May 2020

SELECTED ONLINE READING AND LIBRARY INFORMATION SOURCES ON

APPLICATIONS OF ARTIFICIAL INTELLIGENCE

SELECTED ONLINE READING

E-BOOKS

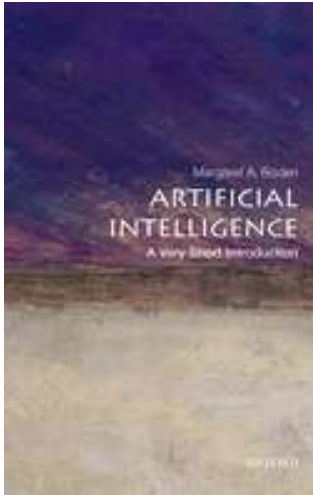E-BOOK CHAPTERS

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> Selected Online Reading on Artificial Intelligence and Ethics

> Selected Online Reading on Artificial Intelligence and Law

E-BOOKS

## *GENERAL APPLICATIONS*

[Artificial intelligence: a very short introduction](#); Margaret A. Boden; Oxford University Press; 2018

Publ**isher's note:** *The applications of Artificial Intelligence lie all around us and affect all aspects of our lives. The results of Artificial Intelligence have been invaluable to biologists, psychologists, and linguists in helping to understand the processes of memory, learning, and language from a fresh angle. As a concept, Artificial Intelligence has fuelled and sharpened the philosophical debates concerning the nature of the mind, intelligence, and the uniqueness of human beings. Artificial Intelligence: A Very Short Introduction considers the history of Artificial Intelligence, its successes, its limitations, and its future goals. It also reviews the philosophical and technological challenges raised by Artificial Intelligence, considering whether programs could ever be really intelligent, creative, or even conscious.*
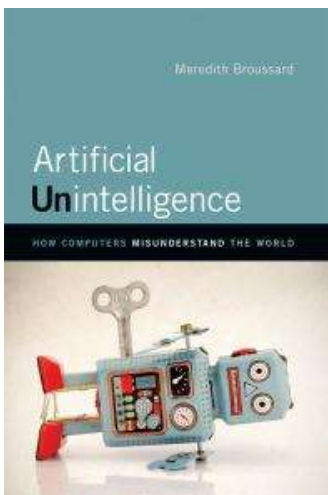
[Artificial Unintelligence](#); Meredith Broussard; The MIT Press; 2018 (ISBN (imprimé) 9780262038003 | ISBN (numérique) 9780262346733)

Publisher's note: *A guide to understanding the inner workings and outer limits of technology and why we should never assume that computers always get it right. In Artificial Unintelligence, Meredith Broussard argues that our collective enthusiasm for applying computer technology to every aspect of life has resulted in a tremendous amount of poorly designed systems. We are so eager to do everything digitally--hiring, driving, paying bills, even choosing romantic partners--that we have stopped demanding that our technology actually work. Broussard, a software developer and journalist, reminds us that there are fundamental limits to what we can (and should) do with technology. With this book, she offers a guide to understanding the inner workings and outer limits of technology--and issues a warning that we should never assume that computers always get things right. Making a case against technochauvinism--the belief that technology is always the solution--Broussard argues that it's just not true that social problems would inevitably retreat before a digitally enabled Utopia. To prove her point, she undertakes a series of adventures in computer programming. She goes for an alarming ride in a driverless car, concluding "the cyborg future is not coming any time soon"; uses artificial intelligence to investigate why students can't pass standardized tests; deploys machine learning to predict which passengers survived the Titanic disaster; and attempts to repair the U.S. campaign finance system by building AI software. If we understand the limits of what we can do with technology, Broussard tells us, we can make better choices about what we should do with it to make the world better for everyone.*
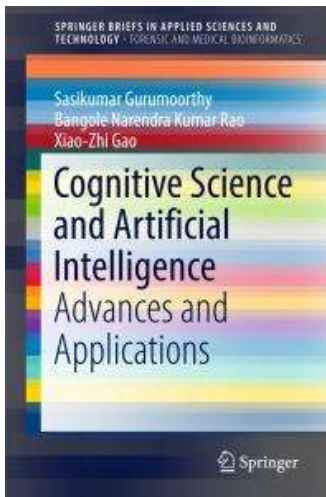
[Cognitive Science and Artificial Intelligence](); Sasikumar Gurumoorthy, Bangole Narendra Kumar Rao, Xiao-Zhi Gao; Springer; 2018

