

That is why a bibliometric analysis on the application of artificial intelligence (AI) tools is conducted to highlight its utilization in solar and wind energy resources. ... Belu R (2009) A project-based power electronics course with an increased content of renewable energy applications. In: 2009 Annual Conference & Exposition ASEE, pp 14-91 ...

He is an Associate Editor for IET Renewable Power Generation, a Guest Editor-in-Chief for Journal of Modern Power Systems and Clean Energy Special Issue on Applications of Artificial Intelligence in Modern Power Systems, a Guest Editor-in-Chief for Transactions of China Electrical Technology Special Issue on Planning and operation of multiple ...

The use of artificial intelligence in renewable energy. ... Artificial intelligence in new energy applications and energy-saving technologies. Power businesses are at the early stage of adoption of AI (A.G., 2020). Digital applications and technologies have witnessed a boom in recent decades. Digital technologies are becoming smaller, more ...

Furthermore, AI will support low-carbon energy systems with high integration of renewable energy and energy efficiency, which are all needed to address climate change 13,36,37. AI can also be used ...

After preparing the data for analysis, a detailed bibliometric analysis was conducted using the CiteSpace tool. This allowed for the visualization of collaboration and citation networks, identification of key authors and publications, and understanding of the main research trends and thematic evolution in the field of artificial intelligence and renewable energy.

This chapter comprehensively reviews the basic principles of artificial intelligence (AI), such as Expert Systems (ES), fuzzy logic (FL), artificial neural network (ANN) or neural network (NNW), and genetic algorithms or evolutionary computation. This background knowledge is essential to understanding the applications of AI in renewable energy systems and smart grid. The chapter ...

As more countries, companies and individuals seek energy sources beyond fossil fuels, interest in renewable energy continues to rise.. In fact, world-wide capacity for energy from solar, wind and other renewable sources increased by 50% in 2023 (link resides outside ibm ). More than 110 countries at the United Nations" COP28 climate change conference ...

This study provides an overview of the applications of algorithms and models of AI as well as its advantages and challenges in renewable energy systems. Published in: 2023 International ...

# Application of artificial intelligence in renewable energy

The large variabilities in renewable energy (RE) generation can make it challenging for renewable power systems to provide stable power supplies; however, artificial intelligence (AI)-based ...

The Solar Energy Technologies Office Fiscal Year 2020 (SETO 2020) funding program supports projects that will improve the affordability, reliability, and value of solar technologies on the U.S. grid and tackle emerging challenges in the solar industry. This program funds projects that advance early-stage photovoltaic (PV), concentrating solar-thermal power (CSP), and systems ...

Renewable energy systems present some helpful effects in several types of applications modes, which have been identified to be, ... A summary of an artificial intelligence application that considers the energy produced based on solar, wind and all types of hybrid energy systems is shown in Table 4.

Artificial Intelligence (AI) is reshaping the energy sector, revolutionising how power is generated, distributed, and consumed. From smart grid management to renewable energy forecasting, and even nuclear power plant safety, AI is fundamentally changing the way the energy industry operates, moving it towards a more efficient, sustainable, and secure future.

The integration of renewable energy sources (RESs) has become more attractive to provide electricity to rural and remote areas, which increases the reliability and sustainability of the electrical system, particularly for areas where electricity extension is difficult. Despite this, the integration of hybrid RESs is accompanied by many problems as a result of the intermittent ...

The world has witnessed a significant shift towards utilizing various renewable energy resources over the past couple of decades due to the continuous depletion of fossil fuels which can seriously impact life on earth [1], [2]. For instance, the expeditious combustion of fossil fuels raises greenhouse gas emissions like carbon dioxide (CO<sub>2</sub>). The high levels of CO<sub>2</sub> in ...

The new digitalization model is powered by the artificial intelligence (AI) technology. The integration of energy supply, demand, and renewable sources into the power grid will be controlled autonomously by smart software that optimizes decision-making and operations. ... which offered an overview of its application to use renewable energy ...

Nowadays, using renewable energy to condense climate revolution and global warming has become a growing trend and various AI-based prediction techniques have been developed to improve the prediction ability of renewable energy.

