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ARTIFICIAL INTELLIGENCE IN ENVIRONMENTAL MONITORING AND CONSERVATION

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Abstract:

This paper presents and explores how to improve environmental sustainability with the help of artificial intelligence (AI). This study evaluates the potential environmental benefits of ai adoption, such as reductions in climate change, agriculture, ocean health, water resources, weather forecasting, and disaster resiliency. Upon conducting a thorough analysis of the available literature, it was found that there is a research deficiency in the utilization of artificial intelligence and decision support systems, as well as optimization models. This study employs qualitative analysis to explore sustainable uses of ai and the environmental impact of ai. It emphasizes. The importance of promoting environmental sustainability through ai and proposes “environmental sustainability. By ai" approach as a prerequisite for developing transparent, responsible, and human-centered ai systems. The study primarily focuses on identifying ways in which ai can be utilized for sustainable environmental practices, with a particular emphasis on the role of ai in promoting environmental sustainability. This study has some limitations, one of which is its limited scope. The paper does not provide an extensive analysis of global environmental policies, which could potentially identify areas for cooperation or common ground. Additionally, the study's focus on environmental sustainability means that it neglects the economic and social aspects of sustainability, which could be further explored. The study can aid stakeholders in comprehending global efforts to enhance environmental sustainability through the implementation of ai.

Keywords: Artificial intelligence, sustainable issues, environmental conservation, economic, social aspects, societal aspects.

Introduction

The 21st-century global environmental challenges have highlighted the importance of artificial intelligence (ai) as a crucial tool to tackle sustainability issues. Initially proposed by John Mccarthy in 1956, ai refers to the science and engineering of developing intelligent machines. Ai primarily falls under the field of computer science, and its effectiveness in addressing environmental issues relies on its ability to incorporate environmental problem-solving techniques. According to Poole et al, the intelligence exhibited by sophisticated machines, in contrast to the natural intelligence of humans and animals, can be referred to as ai. Wang and Srinivasan define ai as a field of scientific and engineering knowledge that aims to create machines that are as intelligent as humans. Nishant et al and duan et al note that ai machines learn from experience as they perform tasks assigned by humans, adapting to new inputs and addressing environmental challenges. In our present digital era, the limitations of human thinking have been expanded through ai, enabling intelligent machines with artificial brains to complement human cognition. The challenges of achieving environmental sustainability are complex, but ai can simplify the process aligning the interests of people and prioritizing sustainable practices. Sustainability is a multifaceted concept that encompasses the environment, economy, and society, and according to the un document "our common future" (also known as the Brundtland report), sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Environmental sustainability means meeting the resource and service needs of both present and future generations without compromising the health of the ecosystem. Unfortunately, the world is currently facing a critical state with regards to the effects of global warming and climate change, making it imperative to take action and adopt environmentally friendly and sustainable products. Addressing environmental challenges such as land degradation or climate extremes requires innovative and advanced ai solutions. The intersection of ai and environmental sustainability can be broadly categorized into four key areas, including sustainable agriculture, conservation of environmental.

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Research gap: The existing literature on ai for environmental sustainability covers various fields such as biodiversity, water, energy, and transportation. However, there is a relative lack of research on the practical applications of ai in these areas, particularly in addressing environmental challenges. While some practical applications have been observed in advanced countries, such as waste collection through advanced routing plans and wildlife conservation for enhanced biodiversity, there is still a need for further exploration and investigation. The research gap lies in the limited understanding of how ai can effectively be utilized to tackle environmental challenges in the fields of biodiversity, water, energy, and transportation. More research is needed to identify and develop innovative ai solutions that can contribute to achieving the sustainable development goals (SDGS) in these areas. Closing this research gap will help bridge the knowledge and implementation divide, enabling the effective use of ai to address environmental sustainability challenges across multiple sectors.

Methodology

This paper provides a review of how artificial intelligence can contribute significantly to achieving environmental sustainability in various areas such as biodiversity, energy, transportation, and water. Monitoring plays a crucial role in the use of artificial intelligence for environmental sustainability. Therefore, employing artificial intelligence can help improve the current state of environmental sustainability. With ai gaining more popularity, it has the potential to be utilized in various industries including environmental sustainability. As the field of ai continues to evolve, companies with significant environmental impacts can harness its power to make positive changes. This is a crucial moment for ai, as advancements in big data, hardware, and ai algorithms have combined to enable major changes to our daily lives. Thanks to these advancements, saving the planet (including the ocean) no longer feels as difficult as it once did! In this research, we will examine five distinct methods by which artificial intelligence can be used to improve the current status of environmental sustainability.