Publisher's note: *This book presents interdisciplinary research on cognition, mind and behavior from an information processing perspective. It includes chapters on Artificial Intelligence, Decision Support Systems, Machine Learning, Data Mining and Support Vector Machines, chiefly with regard to the data obtained and analyzed in Medical Informatics, Bioinformatics and related disciplines. The book reflects the state-of-the-art in Artificial Intelligence and Cognitive Science, and covers theory, algorithms, numerical simulation, error and uncertainty analysis, as well novel applications of new processing techniques in Biomedical Informatics, Computer Science and its applied areas. As such, it offers a valuable resource for students and researchers from the fields of Computer Science and Engineering in Medicine and Biology.*

[Donner un sens à l'intelligence artificielle](); Cédric Villani, et.al.; Mission **Villani sur l'intelligence artificielle; 2018**

Citation tirée de l'introduction : *L'intelligence artificielle est entrée, depuis quelques années, dans une nouvelle ère, qui donne lieu à de nombreux espoirs. C'est en particulier dû à l'essor de l'apprentissage automatique. Rendues possibles par des algorithmes nouveaux, par la multiplication des jeux de données et le décuplement des puissances.*
L'intelligence artificielle est entrée, depuis quelques années, dans une nouvelle ère, qui donne lieu à de nombreux espoirs de calcul, les applications se multiplient : traduction, voiture autonome, détection de cancer,… Le développement de l'IA se fait dans un contexte technologique marqué par la « mise en données » du monde (datafication), qui touche l'ensemble des domaines et des secteurs, la robotique, la blockchain1, le supercalcul et le stockage massif. Au contact de ces différentes réalités technologiques se jouera sûrement le devenir de l'intelligence artificielle.

AI IN ECONOMY
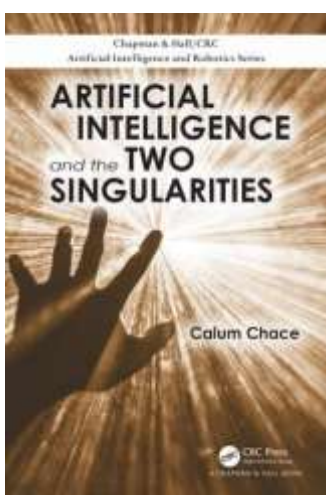
[Artificial Intelligence and the Two Singularities](); Calum Chace; Chapman & Hall; 2018

Publishe**r's note:** *The science of AI was born a little over 60 years ago, but for most of that time, its achievements were modest. In 2012, it experienced a big bang, when a branch of statistics called Machine Learning (and a sub-branch called Deep Learning) was applied to it. Now machines have surpassed humans in image recognition, and they are catching up with us at speech recognition and natural language processing. Every day, the media reports the launch of a new service, a new product, and a new demonstration powered by AI. When will it end? The surprising truth is, the AI revolution has only just begun.*
Artificial Intelligence and the Two Singularities argues that in the course of this century, the exponential growth in the capability of AI is likely to bring about two "singularities" - points at which conditions are so extreme that the normal rules break down. The first is the economic singularity, when machine skill reaches a level that renders many of us unemployable and requires an overhaul of our current economic and social systems. The second is the technological singularity, when machine intelligence reaches and then surpasses the cognitive abilities of an adult human, relegating us to the second smartest species on the planet.
These singularities will present huge challenges, but this book argues that we can meet these challenges and overcome them. If we do, the rewards could be almost unimaginable.
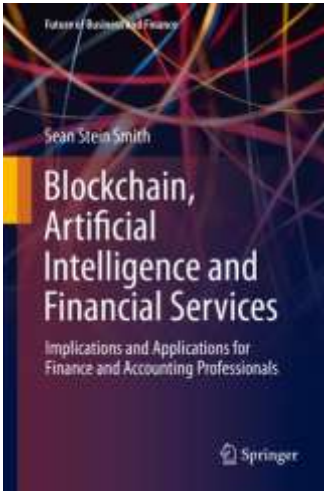
[Blockchain, Artificial Intelligence and Financial Services](); Sean Stein Smith; Springer; 2020 (Print ISBN 978-3-030-29760-2 | Online ISBN 978-3-030-29761-9)

