligence Machines (AIMs) will take over many of the cognitive intelligence tasks that are currently handled by humans. Consequently, the focus in managing human resources will eventually shift from cognitive driven business practices to emotional intelligence driven business practices. This for one will raise the potential value of aging leaders as their capacity for emotional intelligence grows and their relative loss of cognitive intelligence is compensated by the application of AIMs.

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Will My Smartphone ever have Consciousness?

05.07.2016

From a scientific and technical point of view it seems possible that a smartphone might one day have some form of Consciousness. The decision to enable that is up to us. The century-old philosophical debate what Consciousness really is has recently become enriched by Neuroscience with its huge and well-funded efforts to understand the functioning of the human brain. Computational Neuroscience which is part of this effort is trying to model the brain and eventually provide input to Artificial Intelligence applications and new computer architectures thereby plotting the road towards Singularity and its Ecosystem.

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2.3 Machine Intelligence Research (AI)

The Evolution of AI from 2018 to 2019 and Beyond

04.01.2019

The raising complexity of deep-learning algorithms and networks is beginning to backfire as a lack of transparency generates distrust and concern regarding the ethical implications of possible errors in the results computed. Next to the regulatory and ethical issues which will continue to be discussed well into 2019 and beyond, we are likely to witness two efforts to restore trust: Provide secure communication based on quantum-internet to protect private and corporate data with secure access for anyone across the entire globe and to move from a technology-driven AI to a human centric AI, where AI augments humans to reap the potential benefits of AI while adhering to ethical standards as part of the application.

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Can AI Match Humans in Common-Sense Reasoning?

17.08.2018

Common-sense reasoning (CSR) is a major stepping-stone in reaching Artificial General Intelligence (AGI). Many experts from the AI-community, like Geoffrey Hinton, considered the 'grandfather' of neural networks, or Demis Hassabis from Google DeepMind agree, that we need new concepts that go beyond Deep Learning and back-propagation. At a glance, humans can perceive whether a stack of dishes will topple, a branch will support a child's weight ... or if a tool is firmly attached to a table or free to be lifted. Such rapid physical inferences are central to how people interact with the world and with each other, yet their computational underpinnings are poorly understood

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Can AI Match Humans to Ask Questions?

03.08.2018

Asking questions has always played a role in leadership, but it's more vital than ever in today's fast-changing digital landscape, says Hal Gregersen, the executive director of the MIT Leadership Center and lecturer at MIT Sloan School of Management. Consequently, the drive to provide business leaders with conversational AI systems to add support to their decision making is gaining momentum. Microsoft has become a major driving force in conversational AI. Forming the 'Microsoft AI & Research Group', bringing together more than 5,000 computer scientists and engineers to focus on the companies AI products and services, underlines the intensity of this strategic shift to develop machines that can think, reason and communicate like humans.

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Thoughts on Human Learning vs. Machine Learning

01.06.2018

Both human as well as machine learning generate knowledge, one residing in the brain the other residing in the machine. This fact raises the question how we apply what kind of knowledge and how we balance these knowledge resources for optimal results. The application of so-called neural network software, mimicking functions of the human brain, coupled with the availability of low-cost powerful computational hardware resources, provides opportunities to solve problems which in the past have relied on human brain-power. With machine learning a new tool has emerged which is likely to raise our capacity to learn if applied in an ethically responsible way. The consequences are far-reaching as continuous brain research will advance machine learning over the years to come.

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Is AI capable of producing Art?

18.05.2018

According to Wikipedia, art is defined as the expression or application of human creative skill and imagination, producing works to be appreciated primarily for their beauty or emotional power. In June 2016, Google launched the Magenta project, which directly addresses the question, "Can machines be creative?" Researchers at Rutgers University's Art and Artificial Intelligence Laboratory recently generated entirely new artworks, using a new computational system that plays the role of an artist, attempting to demonstrate creativity without any need for a human mind.

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AI in Search for new Inspirations and Human Contribution

01.12.2017

Continuous progress in artificial intelligence (AI) is raising expectations to build systems that learn and think like people. Many advances have come from using deep neural networks trained in tasks such as object recognition, language translation or board games. Despite their biological inspiration and performance achievements, these systems differ from human intelligence in crucial ways. One source of inspiration to advance AI to a level closer to human thinking comes from Geoffrey Hinton, Professor at the University of Toronto and a Google researcher. Another comes from Joshua Tenenbaum, Professor at MIT's Department of Brain and Cognitive Sciences, engaged in reverse engineering the human mind.