Renewable energy & clean fuels artificial intelligence has the potential to enhance the management of renewable energy by utilizing predictive capabilities and intelligent grid systems. For example, it can improve the efficiency of renewable energy production by providing more accurate rainfall predictions, reducing costs, and minimizing carbon pollution. Additionally, ai can optimize energy storage, efficiency, and delivery operations, and improve the reliability and integration of renewable energy sources. These advancements can lead to dynamic pricing and trading, responding to demand fluctuations. IBM has previously utilized ai to improve their rainfall prediction accuracy, resulting in a 30% improvement in their forecasts. The outcomes showed improved operation of their facilities, increased production of renewable energy, and decreased carbon emissions.

Electric vehicles with the increase in companies such as tesla and the rise in gas prices, more and more companies are paying close attention to the demand for electric vehicles (EVS). In 2021, gas prices reached their highest average nominal price since 2014 due to rising crude oil prices and increased demand for gasoline. The average U.S. retail price of gasoline is currently at $3.01 per gallon in 2021, and this price has continued to increase. The environmental advantages of transitioning to EVS are significant and include reducing traffic and air pollution, improving energy supply logistics such as transportation of goods, and enabling more independent driving capability. Electric vehicles (EVS) offer significant environmental benefits, primarily in reducing their impact on the environment. Buses are known to be a major source of climate change due to their greenhouse gas (GHG) emissions, which can also lead to adverse health effects such as respiratory problems. According to the environmental protection agency (EPA), EVS produce lower GHG emissions over their lifetime, including both tailpipe and upstream emissions. Moreover, completely electric vehicles emit zero tailpipe emissions, which further reduces their environmental impact.

More conservation of natural coffers according to a study released by the organization for economic co-operation and development (OECD), a staggering 62 billion tons of natural resources such as minerals, wood, and fossil fuels are extracted from the earth every year. Even more alarming is the fact that 20 percent of these resources are completely wasted, highlighting a major issue with resource efficiency. Metropolises have become a major hub for excessive consumption of natural resources. With more than half of the world's population residing in urban areas, this trend is expected to continue. However, the rapid expansion of cities has resulted in significant environmental challenges, especially in these regions. Smart led lighting has been a popular method for conserving natural resources, particularly in the area of road lighting. In comparison to traditional forms of lighting, smart led lighting uses energy more efficiently and has a longer lifespan. Smart grids, the technology behind smart led lighting, can adjust the lighting conditions to be dimmed or brighter. Smart grids, also referred to as "electricity with intelligence" is an energy-efficient, secure, and reliable electrical grid system. It includes various energy-saving measures such as renewable energy sources, smart devices, and appliances.

Sustainable land use by integrating artificial intelligence with satellite imagery, it is possible to detect changes in land use, vegetation, timber cover, and the effects of natural disasters. Ai-powered agriculture through robotics allows for early detection of crop conditions and issues. Automated corrective measures, automated data collection, and decision-making processes are integrated into this system. It streamlines agricultural inputs and outputs based on energy and

demand, leading to improved adaptability to climate changes, increased resource efficiency of the industry, and a reduction in the use of water, pesticides, and fungicides - all of which have negative impacts on critical ecosystems. This system also helps to address issues such as crop conditions and diseases through ai-driven precision farming and robotics.

Pollution monitoring and early detection air pollution is the fourth biggest threat to humanity, with 92% of the global population residing in areas with dangerous levels of pollution. Despite its widespread impact, air pollution tends to be an overlooked issue. Many parts of the world suffer from significant levels of air pollution, making it unsafe to spend prolonged periods of time outdoors.

Air purifiers with integrated artificial intelligence systems can now monitor real-time air quality and environmental data and adjust filtration effectiveness accordingly. In urban areas, ai-powered simulations can alert people to pollution levels in their area. This enables earlier detection of pollution sources. Additionally, data collected from vehicles, sensors, and cameras can help improve air pollution index in the future. For the environment group, 25 targets were identified where ai can act as an enabler. Ai can help in the conservation of the environment by analyzing large scale interconnected databases to develop common strategies. Ai advances can aid in understanding climate change and modeling its possible impacts, supporting low-carbon energy systems with high integration of renewable energy and energy efficiency, which are essential for addressing climate change. Ai can also help in improving the health of ecosystems by identifying oil spills and combating desertification. However, the high-energy requirements for ai operations, especially if non-carbon neutral energy sources are used, can undermine efforts to achieve SDG 13 on climate action. Moreover, increased access to ai-related information on ecosystems may lead to overexploitation of resources, although such abuse has not been adequately proved. These issues are further discussed in the gaps in ai research.

Result and discussion

Artificial intelligence (ai) has become a crucial area in tackling critical environmental sustainability issues such as biodiversity, energy, transportation, and water management. Biodiversity research has utilized machine learning and natural language processing outcomes to predict ecosystem services. Ai can be a powerful tool in mitigating climate change. For instance, ai-powered buses can cut emissions by 50 percent by 2050 by identifying the most efficient routes. The use of ai in agriculture results in improved yields, as demonstrated by peanut growers in India, who achieved a 30 percent increase in crop production by leveraging ai technology.