Publisher's note: *Blockchain technology and artificial intelligence (AI) have the potential to transform how the accounting and financial services industries engage with the business, stakeholder and consumer communities. Presenting a blend of technical analysis with current and future applications, this book provides professionals with an action plan to embrace and move forward with these new technologies in financial and accounting organizations. It is written in a conversational style that is unbiased and objective, replacing jargon and technical details with real world case examples.*
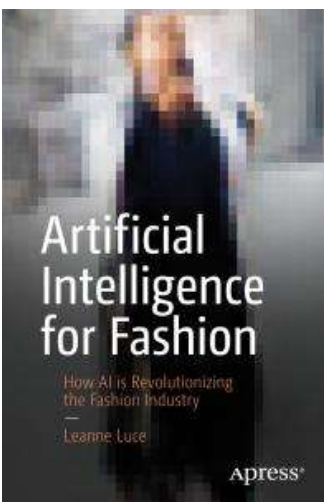
[Artificial Intelligence for Fashion](); Leanne Luce; Apress L. P.; 2018 (ISBN (imprimé) 9781484239308 | ISBN (numérique) 9781484239315)
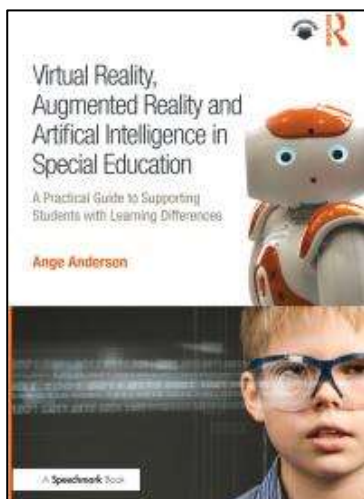
Publisher's note: *Learn how Artificial Intelligence (AI) is being applied in the fashion industry. With an application-focused approach, this book provides real-world examples, breaks down technical jargon for non-technical readers, and provides an educational resource for fashion professionals. The book investigates the ways in which AI is impacting every part of the fashion value chain starting with product discovery and working backwards to manufacturing. Artificial Intelligence for Fashion walks you through concepts, such as connected retail, data mining, and artificially intelligent robotics. Each chapter contains an example of how AI is being applied in the fashion industry illustrated by one major technological theme. There are no equations, algorithms, or code. The technological explanations are cumulative so you will discover more information about the inner workings of artificial intelligence in practical stages as the book progresses. What You'll Learn: Gain a basic understanding of AI and how it is used in fashion; understand key terminology and concepts in AI; review the new competitive landscape of the fashion industry; conceptualize and develop new ways to apply AI within the workplace. Who This Book Is For: Fashion industry professionals from designers, managers, department heads, and executives can use this book to learn about how AI is impacting roles in every department and profession.*
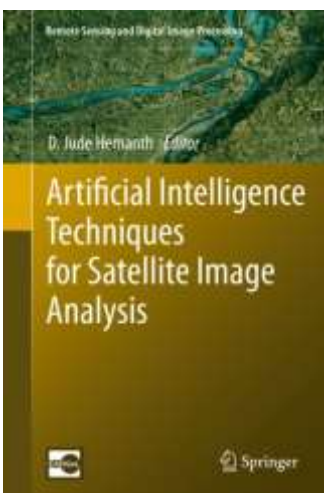
[Artificial Intelligence Techniques for Satellite Image Analysis](); D. Jude **Hemanth, Anna Jarocińska, Freek D. van der Meer; Springer; 2020** (Print ISBN 978-3-030-24177-3 | Online ISBN 978-3-030-24178-0)

Publisher's note: *The main objective of this book is to provide a common platform for diverse concepts in satellite image processing. In particular, it presents the state-of-the-art in Artificial Intelligence (AI) methodologies and shares findings that can be translated into real-time applications to benefit humankind. Interdisciplinary in its scope, the book will be of interest to both newcomers and experienced scientists working in the fields of satellite image processing, geo-engineering, remote sensing and Artificial Intelligence. It can be also used as a supplementary textbook for graduate students in various engineering branches related to image processing.*

[Virtual Reality, Augmented Reality and Artificial Intelligence in Special Education](#); Ange Anderson; Routledge; 2019 (ISBN (imprimé) 9780367024536 | ISBN (numérique) 9780429679742)

Publisher's note: *New technologies and ongoing developments in the fields of Virtual reality, augmented reality and artificial intelligence are changing the ways in which we facilitate learning. Recognising the positive role these technologies can play in the learning and progress of students assessed as having special educational needs, this practical guide explains the characteristics, benefits, risks and potential applications of new technologies in the classroom. An innovative and timely resource, Virtual Reality, Augmented Reality and Artificial Intelligence in Special Education offers a background in the evidence-based theory and practice of using new technologies in an educational context. Accessible and free of complex jargon, chapters provide information on the development, intended uses and most current terminology used in relation to technologies, and explains how modern equipment, approaches and possibilities can be used to promote improved communication skills, independent learning and heightened self-esteem amongst students diagnosed with SEND. Offering a wealth of practical tips, downloadable resources and ideas for engaging with technology in the classroom, the text will support teachers to ensure that students can benefit from exciting technological advances and learn to use them appropriately. Demystifying a complex and varied field, this practical resource will inspire and inform teachers, SENCOs and practitioners working with children and students with SEND as they harness the use of technology in the classroom.*

