# Artificial intelligence's carbon footprint reveals urgent environmental concerns



The rapid growth of artificial intelligence (AI) is transforming industries across the globe, with projections for its expansion reaching annual growth rates of 30-40% over the next decade. However, as the complexity and capabilities of AI systems increase, so does the demand for energy, raising pressing questions regarding the environmental impact of this burgeoning field.

Recent studies highlight the significant carbon footprint associated with AI, particularly in relation to the energy consumption of data centres, which require constant power and substantial cooling. Despite the known energy demands, quantifying AI's true carbon impact remains a challenge due to the absence of a standardised measurement approach. Meng Zhang, a researcher at Zhejiang University in China, noted to Advanced Science News that “a few studies have estimated the carbon footprint of individual AI systems, like GPT-3, especially after it became popular.” However, the collective emissions from major AI systems remain largely uncalculated, obscuring the true environmental implications of their rapid proliferation.

Zhang and his team undertook a significant analysis of the carbon emissions generated by 79 prominent AI systems, including notable names like Gemini Ultra, GPT-4, and Mistral Large. Their methodology focused on the energy consumption of graphics processing units (GPUs), which serve as the backbone for training AI models. These processors, essential for handling extensive data during neural network training, are major consumers of electrical power.

The findings from their study revealed alarming figures: the top 20 AI systems collectively consumed energy equivalent to that used by a small country, such as Iceland or North Korea. In fact, carbon emissions from these systems in 2022 surpassed the emissions of 137 individual countries. Zhang’s research suggests that AI's projected total carbon footprint could reach up to 102.6 million tonnes of CO2 equivalent annually, comparable to the emissions produced by 22 million people in a year.

As the capabilities of AI models expand—evidenced by the exponential growth of parameters in systems like ChatGPT-4 compared to its predecessors—so too do their energy requirements. Zhang pointed out that ChatGPT-4, with up to 1.8 trillion parameters, is estimated to produce emissions twelve times greater than those of ChatGPT-3.5.

Addressing the environmental consequences of AI poses numerous challenges. Although the integration of renewable energy sources appears promising as a sustainable solution, substantial hurdles remain in scalability and global adoption. Zhang also examined the potential role of carbon taxes in raising awareness and altering business practices, suggesting that these could lead to costs of approximately $10 billion USD annually if applied to AI’s energy consumption.

The analysis indicates that carbon taxes might motivate companies to invest in cleaner energy and more efficient AI systems, but the actual impact depends on the policies' implementation effectiveness. Without international collaboration, emissions could simply shift to regions with less stringent environmental regulations.

Zhang underscores the necessity for improved transparency and precision in calculating AI's carbon emissions, advocating for more refined methodologies that include the production of AI hardware and the type of electricity used during operational processes. He emphasised, “Given the potential financial impacts of future policies, like carbon taxes, we need even more precise methods.”

While the present calculations may be approximations, they represent a crucial first step in understanding AI's environmental impact. The challenges posed by AI's growth are balanced by the potential benefits it can offer in resource management and climate change modelling, as acknowledged by Zhang. Notably, he stated, “AI has the potential to significantly benefit the environment by enabling more efficient resource management, advancing renewable energy technologies, and improving climate change modelling.” This dual aspect of AI presents an ongoing narrative in its evolution within the global landscape of technology and sustainability.

Source: [Noah Wire Services](https://www.noahwire.com)

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