Chapter 5
Harnessing AI for Climate Solutions: Tools and Techniques

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ABSTRACT

Subsequently, AI has been instrumental toward suppressing the climate change issue considering it sets creative techniques across the various quandaries associated with the global changes. The following areas of use have been identified: energy control, reduction of greenhouse gas emissions, climatic simulation, and prediction of storms. The strength of AI that is its suitability to work on vast, intertwined datasets can be used to explain patterns and findings which would help researchers and policymakers in eradicating climate change. Looking at the impact of climate change, AI is employed to improve energy, and decrease its usage as well as adopt to green energy. AI systems, by nature, are highly dependent on data, underline the motivating computational requirements and energy utilization, in general, and are linked with the carbon footprint. In addition, lack of data, data quality issues, and relevance and originality of professional practice could also avert the application of intelligent climate solutions based on artificial intelligence, particularly in the

DOI: 10.4018/979-8-3693-9132-7.ch005

developing world.

1. INTRODUCTION TO AI AND CLIMATE CHANGE

"Climate change is a complicated and multifarious global concern needing a thorough and integrated response involving many stakeholders including governments, businesses, and civil society. The difficulties presented by climate change call for the creation and use of sensible answers using the Fourth Industrial Revolution's technical innovations—especially artificial intelligence (AI) technology. Improving energy efficiency, increasing renewable energy systems, optimizing resource management, and enabling early warning systems for natural disasters are just a few of the several facets of climate change mitigating and adaptation strategies that AI has shown great promise in addressing. More resilient and environmentally friendly solutions can be created by using AI's powers to help worldwide adaption initiatives and lessen effects of climate change by Moreover, artificial intelligence-powered technologies are very important for tracking and evaluating climate data, forecasting future climatic patterns, and guiding policy actions meant to more successfully address climate change(Chen et al., 2023). Still, it's important to recognize that the creation and application of artificial intelligence systems themselves have environmental effects that need careful thought and resolution. Particularly deep neural networks, recent research have underlined the considerable energy consumption and carbon emissions connected with running some artificial intelligence models. This begs questions about the possible environmental effects of artificial intelligence and underlines the need of giving sustainable and energy-efficient AI methods top priority, sometimes known as "Green AI." Developing and implementing AI systems meant with environmental issues in mind would help to guarantee that their contributions to climate change mitigating and adaptation are really significant and consistent with sustainability aims. This strategy calls for giving energy efficiency top priority, using renewable energy sources, and applying sensible data management techniques front stage. By tackling these issues and using artificial intelligence's potential responsibly, its power can be used to properly fight climate change while lowering its environmental impact (Olawade et al., 2024; Taddeo et al., 2021).