[Regulating disinformation with artificial intelligence](#); Chris Marsden, Trisha Meyer; European Parliament; 2019 (978-92-846-3947-2)

Publisher's note: *This study examines the consequences of the increasingly prevalent use of artificial intelligence (AI) disinformation initiatives upon freedom of expression, pluralism and the functioning of a democratic polity. The study examines the trade-offs in using automated technology to limit the spread of disinformation online. It presents options (from self-regulatory to legislative) to regulate automated content recognition (ACR) technologies in this context. Special attention is paid to the opportunities for the European Union as a whole to take the lead in setting the framework for designing these technologies in a way that enhances accountability and transparency and respects free speech. The present project reviews some of the key academic and policy ideas on technology and disinformation and highlights their relevance to European policy.*
Chapter 1 introduces the background to the study and presents the definitions used. Chapter 2 scopes the policy boundaries of disinformation from economic, societal and technological perspectives, focusing on the media context, behavioural economics and technological regulation. Chapter 3 maps and evaluates existing regulatory and technological responses to disinformation. In Chapter 4, policy options are presented, paying particular attention to interactions between technological solutions, freedom of expression and media pluralism.
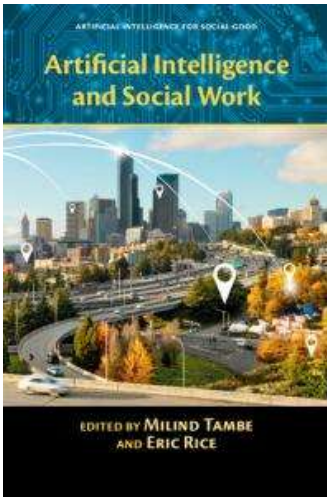
[Artificial Intelligence and Social Work](#); Milind Tambe, Eric Rice; Cambridge University Press; 2018

Publisher's note: *This book marries social work and artificial intelligence to provide an introductory guide for using AI for social good. Following an introductory chapter laying out approaches and ethical principles of using AI for social work interventions, the book describes in detail an intervention to increase the spread of HIV information by using algorithms to determine the key individuals in a social network of homeless youth. Other chapters present interdisciplinary collaborations between AI and social work students, including a chatbot for sexual health information and algorithms to determine who is at higher stress among persons with Type 2 Diabetes. For students, academic researchers, industry leaders, and practitioners, these real-life examples from the USC Center for Artificial Intelligence in Society demonstrate how social work and artificial intelligence can be used in tandem for the greater good.*

E-BOOK CHAPTERS

GENERAL APPLICATION OF AI

[Digitale Intelligenz: KI](#); Bernd Vowinkel; in: [Digitalzeitalter - Digitalgesellschaft Das Ende des Industriezeitalters und der Beginn einer neuen Epoche](#); Oliver Stengel, Alexander van Looy, Stephan Wallaschkowski (eds.); Springer VS; 2017; pp. 89-108

Zusammenfassung: *Wie in Kapitel 2.3 erwähnt, verließ sich die Menschheit seit dem Entwicklungsstadium der Agrargesellschaften vor allem auf die Intelligenz von Männern. Frauen waren von formalen Bildungsmaßnahmen bis ins 20. Jahrhundert hinein weitgehend ausgeschlossen. In der zweiten Hälfte des 20. Jahrhunderts begann jedoch der Anteil an Schülerinnen und Studentinnen weltweit zuzunehmen. In allen gesellschaftlichen Bereichen sind Frauen seitdem auf dem Vormarsch und die Menschheit wird durch ihre Beiträge bereichert.*

AI IN FINANCE
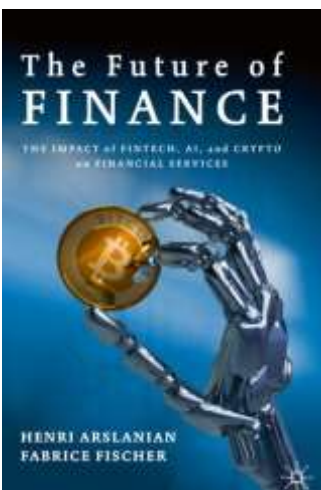
The Fundamentals of Artificial Intelligence. ([Understanding Artificial Intelligence and Its Capabilities](#); and [Applications of Artificial Intelligence in Financial Services](#)); in: [The Future of Finance](#); Henri Arslanian, Fabrice Fischer; Palgrave Macmillan; 2019; pp. 165-197

