

Most people are not very familiar with the concept of artificial intelligence (AI). As an illustration, when 1,500 senior business leaders in the United States in 2017 were asked about AI, only 17 percent said they were familiar with it.¹ A number of them were not sure what it was or how it would affect their particular companies. They understood there was considerable potential for altering business processes, but were not clear how AI could be deployed within their own organizations.

Despite its widespread lack of familiarity, AI is a technology that is transforming every walk of life. It is a wide-ranging tool that enables people to rethink how we integrate information, analyze data, and use the resulting insights to improve decisionmaking. Our hope through this comprehensive overview is to explain AI to an audience of policymakers, opinion leaders, and interested observers, and demonstrate how AI already is altering the world and raising important questions for society, the economy, and governance.

In this paper, we discuss novel applications in finance, national security, health care, criminal justice, transportation, and smart cities, and address issues such as data access problems, algorithmic bias, AI ethics and transparency, and legal liability for AI decisions. We contrast the regulatory approaches of the U.S. and European Union, and close by making a number of recommendations for getting the most out of AI while still protecting important human values.²

In order to maximize AI benefits, we recommend nine steps for going forward:

- Encourage greater data access for researchers without compromising users' personal privacy,
- invest more government funding in unclassified AI research,
- promote new models of digital education and AI workforce development so employees have the skills needed in the 21st-century economy,
- create a federal AI advisory committee to make policy recommendations,
- engage with state and local officials so they enact effective policies,
- regulate broad AI principles rather than specific algorithms,
- take bias complaints seriously so AI does not replicate historic injustice, unfairness, or discrimination in data or algorithms,
- maintain mechanisms for human oversight and control, and
- penalize malicious AI behavior and promote cybersecurity.

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Chapter I

Qualities of artificial intelligence

Although there is no uniformly agreed upon definition, AI generally is thought to refer to “machines that respond to stimulation consistent with traditional responses from humans, given the human capacity for contemplation, judgment and intention.”³ According to researchers Shubhendu and Vijay, these software systems “make decisions which normally require [a] human level of expertise” and help people

anticipate problems or deal with issues as they come up.⁴ As such, they operate in an intentional, intelligent, and adaptive manner.

Intentionality

Artificial intelligence algorithms are designed to make decisions, often using real-time data. They are unlike passive machines that are capable only of mechanical or predetermined responses. Using sensors, digital data, or remote inputs, they combine information from a variety of different sources, analyze the material instantly, and act on the insights derived from those data. With massive improvements in storage systems, processing speeds, and analytic techniques, they are capable of tremendous sophistication in analysis and decisionmaking.

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Intelligence

AI generally is undertaken in conjunction with machine learning and data analytics.⁵ Machine learning takes data and looks for underlying trends. If it spots something that is relevant for a practical problem, software designers can take that knowledge and use it to analyze specific issues. All that is required are data that are sufficiently robust that algorithms can discern useful patterns. Data can come in the form of digital information, satellite imagery, visual information, text, or unstructured data.

Adaptability

AI systems have the ability to learn and adapt as they make decisions. In the transportation area, for example, semi-autonomous vehicles have tools that let drivers and vehicles know about upcoming congestion, potholes, highway construction, or other possible traffic impediments. Vehicles can take advantage of the experience of other vehicles on the road, without human involvement, and the entire corpus of their achieved “experience” is immediately and fully transferable to other similarly configured vehicles. Their advanced algorithms, sensors, and cameras incorporate experience in current operations, and use dashboards and visual displays to present information in real time so human drivers are able to make sense of ongoing traffic and vehicular conditions. And in the case of fully autonomous vehicles, advanced systems can completely control the car or truck, and make all the navigational decisions.

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