Recent shift towards renewable energy resources has increased research for addressing shortcomings of these energy resources. As major issues are related to intermittency and uncertainty of renewable supply, new technologies like artificial intelligence and machine learning offers lot of opportunity to address these issues as they are basically meant for processing of ...

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The new technologies and advanced algorithms based on artificial intelligence (AI) and machine learning (ML) can become a boon to the field of RE systems. These algorithms are used for prediction purposes. ... Renewable energy applications for sustainable agricultural systems. International Journal of Innovative Approaches in Agricultural ...

Artificial Intelligence (AI) and Machine Learning (ML) techniques have been applied to Renewable Energy Systems (RES) for several years, and their intensity and scope have ...

Application of artificial intelligence techniques for modeling, optimizing, and controlling desalination systems powered by renewable energy resources Author links open overlay panel Enas Taha Sayed a, A.G. Olabi b c, Khaled Elsaid d, Muaz Al Radi e, Concetta Semeraro b, Mohammad Hossein Doranehgard f, Mohamed Elrayah Eltayeb b, Mohammad ...

One representative hybrid approach is the adaptive neuro-fuzzy inference system (ANFIS) that integrates neural networks and FL (Youssef et al., 2017) and has been applied to renewable energy systems (Jha et al., 2017). 4 APPLICATIONS OF ARTIFICIAL INTELLIGENCE TO BIOENERGY SYSTEMS

In this paper, the application of artificial intelligence in renewable energy driven seawater desalination is divided into four aspects, each of which has specific application background and mode. In the future, the direction of desalination will continue to expand, but also for readers to comb a clear idea.

A city is considered to be smart when the application of Artificial Intelligence (AI) and the Internet of Things (IoT) is integrated with it. This enables the collection of data from people, devices, and buildings, then analyses are performed to optimize control over infrastructure, traffic, energy, etc.

This thorough overview piques interest in AI and its applications to renewable energy sources, energy transition, and decarbonization. This paper also demonstrates the application of several AI techniques in large-scale systems for the integration of renewable energy, and it evaluates the performance of these strategies using a range of case ...

This chapter presents a detailed overview of some key applications of artificial intelligence (AI) and machine learning (ML) for renewable energy with a particular focus on the challenges, available resources, and potential future research opportunities. ... Energy Systems. In: Manshahia, M.S., Kharchenko, V., Weber, G.W., Vasant, P. (eds ...

By leveraging innovative approaches, such as AIS, VSD frameworks, and lessons from expert systems, the limitations of AI in RETs development can be mitigated, leading to more robust and ethically adequate ...

Although many countries support AI applications in the energy industry, its usage in the RE sector remains

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limited (Cheng and Yu, 2019). The main obstacle is that the proposed AI methods for optimizing RE are expensive and complex (Jiang and Raza, 2023) finding a reputed software provider and configuring the software is a time-consuming process (Jimenez and ...

The prompt development of renewable energies necessitates advanced energy storage technologies, which can alleviate the intermittency of renewable energy. In this regard, artificial intelligence (AI) is a promising tool that provides new opportunities for advancing innovations in advanced energy storage technologies (AEST).

Another type of renewable energy that can be modeled by AI and ML methods is wind energy which many studies have conducted for forecasting and ... These sections are artificial intelligence and its applications in energy efficiency and utilization (Blue); Machine learning and its related methods for Forecasting (Yellow); Algorithms and pattern ...

To improve the efficiency, reliability, and economic viability of these systems, the synergistic application of artificial intelligence (AI) methods has emerged as a promising avenue. This study presents a comprehensive review of the current state of research at the intersection of renewable energy and AI, highlighting key methodologies ...

Renewable energy is gaining traction as an efficient alternative source of energy; it is considerably safer and healthier than traditional energy, and it has greatly contributed to this area. ... Research on the application of artificial intelligence approaches to power and renewable energy systems is now underway. Artificial neural networks ...

Artificial Intelligence (AI) has the potential to significantly enhance how we manage the grid, which is one of the most complex, yet highly reliable, machines on earth. ... advanced AI to forecast renewable energy production for grid operators, smart grid applications of AI to enhance resilience, and optimization of planning for electric ...

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