Publisher's note: *In the following chapters, we will seek to understand the nature and workings of artificial intelligence, the actors driving its development, the inputs necessary to the successful deployment of artificial intelligence, and the implications of all these things for the financial services ecosystem. In this chapter, we will seek to answer the surprisingly tricky question of how to define artificial intelligence before conducting a high-level exploration of both the analytical techniques used to enable AI and the specific capabilities that those techniques enable. Then, in Chap. 15, we will consider the ways that financial institutions today are deploying AI across several subsectors of the industry, as well as some of the most significant impediments that exist for the success of these deployments.*

AI IN DEFENCE
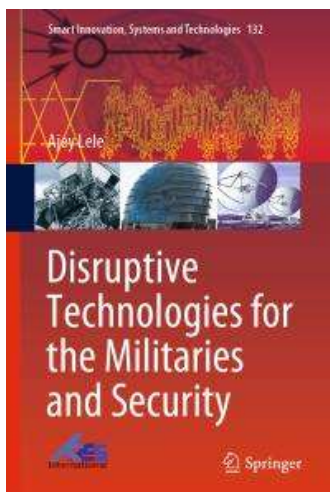
Artificial Intelligence (AI); in: Disruptive Technologies for the Militaries and Security; Ajey Lele, Robert James Howlett, Lakhmi C. Jain; Springer; 2019; pp. 139–154

Publisher's note: *This book debates and discusses the present and future of Disruptive Technologies in general and military Disruptive Technologies in particular. Its primary goal is to discuss various critical and advanced elucidations on strategic technologies. The focus is less on extrapolating the future of technology in a strict sense, and more on understanding the Disruptive Technology paradigm. It is widely accepted that technology alone cannot win any military campaign or war. However, technological superiority always offers militaries an advantage. More importantly, technology also has a great deterrent value. Hence, on occasion, technology can help to avoid wars. Accordingly, it is important to effectively manage new technologies by identifying their strategic utility and role in existing military architectures and the possible contributions they could make towards improving overall military capabilities. This can also entail doctrinal changes, so as to translate these new technologies into concrete advantages.*

AI IN HEALTHCARE

Application of Artificial Intelligence in Healthcare; in: Healthcare 4.0; Janya Chanchaichujit, Albert Tan, Fanwen Meng, Sarayoot Eaimkhong; Palgrave Pivot; 2019; pp. 63-93

Publisher's note: *This chapter presents the role and significance of Artificial Intelligence, commonly known as AI, in the control and management of Tuberculosis (TB). The complexity of the disease and problems in TB diagnosis are introduced. Following this, initiatives and opportunities for using AI in TB diagnosis in Thailand are shown as a case study. The chapter concludes by discussing the current limitations of AI improvement, alternative models and key success factors in the implementation of AI in TB.*

AI IN AGRICULTURE
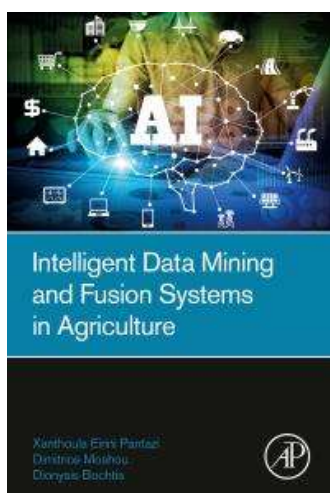
Artificial intelligence in agriculture; in: Intelligent Data Mining and Fusion Systems in Agriculture; Xanthoula-Eirini Pantazi, Dimitrios Moshou, Dionysis Bochtis; Academic Press; 2020; pp. 17–102

Publisher's note: *Intelligent Data Mining and Fusion Systems in Agriculture presents methods of computational intelligence and data fusion that have applications in agriculture for the non-destructive testing of agricultural products and crop condition monitoring. Sections cover the combination of sensors with artificial intelligence architectures in precision agriculture, including algorithms, bio-inspired hierarchical neural maps, and novelty detection algorithms capable of detecting sudden changes in different conditions. This book offers advanced students and entry-level professionals in agricultural science and engineering, geography and geoinformation science an in-depth overview of the connection between decision-making in agricultural operations and the decision support features offered by advanced computational intelligence algorithms. Covers crop protection, automation in*

agriculture, artificial intelligence in agriculture, sensing and Internet of Things (IoTs) in agriculture Addresses AI use in weed management, disease detection, yield prediction and crop production Utilizes case studies to provide real-world insights and direction

