Industrial Artificial Intelligence

#industrial artificial intelligence #AI in manufacturing #industry 4.0 AI #enterprise AI solutions #predictive maintenance AI

Industrial Artificial Intelligence is revolutionizing sectors by optimizing operations, enhancing predictive maintenance, and boosting productivity across manufacturing, logistics, and supply chains. It empowers businesses to transform complex data into actionable insights, driving unprecedented efficiency, innovation, and competitive advantage in the era of Industry 4.0.

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Industrial AI

This book introduces Industrial AI in multiple dimensions. Industrial AI is a systematic discipline which focuses on developing, validating and deploying various machine learning algorithms for industrial applications with sustainable performance. Combined with the state-of-the-art sensing, communication and big data analytics platforms, a systematic Industrial AI methodology will allow integration of physical systems with computational models. The concept of Industrial AI is in infancy stage and may encompass the collective use of technologies such as Internet of Things, Cyber-Physical Systems and Big Data Analytics under the Industry 4.0 initiative where embedded computing devices, smart objects and the physical environment interact with each other to reach intended goals. A broad range of Industries including automotive, aerospace, healthcare, semiconductors, energy, transportation, mining, construction, and industrial automation could harness the power of Industrial AI to gain insights into the invisible relationship of the operation conditions and further use that insight to optimize their uptime, productivity and efficiency of their operations. In terms of predictive maintenance, Industrial AI can detect incipient changes in the system and predict the remains useful life and further to optimize maintenance tasks to avoid disruption to operations.

Industrial Machine Learning

Understand the industrialization of machine learning (ML) and take the first steps toward identifying and generating the transformational disruptors of artificial intelligence (AI). You will learn to apply ML to data lakes in various industries, supplying data professionals with the advanced skills required to handle the future of data engineering and data science. Data lakes currently generated by worldwide industrialized business activities are projected to reach 35 zettabytes (ZB) as the Fourth Industrial Revolution produces an exponential increase of volume, velocity, variety, variability, veracity, visualization, and value. Industrialization of ML evolves from AI and studying pattern recognition against the increasingly unstructured resource stored in data lakes. Industrial Machine Learning supplies advanced, yet practical examples in different industries, including finance, public safety, health care, transportation, manufactory, supply chain, 3D printing, education, research, and data science. The book covers: supervised learning, unsupervised learning, reinforcement learning, evolutionary computing principles, soft robotics disruptors, and hard robotics disruptors. What You Will Learn Generate and identify transformational disruptors of artificial intelligence (AI) Understand the field of machine learning (ML) and apply it to handle big data and process the data lakes in your environment Hone the skills required to handle the future of data engineering and data science Who This Book Is For Intermediate

to expert level professionals in the fields of data science, data engineering, machine learning, and data management

Artificial Intelligence in Mechanical and Industrial Engineering

Artificial Intelligence in Mechanical and Industrial Engineering offers a unified platform for the dissemination of basic and applied knowledge on the integration of artificial intelligence within the realm of mechanical and industrial engineering. The book covers the tools and information needed to build successful careers and a source of knowledge for those working with AI within these domains. The book offers a systematic approach to explicate fundamentals as well as recent advances. It incorporates various case studies for major topics as well as numerous examples. It will also include real-time intelligent automation and associated supporting methodologies and techniques, and cover decision-support systems, as well as applications of Chaos Theory and Fractals. The book will give scientists, researchers, instructors, students, and practitioners the tools and information needed to build successful careers and to be an impetus to advancements in next-generation mechanical and industrial engineering domains.

Industrial Artificial Intelligence Technologies and Applications

The advances in industrial edge artificial intelligence (AI) are transforming the way industrial equipment and machines interact with the real world, with other machines and humans during manufacturing processes. These advances allow Industrial Internet of Things (IIoT) and edge devices to make decisions during the manufacturing processes using sensors and actuators. Digital transformation is reshaping the manufacturing industry, and industrial edge AI aims to combine the potential advantages of edge computing (low latency times, reduced bandwidth, distributed architecture, improved trustworthiness, etc.) with the benefits of AI (intelligent processing, predictive solutions, classification, reasoning, etc.). The industrial environments allow the deployment of highly distributed intelligent industrial applications in remote sites that require reliable connectivity over wireless and cellular connections. Intelligent connectivity combines IIoT, wireless/cellular and AI technologies to support new autonomous industrial applications by enabling AI capabilities at the edge and allowing manufacturing companies to improve operational efficiency and reduce risks and costs for industrial applications. There are several critical issues to consider when introducing AI to industrial IoT applications considering training AI models at the edge, the deployment of the AI-trained inferencing models on the target edge hardware platforms, and the benchmarking of solutions compared to other implementations. Next-generation trustworthy industrial AI systems offer dependability in terms of their design, transparency, explainability, verifiability, and standardised industrial solutions can be implemented in various applications across different industrial sectors. New AI techniques such as embedded machine learning (ML) and deep learning (DL), capture edge data, employ AI models, and deploy these in hardware target edge devices, from ultra-low-power microcontrollers to embedded devices, gateways, and on-premises servers for industrial applications. These techniques reduce latency, increase scalability, reliability, and resilience; and optimise wireless connectivity, greatly expanding the capabilities of the IIoT. This book provides an overview of the latest research results and activities in industrial AI technologies and applications, based on the innovative research, developments and ideas generated by the ECSEL JU AI4DI, ANDANTE and TEMPO projects. The authors describe industrial AI's challenges, the approaches adopted, and the main industrial systems and applications to give the reader extensive insight into the technical nature of this field. The chapters provide insightful material on industrial AI technologies and applications. This book is a valuable resource for researchers, post-graduate students, practitioners, and technoloyg developers interested in gaining insight into industrial edge AI, the IIoT, embedded machine and deep learning, new technologies, and solutions to advance intelligent processing at the edge.

