Artificial Intelligence (AI) is Becoming a Powerful Tool to Combat Climate Change

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	Low				High
Impact	●	●	●	○	○
Likelihood	●	●	●	○	○
Controversy	●	○	○	○	○
Where	Global				
When	Substantial advances in AI by 2030 expected[9]				

Figure 1. EU trend of Sustainable Development Goal (SDG) 13 on climate action. Official statistics show that substantial progress is still to be made to combat climate change in the EU.[8]

Summary

There is overwhelming evidence that the Earth's climate is changing. It is also **looking increasingly likely that we will see global warming of 4°C by the year 2100**. [1][2][3]

Most notably, Carbon Dioxide (CO_2) in the atmosphere has increased by more than 30% in the past few centuries. Virtually all climatologists agree that this is due to human activity – predominantly the burning of fossil fuels, alongside deforestation and related activities which have contributed to greenhouse gas build-up since 1800.[4] Urgent action is now required to mitigate further damage, and/ or to adapt to these shifts.

There is early evidence to suggest that AI tools such as Machine Learning (ML) have substantial potential to help. For example, experts have projected that advances in AI (which refers to using a computer to model intelligent behaviour with minimal intervention from humans[5]) will support the development of low-carbon energy systems.

Technological developments could also allow stakeholders to better understand and model climate change.[6]

Case Study: Using AI to Forecast Energy Performance of Buildings.

Researchers in the USA have used AI techniques to develop a 'campus energy use tool' to predict the effects of long-term climate change on the energy performance of buildings.[7]

They highlight that in looking beyond individual building levels, forecasting building energy performance can help city and community managers to have a better understanding of their future energy needs, and to plan for satisfying them more efficiently.

Detail

Whilst AI itself has advanced rapidly since its inception at a Dartmouth College workshop in 1956, the application of AI technology to climate change is in its early stages. Progress, however, is promising – so much so that **Microsoft has declared that AI can be a 'game changer for our planet'** and committed $50 million to applying AI to grow and scale climate, water, agriculture and biodiversity.[11]

AI has the potential to be utilised across diverse areas: from developing cleaner and safer transportation and smart agriculture, to urban planning and the forecasting of extreme weather. Whilst there is currently no published research which projects how long it will take to apply AI to climate change specifically, significant technological developments in AI are expected by 2030.[9]

Current Applications

- AI-enabled autonomous drones for fast climate change crisis assessment.[10]
- Climate change adaption, e.g., weather forecasting.
- Forecasting building energy performance.[7]

Future Applications

- Modelling climate change[6][9]
- Supporting dev-elopement of low energy carbon systems[6]
- AI for cleaner transportation
- Understanding climate change[6][7]

Required Resources

- Finance: computing resources (software/ hardware)
- Human capital: e.g., AI engineers, researchers & ethicists

Drivers

- Funding
- International collaboration
- Cross-discipline (academic) collaboration
- Technological development
- Competition (e.g., in industry)

References

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Future Implications & Potential Inhibitors

(For the UK and globally)

Implication	Detail	Inhibit-or?
Political	• Need for increased public scrutiny	• Y
Economic	• Increase in funding required for materials and human resources • Creation of jobs	• Y • N
Scientific	• Increased scientific understanding of climate change (e.g., via projection and modelling)	• N
Technol-ogical	• Drives further AI development & innovation	• N
Legal	• Increased need for regulatory oversight • Need for global approach to AI law/ regulation	• Y • Y
Environ-mental	• Potential for required computing power for AI (e.g., CPU usage) to negatively impact environment. • Mitigation of & adaption to climate change	• Y • N