Chapter 5
Bias in Green AI Addressing Disparities in Data and Algorithms

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ABSTRACT

Green AI, a paradigm focused on sustainable and energy-efficient artificial intelligence, holds immense promise for advancing environmental and social equity goals. However, biases inherent in data and algorithms can perpetuate or even exacerbate existing disparities, undermining these objectives. This chapter explores the critical intersection of bias and Green AI, examining how inequities arise in the development and deployment of AI systems designed for sustainability. By analyzing case studies and recent research, the chapter highlights the implications of biased datasets, algorithmic decisions, and accessibility gaps. It also proposes strategies for mitigating bias, such as ethical AI frameworks, diverse data collection practices, and community-driven approaches. Addressing these challenges is essential to ensure that Green AI contributes to an equitable and inclusive future while meeting its sustainability goals.

INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force across industries, with applications ranging from healthcare and education to environmental sustainability. Among these advancements, the concept of Green AI has gained significant attention. Green AI emphasizes the development of energy-efficient and environmentally sustainable AI systems. While its potential for addressing pressing global challenges is immense, Green AI also introduces complex ethical and social considerations. One critical concern is the presence of biases in data and algorithms, which can perpetuate inequalities and hinder the equitable distribution of its benefits. This chapter delves into the foundational aspects of Green AI, the importance of addressing bias, and the intricate relationship between sustainability and social equity.

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1.1 Overview of Green AI

Green AI is a subset of artificial intelligence that prioritizes the creation of sustainable and energy-efficient systems. Traditional AI models often require significant computational resources, leading to high energy consumption and carbon emissions. Green AI seeks to mitigate these environmental impacts by optimizing algorithms, reducing the carbon footprint of training and deploying models, and promoting resource-efficient practices. This approach aligns with global sustainability goals, such as reducing greenhouse gas emissions and conserving natural resources. However, the adoption of Green AI is not merely a technological challenge; it is also a societal one. For Green AI to achieve its full potential, it must be inclusive, addressing the needs of diverse populations while ensuring that no group is disproportionately disadvantaged.

1.2 Importance of Addressing Bias in AI

Bias in AI systems arises when algorithms produce outcomes that unfairly favor or disadvantage certain groups. This bias can stem from various sources, including unrepresentative datasets, flawed model designs, or unintended consequences of optimization objectives. In the context of Green AI, bias can have profound implications. For instance, an AI system designed to allocate renewable energy resources might unintentionally prioritize urban areas over rural communities due to data imbalances. Similarly, predictive models in climate change research may overlook the unique vulnerabilities of marginalized populations. Addressing bias is not only an ethical imperative but also a practical necessity. Biased AI systems undermine trust, limit the effectiveness of solutions, and exacerbate existing disparities, contradicting the core objectives of Green AI.

1.3 THE INTERSECTION OF SUSTAINABILITY AND SOCIAL EQUITY

Sustainability and social equity are deeply interconnected. While sustainability focuses on preserving resources and protecting the environment for future generations, social equity ensures that these efforts benefit all members of society fairly. Green AI operates at this intersection, offering tools to address environmental challenges while promoting equitable outcomes. For example, AI-driven systems can optimize public transportation to reduce emissions and enhance accessibility for underserved communities. However, achieving this dual goal requires deliberate efforts to identify and mitigate biases that may exclude or disadvantage certain groups. By embedding principles of fairness and inclusivity into Green AI initiatives, it is possible to create systems that not only advance sustainability but also bridge social divides.

The intersection of artificial intelligence (AI) and social equity is an emerging field that has gained significant attention in recent years. As AI technologies continue to evolve, their potential to both exacerbate and mitigate social inequalities becomes increasingly apparent. This literature review explores the role of AI in shaping social equity, with a particular focus on the ethical considerations, biases, and societal implications of AI and automation.