Industrial Artificial Intelligence

What prevents me from making the changes I know will make me a more effective Industrial artificial intelligence leader? For your Industrial artificial intelligence project, identify and describe the business environment. is there more than one layer to the business environment? How to deal with Industrial artificial intelligence Changes? At what point will vulnerability assessments be performed once Industrial artificial intelligence is put into production (e.g., ongoing Risk Management after implementation)? What are the long-term Industrial artificial intelligence goals? Defining, designing, creating, and implementing a process to solve a business challenge or meet a business objective is the most

valuable role... In EVERY company, organization and department. Unless you are talking a one-time, single-use project within a business, there should be a process. Whether that process is managed and implemented by humans, AI, or a combination of the two, it needs to be designed by someone with a complex enough perspective to ask the right questions. Someone capable of asking the right questions and step back and say, 'What are we really trying to accomplish here? And is there a different way to look at it?' This Self-Assessment empowers people to do just that - whether their title is entrepreneur, manager, consultant, (Vice-)President, CxO etc... - they are the people who rule the future. They are the person who asks the right questions to make Industrial artificial intelligence investments work better. This Industrial artificial intelligence All-Inclusive Self-Assessment enables You to be that person. All the tools you need to an in-depth Industrial artificial intelligence Self-Assessment. Featuring 699 new and updated case-based questions, organized into seven core areas of process design, this Self-Assessment will help you identify areas in which Industrial artificial intelligence improvements can be made. In using the questions you will be better able to: - diagnose Industrial artificial intelligence projects, initiatives, organizations, businesses and processes using accepted diagnostic standards and practices - implement evidence-based best practice strategies aligned with overall goals - integrate recent advances in Industrial artificial intelligence and process design strategies into practice according to best practice guidelines Using a Self-Assessment tool known as the Industrial artificial intelligence Scorecard, you will develop a clear picture of which Industrial artificial intelligence areas need attention. Your purchase includes access details to the Industrial artificial intelligence self-assessment dashboard download which gives you your dynamically prioritized projects-ready tool and shows your organization exactly what to do next. Your exclusive instant access details can be found in your book.

International Congress and Workshop on Industrial AI 2021

This proceedings of the International Congress and Workshop on Industrial AI 2021 encompasses and integrates the themes and topics of three conferences, eMaintenance, Condition Monitoring and Diagnostic Engineering management (COMADEM), and Advances in Reliability, Maintainability and Supportability (ARMS) into a single resource. The 21st century is witnessing the emerging extensive applications of Artificial Intelligence (AI) and Information Technologies (IT) in industry. Industrial Artificial Intelligence (IAI) integrates IT with Operational Technologies (OT) and Engineering Technologies (ET) to achieve operational excellence through enhanced analytics in operation and maintenance of industrial assets. This volume provides insight into opportunities and challenges caused by the implementation of AI in industries apart from future developments with special reference to operation and maintenance of industrial assets. Industry practitioners in the maintenance field as well as academics seeking applied research in maintenance will find this text useful.

Artificial Intelligence and Industrial Applications

This book gathers the refereed proceedings of the Artificial Intelligence and Industrial Applications (A2IA'2020), the first installment of an annual international conference organized by the ENSAM-Meknes at Moulay Ismail University, Morocco. The 30 papers presented here were carefully reviewed and selected from 141 submissions by an international scientific committee. They address various aspects of artificial intelligence such as smart manufacturing, smart maintenance, smart supply chain management, supervised learning, unsupervised learning, reinforcement learning, graph-based and semi-supervised learning, neural networks, deep learning, planning and optimization, and other AI applications. The book is intended for AI experts, offering them a valuable overview of the status quo and a global outlook for the future, with many new and innovative ideas and recent important developments in AI applications, both of a foundational and practical nature. It will also appeal to non-experts who are curious about this timely and important subject.

