

AI and Environmental Sustainability: An Ethical Perspective

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Abstract - Scientists have been warning of the negative effects of climate change for years, and the impacts of this phenomenon are becoming increasingly apparent around the world. Despite calls to reduce the use of fossil fuels and other resources, many believe that innovations and advancements in technology can help us avoid catastrophic consequences. Artificial intelligence (AI) is often seen as a key solution in many technological approaches to combat climate change, but the environmental impacts of AI are not well understood. This paper begins by highlighting some ways that AI can be used to address climate change, but then goes on to examine the negative environmental consequences that can result from the increased demand for computing power, as well as the lack of governance and regulation surrounding AI. By reviewing existing literature and analyzing current policies, the authors of this paper argue that the most effective way to avoid severe climate impacts is to reduce our reliance on existing systems and infrastructures that contribute to rising global temperatures, rather than relying on untested and uncertain technological solutions.

Keywords-Artificial intelligence, ethical AI, data warehousing, environmental justice, climate change, AI policy

I. INTRODUCTION

Governments worldwide are striving to decrease emissions while minimizing disruptions to the economy and their constituents. They have set goals such as achieving Net-Zero Emissions by 2050, however, achieving such objectives without significant changes in the economy and industrial restructuring would require the global economy to shrink by 42%. This is because the majority of the world's infrastructure relies heavily on fossil fuels for energy, which is the biggest contributor to greenhouse gas emissions, and for the production of goods. In light of this, industries and governments are looking for new technological solutions such as Artificial intelligence (AI) to address climate change, without having to undertake costly industrial reform. AI is considered as one of the most promising technology to mitigate climate change impacts, but the reductions projected

by AI innovations alone, estimated between 1.5-4% by 2030, are not enough to avoid the disastrous impacts of climate change. As a result, there is a desire to use new technologies, such as Artificial Intelligence (AI), to bypass the need for costly industrial reform. While AI optimizations can decrease energy and material consumption, it is important to consider the resource requirements and ethical implications of these optimizations in relation to emissions produced by the Information Communication Technology (ICT) sector, which currently accounts for 2.1-3.9% of global emissions.

II. LEVERAGING ARTIFICIAL INTELLIGENCE TECHNOLOGIES TO COMBAT CLIMATE CHANGE

One way Artificial Intelligence (AI) can be used to combat climate change is by optimizing the use of existing agricultural lands in the agricultural sector, which is one of the major contributors to emissions and environmental degradation. With the projected increase in global population, food production will need to rise by 70% by 2050. AI can help to avoid the conversion of natural areas for farming, through optimization of current land use. Additionally, AI can aid farmers, especially in developing countries, through the use of inexpensive chip and sensor systems for monitoring livestock and phone applications for identifying crop diseases.

Greenhouse Gas Emissions by Industry Sectors

The author takes a comprehensive approach to examine the environmental implications of the rapid growth of AI, considering the interconnected factors of Data, Algorithms, and System Hardware. The focus is on understanding the carbon footprint associated with AI computing, which involves analyzing the model development cycle in large-scale machine learning applications while also considering the life cycle of the hardware systems involved [1].

The authors' objective is to examine various approaches employed for evaluating sustainable performance, utilizing a literature review [2].

Using the combination of Google Earth Engine and R Statistical software, the authors have devised a workflow that utilizes a boosted regression tree machine-learning

framework on digital topographic and EO data to predict the likelihood of wetland occurrence [3].

The authors' findings reveal that all five dimensions are significantly impacted by both positive and negative factors, and emphasize the importance of values, collaboration, shared responsibilities, and ethics in the future sustainable development of AI within society [4].

In this article, the authors have identified five affordances, namely: (1) balancing energy supply and demand while considering energy prices; (2) capturing, reporting, and sharing energy-related data; (3) reducing energy consumption and emissions; (4) implementing sustainable waste management practices; and (5) coordinating flexible charging of electric vehicles. These affordances facilitate energy management through information systems in practical settings and establish a groundwork for further research in the critical field of energy informatics [5].

The use of artificial intelligence (AI) in the oil and gas industry can present environmental risks. While reducing greenhouse gas (GHG) emissions is a crucial step in combatting climate change, AI is being used throughout the oil and gas industry to help maintain their dominance. Physical ecosystems, such as an IT ecosystem, consist of multiple disparate entities that generate large volumes of data related to their environmental and operational state.[6]

The use of Artificial Intelligence (AI) models is leading to a significant increase in the demand for data centers. These centers store and process the vast amount of data required by AI systems, consuming large amounts of energy in the process.