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E-ARTICLES

AI IN ECONOMY

> Wie künstliche Intelligenz die Ordnung der Wirtschaft revolutioniert; Henning Vopel; Wirtschaftsdienst; 2018-11-01; Vol. 98 (11); pp. 828-830
Auszug aus dem Artikel: *Seit jeher ist es ein Menschheitstraum gewesen, die natürlichen Grenzen des Menschen zu überwinden, einen Deus ex Machina zu erschaffen. Die Fantasien künstlicher Intelligenz (KI) finden in der Kulturgeschichte sehr unterschiedliche Ausprägungen und Darstellungen. Sie reichen von Utopien des materiellen Reichtums und ewigen Lebens bis hin zu Dystopien der Unterjochung des Menschen durch übernatürliche und in diesem Sinne künstliche Intelligenz.*

> How artificial intelligence will change the future of marketing; Thomas Davenport, Abhijit Guha, Dhruv Grewal, Timna Bressgott; Journal of the Academy of Marketing Science; 2020-01; Vol. 48 (1); pp. 24-42
Abstract from authors: *In the future, artificial intelligence (AI) is likely to substantially change both marketing strategies and customer behaviors. Building from not only extant research but also extensive interactions with practice, the authors propose a multidimensional framework for understanding the impact of AI involving intelligence levels, task types, and whether AI is embedded in a robot. Prior research typically addresses a subset of these dimensions; this paper integrates all three into a single framework. Next, the authors propose a research agenda that addresses not only how marketing strategies and customer behaviors will change in the future, but also highlights important policy questions relating to privacy, bias and ethics. Finally, the authors suggest AI will be more effective if it augments (rather than replaces) human managers.*

> Artificial Intelligence in Service; Ming-Hui Huang, Roland T. Rust; Journal of Service Research; 2018-05; Vol. 21 (2); pp. 155-172
Abstract from authors: *Artificial intelligence (AI) is increasingly reshaping service by performing various tasks, constituting a major source of innovation, yet threatening human jobs. We develop a theory of AI job replacement to address this double-edged impact. The theory specifies four intelligences required for service tasks—mechanical, analytical, intuitive, and empathetic—and lays out the way firms should decide between humans and machines for accomplishing those tasks. AI is developing in a predictable order, with mechanical mostly preceding analytical, analytical mostly preceding intuitive, and intuitive mostly preceding empathetic intelligence. The theory asserts that AI job replacement* **occurs fundamentally at the task level, rather than the job level, and for "lower" (easier for AI) intelligence tasks first. AI first replaces some of a service job's tasks, a transition stage seen as augmentation, and then progresses to replace human labor entirely when it has the ability to take over**

all of a job's tasks. The progression of AI task replacement from lower to higher intelligences results in predictable shifts over time in the relative importance of the intelligences for service employees. An important implication from our theory is that analytical skills will become less important, as AI takes over more analytical tasks, giving the "softer" intuitive and empathetic skills even more importance for service employees. Eventually, AI will be capable of performing even the intuitive and empathetic tasks, which enables innovative ways of human–machine integration for providing service but also results in a fundamental threat for human employment.

> [Artificial Intelligence : Investment Trends and Selected Industry Uses](#); Xiaomin Mou; EMCompass, no. 71; International Finance Corporation; 2019

Abstract from author: *The global race to fund, develop, and acquire artificial intelligence (AI) technologies and start-ups is intensifying, with commercial uses for AI proliferating in advanced and emerging economies alike. AI can increase gross domestic product (GDP) growth in both advanced countries and emerging markets. In energy, AI can optimize power transmission. In healthcare, diagnosis and drug discovery will benefit enormously from AI. In education it can improve learning environments and learning outcomes and can better prepare youth for transition to the workplace. In manufacturing, AI can help design better products in terms of functionality, quality, and cost, and improve predictive maintenance. AI can help extend credit and financial services to those who lack them. The potential impact of AI on transportation and logistics goes far beyond automation and road safety to span the entire logistics chain. Yet with the exceptions of China and India, emerging markets have received only a modest share of global investment in this advanced technology, despite the fact that they may benefit more from AI implementation than advanced economies.*

> [Artificial Intelligence and 5G Mobile Technology Can Drive Investment Opportunities in Emerging Markets](#); Peter Mockel, Baloko Makala; EMCompass, no. 76; International Finance Corporation, 2019

Abstract from authors: *The intersection of artificial intelligence and 5G mobile technology has enormous potential to deliver dramatic improvements in productivity, efficiency, and cost across business sectors and broader society, delivering innovative products and services not previously possible. Though mainstream applications that combine AI and 5G have yet to emerge, key emerging markets sectors such as agribusiness, healthcare and education will be transformed by the combination of AI and 5G. While many mobile operators remain focused on recouping their investments in previous network standards, there is a growing interest in 5G networks globally.*