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single-use project within a business, there should be a process. Whether that process is managed and implemented by humans, AI, or a combination of the two, it needs to be designed by someone with a complex enough perspective to ask the right questions. Someone capable of asking the right questions and step back and say, 'What are we really trying to accomplish here? And is there a different way to look at it?' This Self-Assessment empowers people to do just that - whether their title is entrepreneur, manager, consultant, (Vice-)President, CxO etc... - they are the people who rule the future. They are the person who asks the right questions to make Industrial artificial intelligence investments work better. This Industrial artificial intelligence All-Inclusive Self-Assessment enables You to be that person. All the tools you need to an in-depth Industrial artificial intelligence Self-Assessment. Featuring 699 new and updated case-based questions, organized into seven core areas of process design, this Self-Assessment will help you identify areas in which Industrial artificial intelligence improvements can be made. In using the questions you will be better able to: - diagnose Industrial artificial intelligence projects, initiatives, organizations, businesses and processes using accepted diagnostic standards and practices - implement evidence-based best practice strategies aligned with overall goals - integrate recent advances in Industrial artificial intelligence and process design strategies into practice according to best practice guidelines Using a Self-Assessment tool known as the Industrial artificial intelligence Scorecard, you will develop a clear picture of which Industrial artificial intelligence areas need attention. Your purchase includes access details to the Industrial artificial intelligence self-assessment dashboard download which gives you your dynamically prioritized projects-ready tool and shows your organization exactly what to do next. Your exclusive instant access details can be found in your book.

Artificial Intelligence in Industrial Applications

This book highlights the analytics and optimization issues in industry, to propose new approaches, and to present applications of innovative approaches in real facilities. In the past few decades there has been an exponential rise in the application of artificial intelligence for solving complex and intricate problems arising in industrial domain. The versatility of these techniques have made them a favorite among scientists and researchers working in diverse areas. The book is edited to serve a broad readership, including computer scientists, medical professionals, and mathematicians interested in studying computational intelligence and their applications. It will also be helpful for researchers, graduate and undergraduate students with an interest in the fields of Artificial Intelligence and Industrial problems. This book will be a useful resource for researchers, academicians as well as professionals interested in the highly interdisciplinary field of Artificial Intelligence.

Artificial Intelligence and the Fourth Industrial Revolution

This book presents the overall technology spectrum in artificial intelligence (AI) and the Fourth Industrial Revolution, which is set to revolutionize the world. It discusses their various aspects and related case studies from industry, academics, administration, law, finance, and accounting as well as educational technology. The contributors, who are experts in their respective fields and from industry and academia, focus on a gesture-recognition prototype for specially abled people; jurisprudential approach to AI and legal reasoning; automated chatbot for autism spectrum disorder using AI assistance; Big Data analytics and Internet of Things (IoT); role of AI in advancement of drug discovery; development, opportunities, and challenges of the Fourth Industrial Revolution; legal, ethical, and policy implications of AI; Internet of Health Things for smart healthcare and digital wellbeing; machine learning and computer vision; computer vision-based system for automation and industrial applications; AI-IoT in home-based healthcare; and AI in super-precision human brain and spine surgery. Buttressed with comprehensive theoretical, methodological, well-established, and validated empirical examples, the book covers the interests of a broad audience from basic science to engineering and technology experts and learners. It will be greatly helpful for CEOs, entrepreneurs, academic leaders, researchers, and students of engineering, biomedicine, and master’s programs in science as well as the vast workforce and students with technical or non-technical backgrounds. It also serves common public interest by presenting new methods to improve the quality of life in general, with a better integration into society.

Machine Learning and Artificial Intelligence with Industrial Applications

This book presents the tools used in machine learning (ML) and the benefits of using such tools in facilities. It focus on real life business applications, explaining the most popular algorithms easily and clearly without the use of calculus or matrix/vector algebra. Replete with case studies, this book

provides a working knowledge of ML current and future capabilities and the impact it will have on every business. It demonstrates that it is also possible to carry out successful ML and AI projects in any manufacturing plant, even without fully fulfilling the five V (Volume, Velocity, Variety, Veracity and Value) usually associated with big data. This book takes a closer look at how AI and ML are also able to work for industrial area, as well as how you could adapt some of the standard tips and techniques (usually for big data) for your own needs in your SME. Organizations which first understand these tools and know how to use them will benefit at the expense of their rivals.

Reinventing Manufacturing and Business Processes Through Artificial Intelligence

"This book describes how newly emerging Artificial Intelligence (AI) technologies will provide unprecedented opportunities to penetrate technology and automation into everything we do, and at the same time, provide a huge playing field for businesses to develop newer models to capture market share. It establishes a milestone in understanding global transformational changes occurring in the manufacturing and corporate world due to AI and tries to find powerful and sophisticated solutions that will improve and streamline operations. Reinventing Manufacturing and Business Processes through Artificial Intelligence will be of interest to students, researchers, and professionals of the AI community as well as interdisciplinary researchers"--

AI and Learning Systems

Over the last few years, interest in the industrial applications of AI and learning systems has surged. This book covers the recent developments and provides a broad perspective of the key challenges that characterize the field of Industry 4.0 with a focus on applications of AI. The target audience for this book includes engineers involved in automation system design, operational planning, and decision support. Computer science practitioners and industrial automation platform developers will also benefit from the timely and accurate information provided in this work. The book is organized into two main sections comprising 12 chapters overall: •Digital Platforms and Learning Systems •Industrial Applications of AI

