Optimum Efficient System For Sustainable Energy And Development by AI

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Abstract

Over the eons, Earth has functioned as the universe's biggest ecosystem, providing essential materials that are essential to the continuing existence of all living things. Nonetheless, the current crises are a direct outcome of both the overuse of natural resources and the exponential growth in human population. To guarantee that resources will be available for future generations, sustainable resource usage is required. The progress of technology has enhanced our standard of living. Innovations like artificial intelligence (AI) can positively impact sustainable development. The use of AI for Sustainability (such as the SDGs) is growing, so it's high time for discussions about how sustainable AI system creation and execution are. Sustainable AI strives to advance sustainable energy. This article is aimed to inspire readers, policymakers, AI ethicists, and developers to connect with the environment and realise that AI has environmental implications. These innovations can boost industrial symbiosis and recycling while lowering waste and energy consumption. AI can support sustainability in a variety of businesses by enhancing resource management and optimizing energy use.

Key words: AI, Sustainable Development, Environment, Energy

Introduction

Artificial intelligence (AI) is the term used to describe the imitation of human intelligence in robots that have been taught to think and behave like people. Artificial Intelligence is a rapidly developing field with the potential to change social interactions. Artificial Intelligence is pervasive; it is used in cutting-edge pedagogies and is researched in a range of settings. Complex technology and a dynamic, creative community are necessary for AI. When artificial intelligence (AI) was originally formed as a field of study in 1955, there was a lot of enthusiasm, but soon there was disillusionment and a lack of financing. In order to set artificial intelligence research apart from cybernetics and avoid the influence of Norbert Wiener, John McCarthy created the term "artificial intelligence" in a workshop at Dartmouth College in 1956. This is by no means an argument against AI; rather, it is a statement that Al is indeed facilitating sustainable growth. However, we must base the development and application of Al systems on a realistic and impartial knowledge of both the advantages and disadvantages of AI. Here, we want to know if artificial intelligence (AI) technology can assist resolve these intricate sustainability issues or if it will make them worse. This pertains to the query: will artificial intelligence conserve or deplete resources? Although the paper's intriguing and significant topics apply to all artificial intelligence, our focus is on Ai art, or the use of AI by artists in their creative processes

what is sustainable development ?

Fundamentally, sustainable development aims to strike a balance between social inclusion, economic prosperity, and environmental care. It is predicated on the understanding that in order to secure the welfare of both the current and future generations, economic growth must be inclusive, environmentally sustainable, and socially equitable. Three linked pillars comprise sustainable development:

1) **Economic Development:** To ensure the responsible use of natural resources and the reduction of adverse environmental effects, it is necessary to promote strong and inclusive economic growth that offers opportunities to all. It entails encouraging entrepreneurship, innovation, and investment in fields that support sustained prosperity without jeopardizing environmental purity.
2) **Social Equity:** Stressing the value of justice, fairness, and inclusivity in society, social equity is the cornerstone of sustainable development. It means giving everyone, regardless of socioeconomic status, gender, ethnicity, or ability, equal access to opportunities, resources, and services. Social cohesion, gender equality, healthcare, education, and poverty reduction are all included in the concept of social equity.
3) **Environmental Protection:** Preserving and restoring ecosystem integrity, reducing the effects of climate change, and protecting natural resources for future generations are the main goals of environmental sustainability, which is a key component of sustainable development. It entails tackling environmental deterioration, lowering pollution, supporting renewable energy sources, conserving biodiversity, and implementing sustainable land use practices.

Sustainable Development Goals {SDG}

The Sustainable Development Goals (SDGs) are a set of 17 interconnected global goals adopted by the United Nations Member States in 2015 as part of the 2030 Agenda for Sustainable Development. The SDGs build upon the Millennium Development Goals (MDGs) but are more comprehensive, encompassing economic, social, and environmental dimensions of sustainable development.

Artificial intelligence and the SDGs

Artificial intelligence has been incorporated in various forms into the SDGs first through experimentation, and later in sustainable management and leadership programs. This paper will discuss three of those projects:

AI and the Water Crisis: the case of smart water management

“Water is essential for life. For thousands of years, human settlement and advancement has been dictated by a reliable supply of clean, safe water. In the face of a fickle supply system, people flourished, moved or perished” (Hill, 2018, para. 1). Water and sanitation are at the center of the SDG resource triad. It touches on, and impacts, women's empowerment and gender equality, food and agriculture, energy and climate, and infrastructure & technology.

AI and agriculture: the case of PlantVillage

PlantVillage is a unique project founded by Penn State University entomologist David Hughes in conjunction with digital epidemiologist Marcel Salathé of the Swiss Federal Institute of Technology (EPFL) in Lausanne, Switzerland. The project attempts to diagnose plant diseases by using an app on a common inexpensive smart phone by a farmer in the field. At the same time, the team is building a database that can recognize and identify plant diseases by using a mobile phone image. “Behind the app …

AI, Sanitation and Health: the case of clean water

We have the ability to provide clean water for every man, woman and child on the Earth. What has been lacking is the collective will to accomplish this. What are we waiting for? This is the commitment we need to make to the world, now.

