Thursday, 26 June 2025 11:00 AM (EDT)

Innovative Environmental Solutions towards Green and Sustainable Artificial Intelligence

A brief introduction to Environmental Science and Ecotechnology

Speaker

Troy Tao (Harbin Institute of Technology) (Chair)

Abstract

Environmental Science and Ecotechnology is an international, peer-reviewed, and open-access journal. ESE acknowledges the interdisciplinary nature of scientific research and primarily reports on frontier research in the field of environmental science and ecological technology, including ecological engineering, global climate change, biodiversity conservation, sustainable development standards and policies, and environmental health. ESE has obtained its latest impact factor of 14.3, based on the 2024 JCR report.

Unraveling the Environmental and Societal Impacts of Data Centers: A Spatial Analysis of Carbon Footprints, Energy Use, and Environmental Justice

Speaker

Suchi Gopal (Boston University)

Abstract

My study examines the environmental and societal impacts of data centers, with a focus on carbon emissions, energy consumption, and effects on vulnerable communities, while highlighting relevance to UN Sustainable Development Goals (SDGs) in the developing South. Using the Greenhouse Gas Protocol, we aim to quantify Scope 1, Scope 2, and Scope 3 emissions from semiconductor manufacturing and data center operations, including energy-intensive cooling systems. The study assesses data center siting across U.S. and other countries, exploring how location affects carbon intensity and renewable energy integration, offering insights for SDG 9 (Industry, Innovation, and Infrastructure). Using U.S. Census data, we map data centers' proximity to marginalized populations, addressing how rising utility costs exacerbate environmental justice issues, aligning with SDG 10 (Reduced Inequalities). For the developing South, we contextualize these findings to support SDG 13 (Climate Action) by proposing scalable, energy-efficient infrastructure and waste heat recovery strategies to mitigate ecological impacts and ensure equitable resource access, informing sustainable digital development and design of sustainable, sovereign AI systems. We propose a Green AI sustainable risk index.

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AI, Energy, and Public Health

Speaker

Shaolei Ren (University of California, Riverside)

Abstract

The energy sector is a major source of harmful air pollutants—such as fine particulate matter—that can travel long distances, penetrate deep into the lungs, and contribute to serious health conditions, including asthma, heart disease, and cancer. As a result, the rapid growth of artificial intelligence (AI) and energy-intensive data centers is contributing to a growing public health burden. Moreover, the use and maintenance of backup generators at data centers further degrade local air quality, compounding these health risks. Despite these challenges, AI also holds transformative potential to improve public health by, for example, enabling health-informed demand response and optimizing the allocation of healthcare resources.

In this talk, I will explore the complex interconnections among AI, energy, and public health. I will introduce the concept of Health-Informed AI, which both mitigates the public health impacts of AI and harnesses AI to advance public health. Through this lens, I will outline pathways for aligning AI development with cleaner air and healthier communities.

Sustainable Computing via Data and Memory-Efficient Models

Speaker

Shreyank N. Gowda (University of Nottingham)

Abstract

As the scale of machine learning models continues to grow, so too does their environmental footprint. From massive training datasets to memory-intensive architectures, the resource demands of modern AI are increasingly at odds with the need for sustainable computing. In this talk, I explore how data- and memory-efficient learning strategies can serve as a pathway toward more sustainable AI. Specifically, I focus on approaches such as zero-shot learning (ZSL) and memory-efficient learning that aim to reduce reliance on large, labeled datasets and minimize computational overhead without sacrificing performance. These techniques are particularly relevant in scenarios where power, storage, or data availability are constrained. By examining the direct link between data volume, memory access, and energy consumption, I highlight how designing models with efficiency in mind is not only a technical challenge but also an environmental imperative. This talk advocates for a shift toward Green AI, where innovation is guided by both performance and its impact on the planet.

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