> [The Role of Artificial Intelligence in Supporting Development in Emerging Markets](#); Davide Strusani, Georges Vivien Houngbonon; EMCompass, no. 69; International Finance Corporation; 2019

Abstract from authors: *Artificial intelligence (AI) has enormous potential to augment human intelligence and to radically alter how one access products and services, gather information, make products, and interact. In emerging markets, AI offers an opportunity to lower costs and barriers to entry for businesses and deliver innovative business models that can leapfrog traditional solutions and reach the underserved. With technology-based solutions increasingly important to economic development in many nations, the goals of ending poverty and boosting shared prosperity may become dependent on harnessing the power of AI. While emerging markets are already using basic AI technologies to solve critical development challenges, much more can be done, and private sector solutions will be critical to scaling new business models, developing new ways of delivering services, and increasing local markets' competitiveness. All of these solutions require innovative approaches to expand opportunities and mitigate risks associated with this new technology.*

AI IN SCIENCE

> [Data Science and AI-Based Optimization in Scientific Programming](#); Ricardo Soto, Juan Gómez-Pulido, Stéphane Caro, José Lanza-Gutiérrez; Hindawi; Scientific Programming; 2019-01-09, Vol. 2019; pp.1-3

Excerpt from article: *This special issue gives the opportunity to know recent advances in the application of intelligent techniques to data-**based optimization problems in scientific programming. Artificial intelligence is today supported for different powerful data science and optimization techniques. For instance, data science commonly relies on AI algorithms to efficiently** solve classification, regression, and clustering problems. This fact is particularly interesting nowadays, whenbigdataareagathersstrengthsupplyinghugeamounts of data from many heterogeneous sources. On the other hand, complex optimization problems that cannot be tackled via traditional mathematical programming techniques are commonly solved with AI-based optimization approaches such as the metaheuristics. These approaches provide optimal solutions avoiding consumption of many computational resources.*

> [Better medicine through machine learning: What's real, and what's artificial?](); Suchi Saria, Atul Butte, Aziz Sheikh; PLoS medicine; 2018-12, Vol. 15 (12); pp. 1-5
> Excerpt from article: *Although progress in AI has been uneven, significant advances in the present decade have led to a proliferation of technologies that substantially impact our everyday lives: computer vision and planning are driving the gaming and transportation industries; speech processing is making conversational applications practical on our phones; and natural language processing, knowledge representation, and reasoning have enabled a machine to beat the Jeopardy and Go champions and are bringing new power to web searches.*
> *Simultaneously, however, advertising hyperbole has led to skepticism and misunderstanding of what is and is not possible with ML. Here, we aim to provide an accessible, scientifically and technologically accurate portrayal of the current state of ML (often referred to as AI in medical literature) in health and medicine and its potential, using examples of recent research—some from PLOS Medicine's November 2018 Special Issue on Machine Learning in Health and Biomedicine, for which we served as guest editors. We have selected studies that illustrate different ways in which ML may be used and their potential for near-term translational impact.*

> [Beyond the hype of big data and artificial intelligence: building foundations for knowledge and wisdom](); J. Car, A. Sheikh, P. Wicks, M.S. Williams; BMC MEDICINE; 2019-07-17; Vol. 17 (1); pp. 143-145
> Abstract from authors: *Big data, coupled with the use of advanced analytical approaches, such as artificial intelligence (AI), have the potential to improve medical outcomes and population health. Data that are routinely generated from, for example, electronic medical records and smart devices have become progressively easier and cheaper to collect, process, and analyze. In recent decades, this has prompted a substantial increase in biomedical research efforts outside traditional clinical trial settings. Despite the apparent enthusiasm of researchers, funders, and the media, evidence is scarce for successful implementation of products, algorithms, and services arising that make a real difference to **clinical care. This article collection provides concrete examples of how "big data" can be used to** advance healthcare and discusses some of the limitations and challenges encountered with this type of research. It primarily focuses on real-world data, such as electronic medical records and genomic medicine, considers new developments in AI and digital health, and discusses ethical considerations and issues related to data sharing. Overall, we remain positive that big data studies and associated new technologies will continue to guide novel, exciting research that will ultimately improve healthcare and medicine—but we are also realistic that concerns remain about privacy, equity, security, and benefit to all.*