[More....](#)

What happens when Artificial equals Human Intelligence?

03.11.2017

Very much driven by ongoing progress in neuroscience to crack the neural code of intelligence, most scientists seem to agree that this moment of intelligence-equality also referred to as 'Singularity' will happen within the next 15 to 65 years. What is the fate of humanity after this milestone is reached? Before we try to answer this question, we should keep in mind that intelligence is only part of what human existence is all about. To deal with the widespread fear that the potential of AI can be misused by governments to wage war or the concern that market-controlling institutions misuse their data-analysis power, we have to widen our scope.

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From Digital Transformation to AGI: are we really ready?

28.07.2017

Currently, most AI systems are based on layers of mathematics that are only loosely inspired by the way the human brain works. Different types of machine learning, such as speech recognition or identifying objects in an image, require different mathematical structures, and the resulting algorithms are only able to perform very specific tasks. In a paper published in the journal *Neuron*, Demis Hassabis, CEO of Google's DeepMind subsidiary and three co-authors argue that only by better understanding human intelligence can we hope to push the boundaries of what artificial intellects can achieve. A general intelligence will need more human-like characteristics—such as an intuitive understanding of the real world and more efficient ways of learning.

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Singularity: From AI to Augmented Intelligence

14.07.2017

As artificial intelligence (AI) gains momentum exponentially, we are heading towards a point where 2 scenarios seem possible: one is the science fiction scenario where humans will eventually be dominated by super intelligent machines, the other is the augmented intelligence scenario where humans succeed in employing intelligent machines to their own advantage, reaching a new level of humanity. There is a wide concern that singularity will result in massive job losses across many industry and business segments. New socio-economic models might be required with features such as 'guaranteed income' or 're-education bonus' to provide support during the transition towards singularity. Once the transition from AI to augmented intelligence is accomplished, our creativity will define new jobs and services which currently do not exist.

[More....](#)

Superintelligence has arrived and now what?

02.06.2017

'Superintelligence: Paths, Dangers, Strategies' is a 2014 bestselling book by the Swedish philosopher Nick Bostrom from the University of Oxford. He argues that if machine brains surpass human brains in general intelligence, then this new superintelligence could replace humans as the dominant lifeform on earth. In a series of interviews with 95 researchers conducted by Nick Bostrom's team and partners, 50% of all respondents declared that in their opinion superintelligence would arrive starting 2040. Google researchers have shown that their learning algorithms can automate the job of designing machine-learning software with designs that rivals or beats the best work of human machine-learning experts. Superintelligence has arrived as an answer to resolve the problem of human resource shortage in the generation of machine learning software.

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Chapter 3

3.1 Business

AI and decision-making, what about intuition?

10.05.2019

Many consider the division between analytic and intuitive thinking as opposites. However, a 2015 meta-analysis – an investigation where the impact of a group of studies is measured – has shown that analytic and intuitive thinking are typically not correlated and could happen at the same time. Infants learn through interacting with the real world, which appears to be training various intuitive engines or simulators inside the brain without the need for massive training data. We need a much better understanding of humans, both in respect to intelligence as well as intuition. This clearly stipulates that neuroscience and behavioural science are required to advance AI further.

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Does your Company need a Chief Philosophy Officer (CPO)?

18.01.2019

Philosophy can help to provide purpose and guidance by tackling fundamental questions about the meaning of life. Artificial intelligence has close connections with philosophy because both share several concepts such as intelligence, consciousness, epistemology, and even free will. The idea behind having a CPO is that the position could be helpful in a business environment that is accelerating at an unprecedented speed. The main-responsibility of a CPO is to provide support for interfacing human values and skills with intelligent machines in order to optimize the potential of man-machine augmentation. To reach this goal he must motivate the team-members to ask questions that are outside of the 'corporate box'.

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Thoughts about a Brain inspired Organization (BiO)

06.10.2017

While current machine-learning efforts are mainly focused on extracting knowledge from 'big-data', the next stage of Artificial General Intelligence (AGI) will provide systems with learning and decision-making capabilities equivalent to those of a human. Consequently, we have the opportunity to create an intelligent organization, modelled on the architecture of the human brain in short, a thought model of a Brain inspired Organization (BiO). Decision-making is one of the fundamental tasks of any organization. Thanks to its continuous, unlimited learning capacity for knowledge generation applying AGI technology, a BiO is far more capable to adapt to change compared to a conventional organization.