International Congress and Workshop on Industrial AI and eMaintenance 2023

This proceedings brings together the papers presented at the International Congress and Workshop on Industrial AI and eMaintenance 2023 (IAI2023). The conference integrates the themes and topics of three conferences: Industrial AI & eMaintenance, Condition Monitoring and Diagnostic Engineering Management (COMADEM) and, Advances in Reliability, Maintainability and Supportability (ARMS) on a single platform. This proceedings serves both academy and industry in providing an excellent platform for collaboration by providing a forum for exchange of ideas and networking. The 21st century has seen remarkable progress in Artificial Intelligence, with application to a variety of fields (computer vision, automatic translation, sentiment analysis in social networks, robotics, etc.) The IAI2023 focuses on Industrial Artificial Intelligence, or IAI. The emergence of industrial AI applications holds tremendous promises in terms of achieving excellence and cost-effectiveness in the operation and maintenance of industrial assets. Opportunities in Industrial AI exist in many industries such as aerospace, railways, mining, construction, process industry, etc. Its development is powered by several trends: the Internet of Things (IoT); the increasing convergence between OT (operational technologies) and IT (information technologies); last but not least, the unabated fast-paced developments of advanced analytics. However, numerous technical and organizational challenges to the widespread development of industrial AI still exist. The IAI2023 conference and its proceedings foster fruitful discussions between AI creators and industrial practitioners.

Artificial Intelligence in Industrial Decision Making, Control and Automation

This book is concerned with Artificial Intelligence (AI) concepts and techniques as applied to industrial decision making, control and automation problems. The field of AI has been expanded enormously during the last years due to that solid theoretical and application results have accumulated. During the first stage of AI development most workers in the field were content with illustrations showing ideas at work on simple problems. Later, as the field matured, emphasis was turned to demonstrations that showed the capability of AI techniques to handle problems of practical value. Now, we arrived at the stage where researchers and practitioners are actually building AI systems that face real-world and industrial problems. This volume provides a set of twenty four well-selected contributions that deal with the application of AI to such real-life and industrial problems. These contributions are grouped and presented in five parts as follows: Part 1: General Issues Part 2: Intelligent Systems Part 3: Neural

Networks in Modelling, Control and Scheduling Part 4: System Diagnostics Part 5: Industrial Robotic, Manufacturing and Organizational Systems Part 1 involves four chapters providing background material and dealing with general issues such as the conceptual integration of qualitative and quantitative models, the treatment of timing problems at system integration, and the investigation of correct reasoning in interactive man-robot systems.

AI Factory

Presents compendium of methodologies and technologies in industrial AI and digitalization Illustrates sensor to actuation approach showing complete cycle, that defines and differences AI and digitalization concept Covers a broad range of academic and industrial issues within the field of asset management Discusses impact of Industry 4.0 in other sectors Includes a dedicated chapter on real-time case studies

Artificial Intelligence for Digitising Industry – Applications

This book provides in-depth insights into use cases implementing artificial intelligence (AI) applications at the edge. It covers new ideas, concepts, research, and innovation to enable the development and deployment of AI, the industrial internet of things (IIoT), edge computing, and digital twin technologies in industrial environments. The work is based on the research results and activities of the AI4DI project, including an overview of industrial use cases, research, technological innovation, validation, and deployment. This book's sections build on the research, development, and innovative ideas elaborated for applications in five industries: automotive, semiconductor, industrial machinery, food and beverage, and transportation. The articles included under each of these five industrial sectors discuss AI-based methods, techniques, models, algorithms, and supporting technologies, such as IIoT, edge computing, digital twins, collaborative robots, silicon-born AI circuit concepts, neuromorphic architectures, and augmented intelligence, that are anticipating the development of Industry 5.0. Automotive applications cover use cases addressing AI-based solutions for inbound logistics and assembly process optimisation, autonomous reconfigurable battery systems, virtual AI training platforms for robot learning, autonomous mobile robotic agents, and predictive maintenance for machines on the level of a digital twin. AI-based technologies and applications in the semiconductor manufacturing industry address use cases related to AI-based failure modes and effects analysis assistants, neural networks for predicting critical 3D dimensions in MEMS inertial sensors, machine vision systems developed in the wafer inspection production line, semiconductor wafer fault classifications, automatic inspection of scanning electron microscope cross-section images for technology verification, anomaly detection on wire bond process trace data, and optical inspection. The use cases presented for machinery and industrial equipment industry applications cover topics related to wood machinery, with the perception of the surrounding environment and intelligent robot applications. AI, IIoT, and robotics solutions are highlighted for the food and beverage industry, presenting use cases addressing novel AI-based environmental monitoring; autonomous environment-aware, quality control systems for Champagne production; and production process optimisation and predictive maintenance for soybeans manufacturing. For the transportation sector, the use cases presented cover the mobility-as-a-service development of AI-based fleet management for supporting multimodal transport. This book highlights the significant technological challenges that AI application developments in industrial sectors are facing, presenting several research challenges and open issues that should guide future development for evolution towards an environment-friendly Industry 5.0. The challenges presented for AI-based applications in industrial environments include issues related to complexity, multidisciplinary and heterogeneity, convergence of AI with other technologies, energy consumption and efficiency, knowledge acquisition, reasoning with limited data, fusion of heterogeneous data, availability of reliable data sets, verification, validation, and testing for decision-making processes.

