Artificial intelligence in power systems

The high penetration of renewable energy sources, coupled with decommissioning of conventional power plants, leads to the reduction of power system inertia. This has negative repercussions on the transient stability of power systems. The purpose of this paper is to review the state-of-the-art regarding the application of artificial intelligence to the power system ...

The methods of artificial intelligence (AI) have been used in the planning and operation of electric power systems for more than 40 years. In recent years, due to the development of microprocessor and data storage technologies, the effectiveness of this use has greatly increased. This paper provides a systematic overview of the application of AI, including ...

Power systems are becoming vastly more complex as demand for electricity grows and decarbonisation efforts ramp up. In the past, grids directed energy from centralised power stations. ... This need arrives just as the capabilities of artificial intelligence (AI) applications are rapidly progressing. As machine learning models have become more ...

Deep Learning for Power System Applications: Case Studies Linking Artificial Intelligence and Power Systems is an ideal resource for professors, students, and industrial and government researchers in power systems, as well as practicing engineers and AI researchers. Provides a history of AI in power grid operation and planning;

3. Power Systems and Artificial Intelligence o An electric power system is a network of electrical components used to supply, transmit and use electric power. Power system engineering deals with the generation, transmission, distribution and utilization of electric power and other electrical devices.

Artificial Intelligence-based Smart Power Systems includes specific information on topics such as: Modeling and analysis of smart power systems, covering steady state analysis, dynamic analysis, voltage stability, and more Recent advancement in power electronics for smart power systems, covering power electronic converters for renewable energy ...

Resulting system needs of 4D power systems raise the interest of major stakeholders in power systems to employ AI [17], predominantly electricity network operators (Transmission System Operators - TSOs, Distribution System Operators - DSOs), energy retailers, energy services companies, consumers, traders, energy policy makers or energy ...

His research interests include artificial intelligence, power systems, power quality, optimization algorithms, and intelligent systems. He has published over 18 research papers in peer-reviewed reputed journals, chapters, and conferences. He is actively involved in the Center of Excellence of Electric vehicle at MITWPU where his

research is ...

Jan Weustink views knowledge graphs as a key prerequisite turning the vision of an autopilot for complex large-scale power stations into reality. The controller needed for the purpose requires artificial intelligence. Unlike with humans, however, it"s difficult to train an AI system on an entire power station all at once.

Madan and Bollinger [54] continued this work by presenting the application of artificial intelligence (mainly expert systems) to power systems. Balu et al. [55] and Adapa [56] concentrated on the application of expert systems in power system planning.

In this paper, the application of heuristic and optimization algorithms based on artificial intelligence (AI) is investigated on electrical power systems. Three distinct areas have been categorized validating the application of AI methods in power systems. It involves classical problem of economic load dispatch in conventional power plant, continuing with optimal sizing issue of ...

AbstractElectric power systems face heightened risks from climate change, on top of existing challenges like aging infrastructure, regulatory shifts, and cybersecurity threats. ... including smart grids, artificial intelligence (AI), and machine learning, (ML), enhance the resilience of power systems against climate-driven extreme weather ...

The papers within this article collection address the field of artificial intelligence in future power systems through a complementary view on several of the most important topics in this domain. The development of innovative artificial intelligence-based models, with a focus on machine learning approaches, especially those based in deep ...

This research attempts to construct a second order observation model in understanding the significance of Artificial intelligence (AI) in changing the global power structure. Because of the inevitable ubiquity of AI in the world societies" near future, it impacts all the sections of society triggering socio-technical iterative developments. Its horizontal impact and ...

Artificial intelligence, or AI, has the potential to cut energy waste, lower energy costs, and facilitate and accelerate the use of clean renewable energy sources in power grids worldwide. AI can also improve the planning, operation, and control of power systems. Thus, AI technologies are closely tied to the ability to provide clean and cheap ...

Artificial intelligence techniques for optimal power flow analysis in smart grids. Journal of Modern Power Systems and Clean Energy. 2023;11(1):182-192. [4] Ahmad I, Kaur H, Singh S. An intelligent data analytics approach for fault detection and diagnosis in power systems using artificial intelligence. Electric Power Systems Research. 2023;197: ...

What is artificial general intelligence? The term "artificial general intelligence" (AGI) was coined to describe

Artificial intelligence in power systems

AI systems that possess capabilities comparable to those of a human. In theory, AGI could someday replicate human-like cognitive abilities including reasoning, problem-solving, perception, learning, and language comprehension.

3. POWER SYSTEM An electric power system is a network of electrical components used to supply, transmit and use electric power. Power systems engineering is a subdivision of electrical engineering that deals with the generation, transmission, distribution and utilisation of electric power and the electrical devices connected to such systems like ...

The artificial intelligence (AI) is part of the modern Power Systems. It is used in protection and control of electrical lines and transformers with good results, in the future will be widely used for implementing the smart grid. Any research is getting closer to an...

This article gives an overview of the artificial intelligence (AI) applications for power electronic systems. The three distinctive life-cycle phases, design, control, and maintenance are correlated with one or more tasks to be addressed by AI, including optimization, classification, regression, and data structure exploration. The applications of four categories of AI are ...

applied sciences. In the context of power systems, application of artificial neural networks (ANNs) and fuzzy logic is commonly referred to in the literature as AI applications in power systems. Over the past 25 years or so, feasibility of the application of AI for a variety of topics in power systems has been explored by a number of investigators.

As different artificial intelligence (AI) techniques continue to evolve, power systems are undergoing significant technological changes with the primary goal of reducing computational time, decreasing utility and consumer costs and ensuring the reliable operation of an electrical ...

The increasing complexity of modern power systems due to the integration of prosumers, renewable energy sources, and energy storage, has significantly complicated system organization and planning. Traditional centralized power plants are being replaced by decentralized structures, making the power flow more complex to predict. As a result, ...

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