How Artificial Intelligence (AI) Is Influencing Us and Our World

Mathematicians and computer scientists have developed and studied Artificial Intelligence (AI) for many decades. In 1950 Alan Turing, considered one of the fathers of computer science, proposed the "imitation game" (now called the Turing Test) to assess a computer's ability to interact in a fashion indistinguishable from a human. We discuss how AI systems work (without formulae or buzzwords), what we might expect in the coming decade, and how AI systems are playing an increasingly central role in culture and society.

Charlie Catlett is a computer scientist who has focused his research for nearly 40 years in the development of the Internet and WorldWideWeb, computer security, and high-performance computing, holding scientific leadership positions at multiple universities and national laboratories. During the past decade his research has focused on the use of computational modeling and artificial intelligence (AI) embedded with sensors to create new classes of environmental measurements and urban planning capabilities. Recently he has also used AI-based data analysis to assess community vulnerability to factors ranging from communicable disease to impacts of climate change, such as flooding and extreme temperatures. He has received numerous awards for his research and leadership, including being named to Crain's "Tech 50" leaders in Chicago in 2014, GovTech magazine's national "25 Doers, Dreamers & Drivers" of 2016, and as a Distinguished Performer in 2019 by the Board of Trustees of Argonne National Laboratory and the University of Chicago. Charlie is a Computer Engineering graduate of the University of Illinois at Urbana-Champaign.

1   Artificial Intelligence (AI) from 1950 to Today.

An overview of the origins of the concept of "artificial intelligence" (AI) as a field of information science, how that field relates to other concepts in information and computer science, and what is behind the seemingly meteoric rise of AI in the past several years. *History and Seminal Contributions: Alan M. Turing and "The Imitation Game"—Artificial General Intelligence (AGI) and Current Issues.*

2   Building Blocks of AI/ML.

Numerical algorithms lie at the heart of computer applications—from solving scientific challenges to gaining insight from analyzing enormous volumes of data. We illustrate the concept of machine learning and its implementation in artificial neural networks. *Linear Algebra and Basics of Machine Learning – Artificial Neural Networks and Training—Types of Neural Networks as "Building Blocks" to AI Models.*

3   Opportunities and Challenges

Machine Learning algorithms have had profound impact on society in the past decade, particularly as implemented with social networks and entertainment applications. More recently, Large Language Models (LLMs) are now being combined with other applications to create an entirely new markets for AI and deeper impact on our lives and jobs—with both exciting and intimidating possibilities. What is behind the apparent acceleration of AI progress in the past 18-24 months and is this level of disruption the new normal? How can we influence the trajectory? *Simple Machine Learning Algorithms and Their Role in Society During the Past Decade—New, Emergent capabilities with Large Language Models (LLMs)—Some Promising Developments: Safety Models and Ethics.*

4   Recommended Reading:

The Computer That Will Change Everything.
Tal Rosnberg, "The Computer that Will Change Everything," Chicago Magazine, January 31, 2023.
Available at https://www.chicagomag.com/chicago-magazine/february-2023/the-computer-that-will-change-everything/

DeepMind's CEO Helped Take AI Mainstream. Now He's Urging Caution.
Perrigo, Billy. "DeepMind's CEO Helped Take AI Mainstream. Now He's Urging Caution." TIME Magazine, January 12. 2023. Available at: https://time.com/6246119/demis-hassabis-deepmind-interview/

AI Experts are Increasingly Afraid of What They're Creating.
Piper, Kelsey. AI experts are increasingly afraid of what they're creating. Vox. Nov. 28, 2022.Available at: https://www.vox.com/the-highlight/23447596/artificial-intelligence-agi-openai-gpt3-existential-risk-human-extinction

Trending Now: How Netflix Chills our Free Will.
Schaffner, Brennan, Stefanescu, Antonia, Campli, Olivia, and Chetty, Marshini. Don't Let Netflix Drive the Bus: User's Sense of Agency Over Time and Content Choice on Netflix, CSCW 2023.
Available at: https://cs.uchicago.edu/news/trending-now-how-netflix-chills-our-free-will/

Going Much Deeper: Stanford's Artificial Intelligence Index Report 2023
Nestor Maslej, Loredana Fattorini, Erik Brynjolfsson, John Etchemendy, Katrina Ligett, Terah Lyons, James Manyika, Helen Ngo, Juan Carlos Niebles, Vanessa Parli, Yoav Shoham, Russell Wald, Jack Clark, and Raymond Perrault, "The AI Index 2023 Annual Report," AI Index Steering Committee, Institute for Human-Centered AI, Stanford University, Stanford, CA, April 2023. Available at: https://aiindex.stanford.edu/report/

Complete Bibliography