Artificial Intelligence in Practice

Cyber-solutions to real-world business problems Artificial Intelligence in Practice is a fascinating look into how companies use AI and machine learning to solve problems. Presenting 50 case studies of actual situations, this book demonstrates practical applications to issues faced by businesses around the globe. The rapidly evolving field of artificial intelligence has expanded beyond research labs and computer science departments and made its way into the mainstream business environment. Artificial intelligence and machine learning are cited as the most important modern business trends to drive success. It is used in areas ranging from banking and finance to social media and marketing. This technology continues to provide innovative solutions to businesses of all sizes, sectors and industries.

This engaging and topical book explores a wide range of cases illustrating how businesses use AI to boost performance, drive efficiency, analyse market preferences and many others. Best-selling author and renowned AI expert Bernard Marr reveals how machine learning technology is transforming the way companies conduct business. This detailed examination provides an overview of each company, describes the specific problem and explains how AI facilitates resolution. Each case study provides a comprehensive overview, including some technical details as well as key learning summaries: Understand how specific business problems are addressed by innovative machine learning methods Explore how current artificial intelligence applications improve performance and increase efficiency in various situations Expand your knowledge of recent AI advancements in technology Gain insight on the future of AI and its increasing role in business and industry Artificial Intelligence in Practice: How 50 Successful Companies Used Artificial Intelligence to Solve Problems is an insightful and informative exploration of the transformative power of technology in 21st century commerce.

Regulating Artificial Intelligence in Industry

Artificial Intelligence (AI) has augmented human activities and unlocked opportunities for many sectors of the economy. It is used for data management and analysis, decision making, and many other aspects. As with most rapidly advancing technologies, law is often playing a catch up role so the study of how law interacts with AI is more critical now than ever before. This book provides a detailed qualitative exploration into regulatory aspects of AI in industry. Offering a unique focus on current practice and existing trends in a wide range of industries where AI plays an increasingly important role, the work contains legal and technical analysis performed by 15 researchers and practitioners from different institutions around the world to provide an overview of how AI is being used and regulated across a wide range of sectors, including aviation, energy, government, healthcare, legal, maritime, military, music, and others. It addresses the broad range of aspects, including privacy, liability, transparency, justice, and others, from the perspective of different jurisdictions. Including a discussion of the role of AI in industry during the Covid-19 pandemic, the chapters also offer a set of recommendations for optimal regulatory interventions. Therefore, this book will be of interest to academics, students and practitioners interested in technological and regulatory aspects of AI.

HR Without People?

HR Without People? is a stimulating and confrontational challenge to conventional thinking on this people-centric profession’s role in the future of work.

The Economics of Artificial Intelligence

"Amid sweeping conversations about the future of artificial intelligence and its impact on US industry and economy, one economic domain has remained relatively insulated from the discussion: health care. How is it possible that an industry so bemoaned for inefficiency and expense, an industry so large that it now makes up a quarter of the US economy, could escape the efficiency- and cost-driven disruptions of AI? How are doctor's offices still relying on fax machines in the age of driverless cars? Why is it the one industry where we'd like to see AI try some things the one that machines can't seem to infiltrate? The Economics of Artificial Intelligence: Health Care Challenges convenes contributions from health economists, physicians, philosophers, and legal scholars to identify the primary barriers to entry for AI in America's biggest industry. Across original papers and wide-ranging written responses, they find five domains of barriers: incentives; management; data availability; regulation. They also find evidence of real opportunity: AI has promise to improve outcomes and lower costs, and if paths to intervention are seized upon, improvements will follow"--

Artificial Intelligence and Industrial Applications

This book gathers selected papers from Artificial Intelligence and Industrial Applications (A2IA’2020), the first installment of an annual international conference organized by ENSAM-Meknes at Moulay Ismail University, Morocco. The 29 papers presented here were carefully reviewed and selected from 141 submissions by an international scientific committee. They address various aspects of artificial intelligence such as digital twin, multiagent systems, deep learning, image processing and analysis, control, prediction, modeling, optimization and design, as well as AI applications in industry, health, energy, agriculture, and education. The book is intended for AI experts, offering them a valuable overview and global outlook for the future, and highlights a wealth of innovative ideas and recent,

important advances in AI applications, both of a foundational and practical nature. It will also appeal to non-experts who are curious about this timely and important subject.