> [Emerging trends in geospatial artificial intelligence (geoAI): Potential applications for environmental epidemiology](); Trang Vopham, Jaime E. Hart, Francine Laden, Yao-Yi Chiang; Environmental Health: A Global Access Science Source; 2018-04-17; Vol. 17 (1); pp. 40-46
> Abstract from authors: *Geospatial artificial intelligence (geoAI) is an emerging scientific discipline that combines innovations in spatial science, artificial intelligence methods in machine learning (e.g., deep learning), data mining, and high-performance computing to extract knowledge from spatial big data. In environmental epidemiology, exposure modeling is a commonly used approach to conduct exposure assessment to determine the distribution of exposures in study populations. geoAI*

technologies provide important advantages for exposure modeling in environmental epidemiology, including the ability to incorporate large amounts of big spatial and temporal data in a variety of formats; computational efficiency; flexibility in algorithms and workflows to accommodate relevant characteristics of spatial (environmental) processes including spatial nonstationarity; and scalability to model other environmental exposures across different geographic areas. The objectives of this commentary are to provide an overview of key concepts surrounding the evolving and interdisciplinary field of geoAI including spatial data science, machine learning, deep learning, and data mining; recent geoAI applications in research; and potential future directions for geoAI in environmental epidemiology.

> [Artificial intelligence in drug design](#); Gerhard Hessler, Karl-Heinz Baringhaus; Molecules; 2018-10-02; Vol. 23 (10); p. 2520
Abstract from authors: *Artificial Intelligence (AI) plays a pivotal role in drug discovery. In particular artificial neural networks such as deep neural networks or recurrent networks drive this area. Numerous applications in property or activity predictions like physicochemical and ADMET properties have recently appeared and underpin the strength of this technology in quantitative structure-property relationships (QSPR) or quantitative structure-activity relationships (QSAR). Artificial intelligence in de novo design drives the generation of meaningful new biologically active molecules towards desired properties. Several examples establish the strength of artificial intelligence in this field. Combination with synthesis planning and ease of synthesis is feasible and more and more automated drug discovery by computers is expected in the near future.*

> [Artificial intelligence in clinical health care applications: viewpoint](#); Michael van Hartskamp, Sergio Consoli, Wim Verhaegh, Milan Petkovic, Anja van de Stolpe; Interactive Journal of Medical Research; 2019-04-05; Vol. 8 (2)
Abstract from authors: *The idea of artificial intelligence (AI) has a long history. It turned out, however, that reaching intelligence at human levels is more complicated than originally anticipated. Currently, we are experiencing a renewed interest in AI, fueled by an enormous increase in computing power and an even larger increase in data, in combination with improved AI technologies like deep learning. Healthcare is considered the next domain to be revolutionized by artificial intelligence. While AI approaches are excellently suited to develop certain algorithms, for biomedical applications there are specific challenges. We propose six recommendations—the 6Rs—to improve AI projects in the biomedical space, especially clinical health care, and to facilitate communication between AI scientists and medical doctors: (1) Relevant and well-defined clinical question first; (2) Right data (ie, representative and of good quality); (3) Ratio between number of patients and their variables should fit the AI method; (4) Relationship between data and ground truth should be as direct and causal as possible; (5) Regulatory ready; enabling validation; and (6) Right AI method.*

AI IN INFRASTRUCTURE

> [Artificial Intelligence and the Future for Smart Homes](#); Ommid Saberi, Rebecca Menes; EMCompass, no. 78; International Finance Corporation; 2020
Abstract from authors: *The floor area of the buildings we occupy is expected to double by 2060, with most of this growth occurring in residential construction. And population growth and urbanization in emerging markets will mean expanding cities and rising demand for new housing in urban areas around the world.1 These trends represent an enormous opportunity to design, build, and operate the homes of tomorrow in intelligent ways that minimize energy consumption and carbon emissions, lower building and homeowner costs, and raise home values. Artificial intelligence will play a pivotal role in this effort by using data, including grid data, smart meter data, weather data, and energy use information, to study and improve building performance, optimize resource consumption, and increase comfort and cost efficiency for residents. AI will also analyze data collected from multiple buildings to improve building design and construction and inform future policy making related to construction and urban planning.*

> [How Artificial Intelligence is Making Transport Safer, Cleaner, More Reliable and Efficient in Emerging Markets](#); Maria Lopez Conde, Ian Twinn; EMCompass, no. 75; International Finance Corporation; 2019
Abstract from authors: *Transport in emerging markets often faces acute challenges due to poor infrastructure, growing populations, urbanization, and in some regions rising prosperity, which increases vehicle traffic, cargo volumes, and pollution. Artificial intelligence offers new solutions to these challenges by making market entry easier and allowing countries to reach underserved populations, creating markets and private sector investment opportunities associated with them.*

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