AI-Enabled Energy Policy for a Sustainable Future

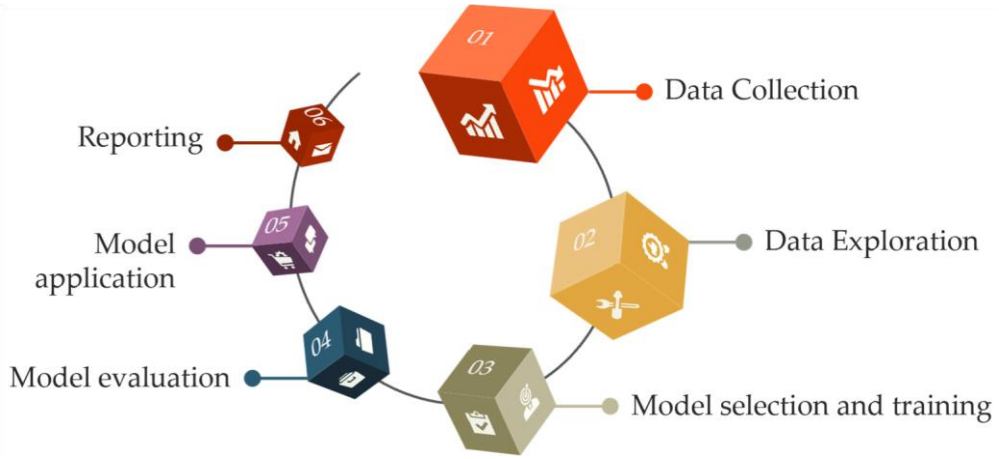
In the present day, global warming and sustainable development are critical issues that call for interdisciplinary solutions. Energy poverty and sustainability pillars that adapt based on supply and demand infrastructure are two of the many dimensions of sustainable energy impact at the regional and global levels. Specific metrics, indicators, tools, and approaches are needed to measure these characteristics.

Energy policy is a comprehensive set of laws, regulations, guidelines, and courses of action with limited flexibility for decision making that govern energy production, distribution, and consumption

How Will AI Shape Future Energy Policies?

Modeling energy systems in the context of AI and machine learning deployment is challenging and time consuming due to their complex interdependencies and non-linear patterns

The last steps are reporting and highlighting to summarize the research, including the methods, results obtained, conclusions, and essential findings and recommendations.



1: Data Collection:
The first step in developing a data-driven model for energy facilities involves identifying the necessary datasets for training and testing the model.

2. Data Exploration: Following the acquisition of data, the information is analyzed to find trends and connections between the input and output variables. This entails carrying out any required pre-processing on the data, like feature scaling or normalization.

3. Model Training and Model Selection:

An appropriate data-driven model, like an artificial neural network, can be chosen and trained on the gathered data once the data has been thoroughly examined.

4. Model Evaluation: A different dataset is needed to assess the model's performance after it has been trained. To enhance its performance, the model can be adjusted as needed.

5. Model Application: Using the trained model to forecast and examine the variables in various scenarios is the next stage. Predictions made by the model allow recommendations for optimization to be developed

6: Reporting:
Finally, the study's results are summarized in a report that includes the methods used, results obtained, and conclusions drawn.

Role of AI in RE utilization/ optimization of renewable energy

The emerging role of AI for RE utilization may help the latter to achieve some targets within the Environment, Society, and Economy groups by 22%, 28%, and 23%, respectively. This is due to the ability of AI to improve the operation and efficiency of RE sources and reduce the cost of operation and produced energy as well as minimize their environmental impacts efficiently (Jha et al., 2017; Srivastava, 2020; Hannan et al., 2020b)

Furthermore, the electricity industry in industrialized nations has already started utilizing AI and associated technologies to facilitate communication between smart meters, smart grids, and Internet of Things (IoT) devices. According to Nišetić et al. (2020), this kind of technology can improve energy management, efficiency, transparency, and the usage of renewable energy sources. In other words, this step helps the RE meet 100% of the SDG 7 targets, among many other targets. Additionally, the role of AI applications can span a variety of RE system functions, including forecasting, reducing emissions, minimizing costs, robust and smooth control, maintaining high power quality even in the event of intermittent input, expanding novel technologies for the most efficient production from available natural resources, environmental awareness, improved energy management, energy distribution, and energy delivery (Antonopoulos et al., 2020; Al-Shetwi et al., 2020a; Ahmad et al., 2021).

It is founded that AI utilization in RE can assist in achieving the future goals of the RE by developing accurate strategies in the control, simulation, decision, and optimization of RE systems

The application of AI in the renewable energy (RE) power sector is currently making its way to emerging nations, where it might have a significant influence on the SDGs since development depends on affordable, clean electricity. By gradually giving AI software companies access to knowledge about the power industry, the problems can be resolved. Artificial intelligence (AI) technologies, when correctly developed, can be helpful in automating regular and structured processes, assisting people in addressing potential energy concerns in the future.

Conclusion

In conclusion, there is a great deal of promise for the future in using AI to build the most effective system possible for sustainable development and energy. Artificial Intelligence (AI) technologies can be integrated into energy systems to maximize resource allocation, improve efficiency, and reduce environmental impact. Artificial intelligence (AI) has the power to completely transform the way we generate, distribute, and use energy, opening the door to a more robust and sustainable future. To guarantee that AI is used ethically, inclusively, and with an emphasis on long-term sustainability, stakeholders, legislators, researchers, and industry leaders must work together to realize this potential. We can use AI to hasten the transition to a greener, wealthier future with combined effort and creativity . To sum up, using artificial intelligence (AI) to accomplish sustainable objectives, improve energy efficiency, and optimize energy consumption is a revolutionary way to tackle urgent global issues. By utilizing AI, we may gain access to hitherto unattainable insights, optimize procedures, and make data-driven choices that result in observable advancements in sustainability and energy efficiency across a range of industries. Artificial Intelligence (AI) enables us to optimize energy use, minimize waste, and decrease greenhouse gas emissions through machine learning algorithms, predictive modelling , and sophisticated analytics. Artificial intelligence (AI)-driven solutions provide a route forward for a more resilient and sustainable energy future, from smart building management systems that reduce energy usage to smart grids that dynamically balance supply and demand.