Artificial Intelligence and Industry 4.0

Artificial Intelligence and Industry 4.0 explores recent advancements in blockchain technology and artificial intelligence (AI) as well as their crucial impacts on realizing Industry 4.0 goals. The book explores AI applications in industry including Internet of Things (IoT) and Industrial Internet of Things (IIoT) technology. Chapters explore how AI (machine learning, smart cities, healthcare, Society 5.0, etc.) have numerous potential applications in the Industry 4.0 era. This book is a useful resource for researchers and graduate students in computer science researching and developing AI and the IIoT. Explores artificial intelligence applications within the industrial manufacturing and communications sectors Presents a wide range of machine learning, computer vision, and digital twin applications across the IoT sector Explores how deep learning and cognitive computing tools enable processing vast data sets, precise and comprehensive forecast of risks, and delivering recommended actions

New Trends in the Use of Artificial Intelligence for the Industry 4.0

Industry 4.0 is based on the cyber-physical transformation of processes, systems and methods applied in the manufacturing sector, and on its autonomous and decentralized operation. Industry 4.0 reflects that the industrial world is at the beginning of the so-called Fourth Industrial Revolution, characterized by a massive interconnection of assets and the integration of human operators with the manufacturing environment. In this regard, data analytics and, specifically, the artificial intelligence is the vehicular technology towards the next generation of smart factories.Chapters in this book cover a diversity of current and new developments in the use of artificial intelligence on the industrial sector seen from the fourth industrial revolution point of view, namely, cyber-physical applications, artificial intelligence technologies and tools, Industrial Internet of Things and data analytics. This book contains high-quality chapters containing original research results and literature review of exceptional merit. Thus, it is in the aim of the book to contribute to the literature of the topic in this regard and let the readers know current and new trends in the use of artificial intelligence for the Industry 4.0.

The New Advanced Society

THE NEW ADVANCED SOCIETY Included in this book are the fundamentals of Society 5.0, artificial intelligence, and the industrial Internet of Things, featuring their working principles and application in different sectors. A 360-degree view of the different dimensions of the digital revolution is presented in this book, including the various industries transforming industrial manufacturing, the security and challenges ahead, and the far-reaching implications for society and the economy. The main objective of this edited book is to cover the impact that the new advanced society has on several platforms such as smart manufacturing systems, where artificial intelligence can be integrated with existing systems to make them smart, new business models and strategies, where anything and everything is possible through the internet and cloud, smart food chain systems, where food products can be delivered to any corner of the world at any time and in any situation, smart transport systems in which robots and self-driven cars are taking the lead, advances in security systems to assure people of their privacy and safety, and smart healthcare systems, where biochips can be incorporated into the human body to predict deadly diseases at early stages. Finally, it can be understood that the social reformation of Society 5.0 will lead to a society where every person leads an active and healthy life. Audience The targeted audience for this book includes research scholars and industry engineers in artificial intelligence and information technology, engineering students, cybersecurity experts, government research agencies and policymakers, business leaders, and entrepreneurs. Sandeep Kumar Panda, PhD is an associate professor in the Department of Data Science and Artificial Intelligence at IcfaiTech (Faculty of Science and Technology), ICFAI Foundation for Higher Education, Hyderabad. His research areas include artificial intelligence, IoT, blockchain technology, cloud computing, cryptography, computational intelligence, and software engineering. Ramesh Kumar Mohapatra, PhD is an assistant professor in the Department of Computer Science and Engineering, National Institute of Technology, Rourkela, Odisha, India. His research interests include optical character recognition, document image analysis, video processing, secure computing, and machine learning. Subhrakanta Panda, PhD is an assistant professor in the Department of Computer Science and Information Systems, BITS-PILANI, Hyderabad Campus, Jawahar Nagar, Hyderabad, India. His research interests include social network analysis, cloud computing, security testing, and blockchain. S. Balamurugan, PhD is the Director of Research

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Artificial Intelligence in Industry 4.0

This book is intended to help management and other interested parties such as engineers, to understand the state of the art when it comes to the intersection between AI and Industry 4.0 and get them to realise the huge possibilities which can be unleashed by the intersection of these two fields. We have heard a lot about Industry 4.0, but most of the time, it focuses mainly on automation. In this book, the authors are going a step further by exploring advanced applications of Artificial Intelligence (AI) techniques, ranging from the use of deep learning algorithms in order to make predictions, up to an implementation of a full-blown Digital Triplet system. The scope of the book is to showcase what is currently brewing in the labs with the hope of migrating these technologies towards the factory floors. Chairpersons and CEOs must read these papers if they want to stay at the forefront of the game, ahead of their competition, while also saving huge sums of money in the process.

Blockchain and AI Technology in the Industrial Internet of Things

Blockchain and artificial intelligence (AI) in industrial internet of things is an emerging field of research at the intersection of information science, computer science, and electronics engineering. The radical digitization of industry coupled with the explosion of the internet of things (IoT) has set up a paradigm shift for industrial and manufacturing companies. There exists a need for a comprehensive collection of original research of the best performing methods and state-of-the-art approaches in this area of blockchain, AI, and the industrial internet of things in this new era for industrial and manufacturing companies. Blockchain and AI Technology in the Industrial Internet of Things compares different approaches to the industrial internet of things and explores the direct impact blockchain and AI technology have on the betterment of the human life. The chapters provide the latest advances in the field and provide insights and concerns on the concept and growth of the industrial internet of things. While including research on security and privacy, supply chain management systems, performance analysis, and a variety of industries, this book is ideal for professionals, researchers, managers, technologists, security analysts, executives, practitioners, researchers, academicians, and students looking for advanced research and information on the newest technologies, advances, and approaches for blockchain and AI in the industrial internet of things.