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AI+IoT+Neuroscience = the Intelligent Organization

11.08.2017

Dear Reader,

In its second year of operation the website starts with an Essay that opens a new chapter regarding the emergence of Singularity. The integration of AI, IoT and Neuroscience provides new and exciting scenarios to implement intelligent organizations managed by humans.

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Machine Learning and Corporate Leadership

27.01.2017

Leadership is strongly linked to a corporate culture which defines values far beyond the typical elements of balance sheet data such as earnings, growth and profitability. The Start-Up represents a culture where mostly young people combine all their energy and knowledge to realize a 'dream' producing something which customers find useful. An established company has customers, products and services acquired over many years. One of their greatest assets is the 'Data' related to these activities. To extract knowledge from this data is accomplished through advancements in Machine Learning. As paradox as this may sound this trend will have the effect that human resources are likely to become the most valuable asset a company has. Thus, human resource management will be a key leadership issue.

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Decision Making: performed by Humans or Machines?

02.12.2016

Over the last 40 years several thought-models have been created to describe how humans make decisions. Common to most of them is the view that humans do not just follow rationality to make decisions. Behavioural economics sometimes also referred to as Neuro Economics uses psychological experimentation to develop theories about human decision making and has identified a range of biases as a result of the way people think and feel. One of the most important conversations in the field of Machine Learning is the debate surrounding the use of predictive methods to influence human decisions. Machine Learning methods could hypothetically make decisions for humans, but should they? And where should we draw the line?

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Economic Forum 'The Rise of the Machines'

11.11.2016

On November 7, 2016 the UBS International Center of Economics in Society conducted its 5th Forum for Economic Dialogue titled 'The Rise of the Machines'. Over 500 people attended this year's forum at the Kaufleuten in Zurich. The UBS International Center of Economics in Society is an Associated Institute at the Department of Economics of the University of Zurich. It was established in 2012, enabled by a generous founding donation by UBS of CHF 100 Million. This year's Forum featured economists, entrepreneurs, philosophers, and technology experts who discussed whether, and if so how, the wave of technological change will revolutionize the way our economy operates and how human beings participate in it.

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Machine Learning and the 4th Industrial Revolution

14.10.2016

Every generation or so, a number of emerging technologies converge, and something revolutionary occurs. The reason we are now experiencing a paradigm shift towards the 4th industrial revolution, largely driven by AI and Machine Learning, is the simultaneous occurrence of the following: a) The growing availability of massive computational resources for neural network and machine learning applications b) Networked access to the massive and rapidly growing data pools (big data) representing knowledge mostly as unformatted data c) The ongoing integration of Deep Learning (a subset of machine learning) and Neuroscience with brain research.

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From Digital Transformation to Singularity

10.08.2016

Digital Transformation is the prelude to Singularity. A digitally transformed company has the corporate culture to successfully manage the complex issues of Singularity. The following discussion will help to understand the drivers behind this paradigm shift. Preparing for a digital economy is no easy task. It means developing digital capabilities in which a company's activities, people, culture, and structure are in sync and aligned toward a set of organizational goals. Cognitive Singularity will not happen suddenly as a 'big bang'. It will come step by step as deep learning AI and cognitive computer applications are generating value for specific business and customer segments.

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Singularity will cause job market disruptions!

15.07.2016

Technological advances have destroyed jobs since the beginning of industrialization. However, new job opportunities requiring new skills are often created following layoff-periods. The time for adjustment and the flexibility of individuals to adapt to new job situations supported by a socially responsible leadership is the key to handle the impact of change. With Singularity approaching there will be no more than a few outstanding high-paid individuals who are the ultimate drivers of advancing the performance of AI systems at an exponential rate. On the other side, there are a vast number of people facing potential unemployment due to the consequences of this development. This will cause serious disruptions especially within the white-collar job market.

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Artificial Intelligence and the VW Emissions Disaster

14.06.2016

The VW diesel emissions disaster will go down in history as one of the most significant commercial disasters with billions of dollars lost in the value of share capital and damage to VW's reputation which will be extremely costly and time-consuming to repair. Engineers had the idea that artificial intelligence software could be implemented that would sense if the car were being government tested for exhaust emission. Under normal driving conditions, however, this 'artificial intelligent switch' would not be activated causing far higher emissions. Additional laws will be put into place to avoid a reoccurrence of the VW case. However, unless a corporate culture of ethical conduct is implemented, also applied to the design of AI software, laws will be broken again.

