



## Convergence Strategies for Green Computing and Sustainable Development

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### Description & Coverage

#### Description:

**Convergence Strategies for Green Computing and Sustainable Development** presents a comprehensive exploration of the potential of emerging technologies, such as the Internet of Things (IoT), Artificial Intelligence (AI), fog computing, and cloud computing, to aid in fostering a sustainable future. It examines how these technologies can reduce the impact of unsustainability in societies, the environment, and natural resources, offering invaluable insights into harnessing their power for positive change.

The book highlights how the IoT can effectively contribute to pollution reduction using energy-efficient sensors. These sensors are crucial in measuring various components and monitoring trends in the current era. Additionally, AI techniques enable computational analysis to envision systems that promote positive energy. On the other hand, cloud computing revolutionizes business models by providing flexibility, cost savings, enhanced security, efficiency, and unlimited storage while optimizing energy consumption and reducing carbon footprints.

Within the realm of green computing, the book emphasizes the development, design, and use of digital devices to minimize carbon footprints and create a sustainable environment.

**Convergence Strategies for Green Computing and Sustainable Development** serves as a comprehensive strategy that holistically understands, transforms, and develops technological systems in society.

This book caters to a diverse range of readers, including graduate students, researchers, working professionals seeking knowledge, and industry experts seeking information about new trends. With its recommended topics and comprehensive table of contents, readers can gain in-depth knowledge about sustainable cloud computing, artificial intelligence and machine learning for sustainable development, sustainable wireless systems and networks, and the crucial role of green IoT and Edge-AI in driving a sustainable digital transition.

**Convergence Strategies for Green Computing and Sustainable Development** is a vital resource that equips readers with the necessary tools to navigate the emerging technological landscape and contribute to creating a greener and more sustainable future.

#### Coverage:

The many academic areas covered in this publication include, but are not limited to:

- Artificial Intelligence (AI)
- Carbon Footprint
- Cloud Computing
- Emerging Technologies

- Energy Efficiency
- Fog Computing
- Green Computing
- Internet of Things (IoT)
- Sustainable Development
- Technological Convergence

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## Chapter 9

# Edge AI in Cloud Computing for Sustainable Development: Enhancing Cloud Computing With Applied Artificial Intelligence and Machine Learning

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## ABSTRACT

*This chapter explores the integration of applied artificial intelligence (AI), machine learning (ML), and edge computing in cloud environments, with a focus on leveraging these technologies for sustainable development. The first part of the thesis investigates the enhancement of cloud computing through the application of AI and ML techniques. The second part delves into the emerging paradigm of Edge AI in cloud computing, which examines the integration of AI and ML capabilities at the network edge to enable real-time analysis and decision-making. The thesis highlights the importance of sustainable development in cloud computing, emphasizing the need for energy-efficient and environmentally conscious solutions. Through comprehensive experimentation and analysis, this research contributes valuable insights into the development of sustainable cloud architectures and strategies. The findings provide a roadmap for organizations and researchers to leverage the synergistic potential of AI, ML, and edge computing, driv-*

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*ing advancements in cloud technology for sustainable development.*

## **INTRODUCTION**

The convergence of cloud computing and artificial intelligence (AI) has led to remarkable advancements in various fields. One area that holds immense promise for sustainable development is the integration of edge AI in cloud computing. This powerful combination enables the deployment of AI and machine learning algorithms at the network edge, close to the data source, to enhance the capabilities of cloud-based systems. By leveraging applied AI and machine learning techniques, we can revolutionize cloud computing for sustainable development, addressing pressing environmental, social, and economic challenges.

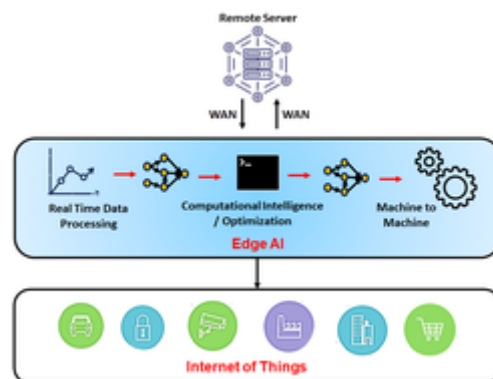
Cloud computing has already revolutionized the way we store, process, and access data, offering scalability, flexibility, and cost-efficiency. However, as the volume of data continues to grow exponentially, there is a need for more efficient and sustainable solutions. Edge AI, which brings AI and machine learning capabilities to the edge of the network, allows for real-time data processing, reducing latency, network bandwidth, and energy consumption. This integration opens up new possibilities for sustainable development by enabling intelligent decision-making and resource optimization.

This paper aims to explore the potential of applied AI and machine learning in enhancing cloud computing for sustainable development. We delve into the fundamental concepts and principles of edge AI, including edge devices, edge analytics, and edge-based machine learning algorithms. We discuss how edge AI can effectively address the challenges of large-scale data processing, energy efficiency, and network latency, while simultaneously promoting sustainability.

Furthermore, we examine the practical applications and case studies where edge AI has been successfully employed to advance sustainable development goals. These applications range from smart energy management and environmental monitoring to precision agriculture and smart transportation. Through these examples, we demonstrate the significant impact that applied AI and machine learning can have on creating more sustainable and resilient systems.

The integration of edge AI in cloud computing offers several benefits for sustainable development. It enables real-time decision-making, reduces the dependency on centralized data processing centers, enhances privacy and security, and optimizes resource utilization. By harnessing the power of applied AI and machine learning, we can foster sustainable practices, conserve natural resources, mitigate climate change impacts, and improve the overall quality of life.

*Figure 1. Practical usage of edge AI in IOT*



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