Conclusion

My proposal is that sustainable ai should prioritize sustainable development by focusing on the interconnections between ai innovation and equitable resource distribution, between the environment, society, and economy. Although this paper does not address each pillar of sustainability (i.e. social, economic, environmental) in relation to sustainable ai, it aims to encourage collection of ideas, policymakers, ai ethicists, and ai innovators to consider the environment - to remember that there are environmental consequences associated with ai.

References

1. The sustainability of artificial intelligence: an urbanistic viewpoint from the lens of smart and sustainable cities. Sustainability, 12(20), 8548. 2 russell, s. J. (2010).
2. Artificial intelligence a modern approach. Pearson education, inc. 3 poole, h. H. (2012).
3. Ai ethics. Mit press. 8 burger, j., Ostrom, e., Norgaard, r., policansky, d., & goldstein, b. D. (eds.). (2001).
4. Protecting the commons: a framework for resource management in the Americas. Island press. 9 Cosme, I., santos, r., & O'Neill, d. W. (2017).
5. Assessing the degrowth discourse: a review and analysis of academic degrowth policy proposals. Journal of cleaner production, 149, 321-334. 10 Bhuyan, n. (2017).
6. Sustainable development and the agenda of global social justice. Essays on sustainability and management: emerging perspectives, 19-31. 11 Morelli, j. (2011).
7. Artificial intelligence for sustainability: challenges, opportunities, and a research agenda. International journal of information management, 53, 102104. 13 Kellstedt, p. M., Zahran, s., & vedlitz, a. (2008).
8. Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. Risk analysis: an international journal, 28(1), 113-126. 14 Hoek, a. C., Pearson, d., James, s. W., Lawrence, m. A., & Friel, s. (2017).
9. Artificial intelligence models for prediction of the tide level in Venice. Stochastic environmental research and risk assessment, 35(12), 2537- 2548. 17 qian, y., song, k., hu, t., & ying, t. (2018).
10. Environmental status of livestock and poultry sectors in china under current transformation stage. Science of the total environment, 622, 702-709. 18 govindan, k., jha, p. C., & Garg, k. (2016)

11. . Artificial intelligence technologies and related urban planning and development concepts: how are they perceived and utilized in Australia. Journal of open innovation: technology, market, and complexity, 6(4), 187. 30 west, d. M. (2018). The future of work: robots, ai, and automation. Brooking's institution press. 31 manning, s., & bejarano, t. A. (2017)
12. Protecting the commons: a framework for resource management in the Americas. Island press. 9 cosme, i., santos, r., & O'Neill, d. W. (2017).
13. R. K. Kaushik Anjali and D. Sharma, "Analyzing the Effect of Partial Shading on Performance of Grid Connected Solar PV System", 2018 3rd International Conference and Workshops on Recent Advances and Innovations in Engineering (ICRAIE), pp. 1-4, 2018.
14. R. Kaushik, O. P. Mahela, P. K. Bhatt, B. Khan, S. Padmanaban and F. Blaabjerg, "A Hybrid Algorithm for Recognition of Power Quality Disturbances," in IEEE Access, vol. 8, pp. 229184-229200, 2020.
15. Kaushik, R. K. "Pragati. Analysis and Case Study of Power Transmission and Distribution." J Adv Res Power Electro Power Sys 7.2 (2020): 1-3.
16. Assessing the degrowth discourse: a review and analysis of academic degrowth policy proposals. Journal of cleaner production, 149, 321-334. 10 Bhuyan, n. (2017).
17. IOT solution for smart cities' pollution monitoring and the security challenges. Sensors, 19(15), 3401. 35 juris, j. S. (2016).
18. Machine learning and artificial intelligence to aid climate change research and preparedness. Environmental research letters, 14(12), 124007. 37 Munchausen, m., meinshausen, n., hare, w., raper, s. C., frieler, k., knutti, r., ... & allen, m. R. (2009).
19. Greenhouse gas emission targets for limiting global warming to 2 c. Nature, 458(7242), 1158-1162. 38 leal filho, w., azeiteiro, u., Alves, f., pace, p., mifsud, m., brandli, l., ... & disterheft, a. (2018).
20. Reinvigorating the sustainable development research agenda: the role of the sustainable development goals (sag). International journal of sustainable development & world ecology, 25(2), 131- 142. 39 kayakutlu, g., & Mercier Laurent, e. (2017).
21. Kaushik, M. Et al. (2015) "Availability analysis for embedded system with N-version programming using fuzzy approach," International Journal of Software Engineering Technology and Applications.
22. Sharma, R., Kaushik, M. And Kumar, G. (2015) "Reliability analysis of an embedded system with multiple vacations and standby", International Journal of Reliability and Applications.
23. Kaushik, M. And Kumar, G. (2015) "Markovian Reliability Analysis for Software using Error Generation and Imperfect Debugging", International Multi Conference of Engineers and Computer Scientists 2015.