The 4th Industrial Revolution

This book helps decision makers grasp the importance, and applicability to business, of the new technologies and extended connectivity of systems that underlie what is becoming known as the Fourth Industrial Revolution: technologies and systems such as artificial intelligence, machine learning, 3D printing, the internet of things, virtual and augmented reality, big data and mobile networks. The WEF, OECD and UN all agree that humanity is on the cusp of the Fourth Industrial Revolution.
As intelligent systems become integrated into every aspect of our lives this revolution will induce cultural and societal change of a magnitude hitherto unforeseen. These technologies challenge the values, customer experience and business propositions that have been the mainstay of almost every business and organization in existence. By redefining and encapsulating new value structures with emerging intelligent technologies, new innovative models are being created, and brought to market. Understanding the potential and impact of these changes will be a fundamental leadership requirement over the coming years. Skilton and Hovsepian provide decision makers with practical, independent and authoritative guidance to help them prepare for the changes we are all likely to witness due to the rapid convergence of technological advances. In short, bite-sized, nuggets, with frameworks supported by a deep set of practical and up-to-the-minute case studies, they shine light on the new business models and enterprise architectures emerging as businesses seek to build strategies to thrive within this brave new world.

Computational Sciences and Artificial Intelligence in Industry

This book is addressed to young researchers and engineers in the fields of Computational Science and Artificial Intelligence, ranging from innovative computational methods to digital machine learning tools and their coupling used for solving challenging industrial and societal problems.This book provides the

latest knowledge from jointly academic and industries experts in Computational Science and Artificial Intelligence fields for exploring possibilities and identifying challenges of applying Computational Sciences and AI methods and tools in industrial and societal sectors.

The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success

This book focuses on the implementation of AI for growing business, and the book includes research articles and expository papers on the applications of AI on decision-making, health care, smart universities, public sector and digital government, FinTech, and RegTech. Artificial Intelligence (AI) is a vital and a fundamental driver for the Fourth Industrial Revolution (FIR). Its influence is observed at homes, in the businesses and in the public spaces. The embodied best of AI reflects robots which drive our cars, stock our warehouses, monitor our behaviors and warn us of our health, and care for our young children. Some researchers also discussed the role of AI in the current COVID-19 pandemic, whether in the health sector, education, and others. On all of these, the researchers discussed the impact of AI on decision-making in those vital sectors of the economy.

The Future Computed

This book contains the works connected with the key advances in Industrial Artificial Intelligence presented at IITI 2023, the Seventh International Scientific Conference on Intelligent Information Technologies for Industry held on September 25-30, 2023 in St. Petersburg, Russia. The works were written by the experts in the field of applied artificial intelligence including topics such as Machine Learning, Explainable AI, Decision-Making, Fuzzy Logic, Multi-Agent and Bioinspired Systems. The following industrial application domains were touched: railway automation, cyber security, intelligent medical systems, navigation and energetic systems. The editors believe that this book will be helpful for all scientists and engineers interested in the modern state of applied artificial intelligence.

Proceedings of the Seventh International Scientific Conference “Intelligent Information Technologies for Industry” (IITI’23)

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The past decade has seen considerable advances in CAE tools that employ leading-edge artificial intelligence techniques and that can be used with CAD/CAM tools to reduce design costs. In three parts, this book covers current Al applications that can prove beneficial in the design and planning stages of manufacturing, that can assist in solving scheduling and control problems, and that can be used in manufacturing integration.A. F. Famili is Research Scientist at the Knowledge Systems Laboratory of the National Research Council of Canada. Steven H. Kim is Visiting Fellow at the Design Research Institute, Cornell University. Dana S. Nau an Associate Professor in the Computer Science Department at the University of Maryland.Contents: Application of Machine Learning to Industrial Planning and Decision Making. Incorporating Special Purpose Resource Design in Planning to Make More Efficient Plans. Geometric Reasoning Using a Feature Algebra. Backward Assembly Planning Symmetry Groups in Solid Model-Based Assembly Planning. An Expert System Approach for Economic Evaluation of Machining Operation Planning. Interactive Problem Solving for Production Planning. An Abstraction-Based Search and Learning Approach for Effective Scheduling. ADDYMS: Architecture for Distributed Dynamic Manufacturing Scheduling. An Architecture for Real Time Distributed Scheduling. Teamwork Among Intelligent Agents: Framework and Case Study in Robotic Service. Exploiting Local Flexibility During Execution of Precomputed Schedules. Symbolic Representation and Planning for Robot Control Systems in Manufacturing. An Architecture for Integrating Enterprise Automation. An Intelligent Agent Framework for Enterprise Integration. Integrated Software System for Intelligent

Manufacturing. Enterprise Management Network Architecture: A Tool for Manufacturing Enterprise Integration. Design and Manufacturing: Integration through Quality.