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3.2 Society

Is AI steering us towards a Collapse of Western Civilization? 15.03.2019

In theory, a civilization might be less vulnerable to collapse if new technologies can mitigate against pressures such as climate change. Our technological capabilities may have the potential to delay collapse. In the past, collapse was confined to regions – it was a temporary setback, and people often could return to agrarian lifestyles following the collapse. However, the world is now deeply interconnected and interdependent. Additionally, new instruments of violence, such as lethal autonomous weapons, will be available soon. The most dangerous threat, however, comes from the exponentially rising complexity induced by AI in combination with the rise of inequality and oligarchy by tech-giants such as Facebook, Google and Amazon.

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Towards a Charta for Machine-Interaction 23.11.2018

Today's conversational support-services and assistants are voice-activated. Based on natural language processing and speech recognition, these so-called 'bots' provide voice and text answers to questions submitted via smart speakers or phones. However, the future of voice will probably not be relative to speakers alone. The Avatar appears as a screen-based simulation of a fictional Human who is able to sense and monitor the emotions, the physical well-being and the intellectual capacity of its human counterpart. As Singularity will arrive, a Charta is needed to augment and balance the unique capabilities of Humans and AI-Machines in form of an Ecosystem.

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Machine-Emotions and the Struggle for Power over Humans 09.11.2018

One of the founding fathers of AI, Marvin Minsky, was once questioned about machine-emotions and said: "The question is not whether intelligent machines can have any emotions, but whether machines can be intelligent without any emotions". Augmenting an AI focused on mathematics and statistics with an AI focused on emotion sets the stage of unprecedented power exercised by a few tech conglomerates. It is the balance between the ever-increasing power of the new potentate – the intelligent machine – and the role of human beings that needs to be defined and regulated.

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Should Machine-Intelligence Be Taxed? 09.02.2018

The phenomenal growth of Facebook, Google and Amazon (FGAs) is based on a simple but very powerful business model: Provide a service at no charge to get personal data and monetize this data for targeted advertising. The current financial tax contribution of the FGAs to government institutions will not be enough to cover their fair share of the social costs caused by the disruptive impact of machine-intelligence. To maintain our democratic values, we need a redesign of our tax and social welfare system that takes into account the impact of machine-intelligence.

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China's move to reach AI world-supremacy by 2030

26.01.2018

In July 2017, China's State Council announced the "Next Generation Artificial Intelligence Development Plan". The Chinese government's plan aims (a) to keep pace with Western AI technology by 2020, (b) make major breakthroughs by 2025, and (c) lead the world in AI by 2030. The question looms as to what our Western democratic society can do to stay ahead of this race and to maintain our values. Intelligence 'Made in China' is likely to be more than just a service- or product offering, it could also be a cultural imperative.

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Thoughts about the Future Impact of AI in our Society

15.12.2017

Discussions about the consequences of AI are far reaching and reviewing it requires some guidelines to avoid being trapped in speculation and science fiction scenarios. While the potential for positive consequences should be enhanced, it is vital that our society sets up barriers against misuse and propagation of negative impacts. To assess the consequences of Artificial Intelligence (AI) being equal to Natural Intelligence (NI), it helps to differentiate between economic, social and individual contexts.

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3.3 Individual/Ethics

Is Facebook a 'Digital Gangster'? What about Ethics?

01.03.2019

Following an inquiry launched in 2017 as concern grew about the influence of false information and its ability to be spread unscrutinised on social media, a UK parliamentary committee has published its findings on February 18, 2019 after an 18-month investigation into disinformation and fake news. It could be vital that IEEE's proposed standard 'P7008 for Ethically Driven Nudging by Robotic, Intelligent and Autonomous Systems' in combination with strong government supported regulations against misuse can restore trust into internet applications and social media. Fighting this attempt, as perceived by the UK's Parliamentary Committee when investigating Facebook, is likely to provoke the 'Digital Gangster' image.

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From Privacy Invasion to Identity Loss?