AI-Driven Physical Devices and Technologies

The physical devices that AI systems utilize also consume a significant amount of energy and other resources. The manufacturing of microchips, for instance, consumes a large amount of electricity, water, and chemicals, which can harm not only workers but also the surrounding communities and the environment. One microchip can consume up to 1.3 kilograms of fossil fuels and waste 99% of the materials used in its production. Similarly, the production of a single desktop computer requires a significant amount of fossil fuels, chemicals, and water. This high resource consumption is also reflected in the production of other AI-enabled device networks, such as the Internet of Things. The main conclusion of this study is an important contribution to the academic literature and is also helpful for restaurant managers for planning communication strategies through social media, since environmental sustainability is one of the main concerns of the public.[8]

Environmental Disparities - Examining Inequalities in Environmental Impact

The effects of climate change are not distributed equally and

often disproportionately impact disadvantaged communities that lack access to resources or support. Environmental justice groups aim to gather more data to understand the impact of inequality and environmental racism, which refers to government's role in perpetuating race-based harm through a lack of regulation while maintaining ties with polluting industries. Research that is extractive and does not include diverse perspectives can lead to invisible harms within data systems that are only revealed when real-world impacts are felt by communities that were excluded from the training data or when models are used irresponsibly. harmful technologies to be implemented.[9]

Current AI Policies

The lack of regulations for the use of AI systems in Canada. Currently, there are no federal laws in place, and the Environmental Protection Act (1999) does not address climate change or the use of AI. A proposed amendment, Bill C-28, would include the human rights to healthy environments and environmental justice, but so far, none of Canada's climate plans include AI controls. Although mentioned at the COP26 summit in 2021, no country has yet implemented AI regulations. However, Canada and other G7 countries are developing the Global Partnership on Artificial Intelligence, which aims to focus on Responsible AI and Data Governance. Despite the lack of regulation, National Resources Canada has partnered with Microsoft for AI projects, focusing on detecting environmental non-compliance, bolstering energy grid readiness for electric vehicles, and reducing the risks from mining operations. NRCan currently supports 13 AI projects, four of which monitor water, energy, and the claims of sustainable technologies, while the rest explore efficiencies in various settings, including non-renewable resource extraction and refinement. These Canadian AI initiatives are being undertaken without standardized AI regulation.

III. RECOMMENDATIONS

The lack of regulations for climate-related AI in Canada is consistent with the overall lack of AI regulation in the country. The Office of the Privacy Commissioner of Canada has put forth a flexible approach for ensuring that data collection and use are in line with informed consent and new human rights related to data de-identification and automated decision-making. They suggest that de-identified data can be used for research and statistical purposes, such as climate-related models, as long as it is consistent with the original purpose of data collection.

Despite the existence of several recommendations and proposals for AI regulation in Canada, such as those made by the Office of the Privacy Commissioner of Canada and the proposed Artificial Intelligence Act from the European Commission, there is currently a lack of legislation and

enforcement in place. While climate change is a prevalent issue in political campaigns, governance of AI and related technologies is not given the same level of attention. As Canada aims to become a leader in the field of AI, it is crucial for policymakers to take a leading role in implementing tangible legislation that aligns with responsible AI principles, particularly in regards to the impact of AI on the climate. The priority should be on rapidly decarbonizing society above all other mitigation efforts.

IV. CONCLUSION

The increasing use of artificial intelligence (AI) technologies is generally predicted to have a positive impact, provided that they are implemented ethically. AI has the potential to positively impact 134 of the 169 targets established by the United Nations' Sustainable Development Goals, which cover social, economic, and environmental goals. Additionally, AI can be used to improve our understanding of climate change, support the use of renewable energy, and enhance ecosystem health. However, it's important to note that the energy consumption of AI systems is a concern, but recent developments in more efficient and scalable AI models and data center servers may help to reduce energy consumption and increase the environmental benefits of AI. It's also important to mention that the lack of enforceable AI regulation can exacerbate biases and cause societal, economic, and environmental harm.

It's important to consider the way in which artificial intelligence (AI) models are created, implemented, and maintained when evaluating their potential to combat climate change. While AI can have a significant impact on reducing greenhouse gas emissions across many industries, it can also cause harm to the environment and vulnerable communities if it's not powered by sustainable energy sources and guided by ethical considerations.

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