Artificial Intelligence Applications in Manufacturing

This book outlines the recent advancements in the field of artificial intelligence (AI) and addresses how useful it is in achieving truly sustainable solutions. The book also serves as a useful reference literature in developing sustainable engineering solutions to various social and techno-commercial issues of global significance. This book is organized into two sections: section 1 is focused on fundamentals and principles of AI to lay the groundwork for the second section. Section 2 explores the sustainable engineering solutions development using AI, which addresses challenges in various computing techniques and opportunities in engineering design for sustainable development using IoT/AI and smart cities. Applications include waste minimization, re-manufacturing, reuse and recycling technologies using IoT/AI, Industry 4.0, intelligent and smart grid systems, energy conservation using technology, and robotic process automation (RPA). The book is ideal for the engineers, researchers and students interested in how AI can aid in sustainable development applications.

Artificial Intelligence for a Sustainable Industry 4.0

This book argues that Marxist theory is essential for understanding the contemporary industrialization of the form of artificial intelligence (AI) called machine learning. It includes a political economic history of AI, tracking how it went from a fringe research interest for a handful of scientists in the 1950s to a centerpiece of cybernetic capital fifty years later. It also includes a political economic study of the scale, scope and dynamics of the contemporary AI industry as well as a labour process analysis of commercial machine learning software production, based on interviews with workers and management in AI companies around the world, ranging from tiny startups to giant technology firms. On the basis of this study, Steinhoff develops a Marxist analysis to argue that the popular theory of immaterial labour, which holds that information technologies increase the autonomy of workers from capital, tending towards a post-capitalist economy, does not adequately describe the situation of high-tech digital labour today. In the AI industry, digital labour remains firmly under the control of capital. Steinhoff argues that theories discerning therein an emergent autonomy of labour are in fact witnessing labour’s increasing automation.

Automation and Autonomy

This book collects perceptions and needs expectations and experiences concerning the application of Artificial Intelligence (AI) and Machine Learning in the steel sector. It contains a selection of themes discussed within the Workshop entitled “Impact and Opportunities of Artificial Intelligence in the Steel Industry” organized by the European Steel Technology Platform as an online event from October 15 until November 5, 2020. The event aimed at analyzing the diffusion of AI technologies in steelworks and at providing indications for future research, development and innovation actions addressing the sector demands. The chapters treat general analyses on transversal themes and applications for process optimization, product quality enhancement, yield increase, optimal exploitation of resources and smart data handling. The book is devoted to researchers and technicians in the steel or AI fields as well as for managers and policymakers exploring the opportunities provided by AI in industry.

Impact and Opportunities of Artificial Intelligence Techniques in the Steel Industry

"Revolutionizing Manufacturing: The Application of AI in Industry 4.0" is a comprehensive and engaging exploration of the transformative impact of Artificial Intelligence in today's industrial revolution. This report presents a clear, incisive look at the technological forces turbo-charging the manufacturing industry worldwide, marrying the technical with the practical in a way that's palatable to any reader-industry professional, academic, or intrigued onlooker. With Malcolm Johnson as your guide-an avid technophile and experienced manufacturing strategist-you will traverse the industry's evolutionary landscape, viewed through the lens of AI. Capture the essence of what's fueling this ongoing revolution, all while demystifying complex concepts and unravelling the jargon that typically cloaks this field. The report's narrative is divided into ten transformative chapters, beginning with a review of the Manufacturing Landscape Pre-Industry 4.0, and climaxing in a detailed panorama of The Horizon of Industrial AI. The chapters in between deep-dive into the heart of AI, its intersection with Industry 4.0, and a keen analysis of its benefits and potential pitfalls. By purchasing this report, you're not just securing a source of crucial information but a ticket to journey through the thriving heart of the modern

industrial revolution. Let us journey together into this exciting frontier, emerging informed, enlightened, and ready to participate in the conversations defining our technological future.

The 3rd International Conference on Industrial Artificial Intelligence (IAI 2021)

Artificial Intelligence (AI) is redefining the nature and principles of general management. The technological revolution is reshaping industries, disrupting existing business models, making traditional companies obsolete and creating social change. In response, the role of the manager needs to urgently evolve and adjust. Companies need to rethink their purpose, strategy, organisational design and decision-making rules. Crucially they will also need to consider how to nurture and develop the business leaders of the future and develop new ways to interact with society on issues such as privacy and trust. Containing international insights from leading figures from the world of management and technology, this book addresses the big challenges facing organisations, including: · Decision-making · Corporate strategy · People management and leadership · Organisational design Taking a holistic approach, this collection of expert voices provides valuable insight into how firms will discover and commit to what makes them unique in this new big data world, empowering them to create and sustain competitive advantage.

Revolutionizing Manufacturing

The Future of Management in an AI World