06.04.2018

Facebook's data breach disaster is a good indicator of how much private data of internet users has become a commodity to manipulate human decision-making on a massive scale. Using the internet leaves a digital footprint which can be analysed. Information about one's personality can be predicted from Facebook 'Likes' or Tweets. Personality profiling will reach a level of perfection where humans might succumb to the manipulation of intelligent machines. However, persuasion and manipulation by these machines and their algorithms can be curbed by our own sense of identity and self-awareness.

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AI and Neuro-Technology: Ethics a must for Human Survival

17.11.2017

As Neuroscience and AI is beginning to merge to come up with a true 'Artificial General Intelligence (AGI)' the 'issue of ethics' needs new attention. Technological developments in machine intelligence and Neuro-Technology implicate that it will be possible to decode people's mental processes and directly manipulate the brain mechanisms underlying their intentions, emotions and decisions. Consequently, the current efforts to incorporate standards of ethics in AI have to be extended to include Neuro-Technology as well. There is no way to reap the potential benefits of Singularity without the adaptation and implementation of strong ethics fostering our human values.

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Google adds Ethics Unit to reach AI Supremacy

20.10.2017

Google has implemented the world's most powerful network of data centres. With its own AI-optimized hardware design, Google currently provides services to 2 billion active Android devices, 1 billion YouTube users watching 1 billion hours of video every day and handling over 1 million search inquiries per second. In a bold move to take leadership in the discussion about ethics, DeepMind, Google's subsidiary, also known for its AlphaGo software that beat the world's best Go player, has announced the formation of a major new AI research unit called 'Deep Mind Ethics and Society (DMES)' comprised of a full-time staff and external advisors.

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Content Personalization vs. Privacy and Trust

08.09.2017

Online content is becoming increasingly personalized. As firms have expanded their data collection efforts to link data across sites, everything from the advertisements a user sees to the top search results on Google has been enhanced for personal relevance. The invasion of AI technology and Neuroscience is crossing the border into our private sphere. 'Smart home' applications based on IoT devices or bidirectional loudspeakers are opening new paths to profile the user including emotion sensing. We all know that it takes years building trust, seconds to break and forever to repair. Trust requires transparency, something the big tech companies only partially provide. Many of us don't trust Google, Facebook, Amazon and Co. but we like the convenience their products are providing.

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AI and Big Data: What about Privacy Protection?

21.04.2017

Imagine a world where an authoritarian government monitors everything you do, collects huge amounts of data on almost every interaction you make, and provides you with a score that measures how "trustworthy" you are. Contrary to the concept of a totalitarian society, the individual, his personal welfare and rights and responsibility within society represent what we consider democratic values. These values are threatened to be undermined by companies monopolizing internet usage for monetary reasons. To manage the rising complexity of our internet footprint opens a business proposition for a Trusted-Data-Service-Provider offering individuals a range of privacy protection.

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AI and Neuroscience on the Crossroad to Ethics

07.04.2017

Whereas developments in technology have been largely driven by economics and market demand governed by regulations concerning product safety and environmental issues, developments in medical science and artificial intelligence (AI) must also consider ethical standards. As AI invades our personal integrity be it through behavioral data collected via internet transactions or be it through brain computer interfaces (BCIs) we have reached a crossroad in ethics both on a technological as well as a medical and neuroscientific track. BCI based 'Brain Doping' represents a new dimension of human performance enhancement that goes way beyond our legal framework of applying drugs or psychotherapy to fight performance problems.

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Should we trust Artificial Intelligent Machines (AIMs)?

10.03.2017

Trust is a vital element of corporate culture and leaders understand its importance. In its 2016 global CEO survey, PwC (PricewaterhouseCoopers) reported that 55% of CEOs think that a lack of trust is a threat to their organization's growth. Companies engaged in business-to-business activities like IBM promoting the application of AIM services in the health sector for example, need to incorporate the trust factor into their products in order to expand their business. Consequently, it is the quality of the product that will answer the question if AIMs can be trusted.

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Ethics and Artificial Intelligence

16.12.2016

Ethics or moral philosophy is a branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong conduct. In practice, ethics seeks to resolve questions of human morality, by defining concepts such as good and evil, right and wrong, virtue and vice, justice and crime. The possibility of creating thinking machines raises a host of ethical issues. These questions relate both to ensuring that such machines do not harm humans and other morally relevant beings. As humans are applying ethical standards to their decision-making processes it seems reasonable to implement a set of equivalent ethical ground rules or algorithms within the software of Artificial Intelligent Machines (AIMs).

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