
WHAT ARE THE SOLUTIONS TO CLIMATE CHANGE? A PERSPECTIVE VIEW OF AN AI STUDENT

1 CONTENT

Climate change refers to long-term shifts in temperatures and weather patterns. In our current recognition, climate change seems a negative phrase, as it means extreme weather such as high temperatures or snow and ice, and unsuitable living climates. In fact, climate change can be natural, due to changes in the sun's activity or large volcanic eruptions. But since the 1800s, human living and production activities have become the main cause of climate change, primarily due to the burning of fossil fuels like coal, oil and gas, which will generate greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun's heat and raising temperatures (UNCA).

When entering the 21st century, a range of human activities are generating more and more greenhouse gases, such as the excessive burning of coal to generate electricity and more and more gasoline-powered private cars on the road, which are causing the current global average temperature to rise. According to a UN annual report (UNEP (October 24, 2024)), current policies in place point to up to 3.1°C of warming by the end of the century.

As we have been taught in primary school, climate change not only affects human health, plantation, living and work, but also has negative effects on animals and plants, which will reduce the biodiversity on the Earth. Therefore, governments around the world have taken some actions to restrain global climate change. For example, in response to climate change, the Chinese government has set a clear goal to reach its carbon peak by 2030 and achieve carbon neutrality by 2060, endeavoring to gradually realize net-zero carbon dioxide (CO₂) emissions (Zhao et al. (2022)).

From the academic point of view, scientists have conducted a lot of statistics and research to verify the necessity of limiting the fast climate change (Dietz et al. (2020)). Recently, there is a prevalent awareness that 'nature-based solutions' (NbS), which involve working with and enhancing nature to help address societal challenges, can be employed to protect human from climate change impacts while encompassing a wide range of actions, such as the protection and management of natural and semi-natural ecosystems, the incorporation of green and blue infrastructure in urban areas, and the application of ecosystem-based principles to agricultural systems (Seddon et al. (2020); Osaka et al. (2021)). Although it seems a good way, some people concern that it distracts from the need to rapidly phase out the use of fossil fuels, protects existing intact ecosystems. Besides, the expansion of forestry framed as a climate change mitigation solution is coming at the cost of carbon rich and biodiverse native ecosystems and local resource rights (Seddon et al. (2021)).

In the era of Artificial Intelligence, researchers try to curb climate change in "AI+" ways. As one of branch of AI, Machine learning (ML) algorithms have achieved great performance in different kinds of real-world applications, such as searching, transportation, agriculture, et al. A considerable number of isolated Earth System features have been analyzed with ML techniques, and more generic applications to understand better the full climate system are still under explored (Huntingford et al. (2019)). In fact, artificial intelligence can mitigate the adverse effects of climate change, with a focus on energy efficiency, carbon sequestration and storage, weather and renewable energy forecasting, grid management, building design, transportation, precision agriculture, industrial processes, reducing deforestation, and resilient cities (Chen et al. (2023)). I believe Pangu-Weather (Bi et al. (2022)), a deep learning based system for fast and accurate global weather forecast proposed by Huawei is a good example to show how "AI" can be help in the mitigation of climate change. The system established a data-driven environment by downloading 43 years of hourly global weather data from the 5th generation of ECMWF reanalysis (ERA5) data, and it achieved state-of-the-art numerical

weather prediction in terms of geopotential, specific humidity, wind speed, temperature, et al based on AI methods.

With the accurate predictions, researchers can simulate the environments in the near future by software more easily, and test different possible solutions to curb the sharp change in global climate. For example, if we want to reduce the high temperature in the summer, the scientists can apply this AI-based system to predict the target temperature by controlling other environment conditions, such as the average carbon emission of each person on the Earth. In the meanwhile, governments can establish policies regarding to climate change by following the experimental results and suggestions of scientists, such as replacing all fuel-efficient vehicles by electric ones. Besides, with AI-assisted researches in materials discovery, sustainable clean fuels can be designed and accelerated inexpensively, and the fossil energy will reduce into 19% in the 2040 (Maleki et al. (2022)).

In summary, with the applications of AI, all kinds of researches in climate change can be greatly improved. What's more, when people use large language models or AI assistant tools in their daily lives, those agents can also provide positive guidance to human with eco-friendly ideas, which can enhance the recognition of human in climate change, biodiversity and eco-systems. I believe human beings can find the best solution to the climate change with the help or guidance of AI.

2 STATEMENT OF AI

I have used ChatGPT to collect examples, but I do not generate sentences and paragraphs with it.

REFERENCES

- Kaifeng Bi, Lingxi Xie, Hengheng Zhang, Xin Chen, Xiaotao Gu, and Qi Tian. Pangu-weather: A 3d high-resolution model for fast and accurate global weather forecast. *arXiv preprint arXiv:2211.02556*, 2022.
- Lin Chen, Zhonghao Chen, Yubing Zhang, Yunfei Liu, Ahmed I Osman, Mohamed Farghali, Jianmin Hua, Ahmed Al-Fatesh, Ikko Ihara, David W Rooney, et al. Artificial intelligence-based solutions for climate change: a review. *Environmental Chemistry Letters*, 21(5):2525–2557, 2023.
- Thomas Dietz, Rachael L Shwom, and Cameron T Whitley. Climate change and society. *Annual Review of Sociology*, 46(1):135–158, 2020.
- Chris Huntingford, Elizabeth S Jeffers, Michael B Bonsall, Hannah M Christensen, Thomas Lees, and Hui Yang. Machine learning and artificial intelligence to aid climate change research and preparedness. *Environmental Research Letters*, 14(12):124007, 2019.
- Reza Maleki, Mohsen Asadnia, and Amir Razmjou. Artificial intelligence-based material discovery for clean energy future. *Advanced Intelligent Systems*, 4(10):2200073, 2022.
- Shannon Osaka, Rob Bellamy, and Noel Castree. Framing “nature-based” solutions to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 12(5):e729, 2021.
- Nathalie Seddon, Alexandre Chausson, Pam Berry, Cécile AJ Girardin, Alison Smith, and Beth Turner. Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Philosophical Transactions of the Royal Society B*, 375(1794):20190120, 2020.
- Nathalie Seddon, Alison Smith, Pete Smith, Isabel Key, Alexandre Chausson, Cécile Girardin, Jo House, Shilpi Srivastava, and Beth Turner. Getting the message right on nature-based solutions to climate change. *Global change biology*, 27(8):1518–1546, 2021.
- UNCA. What is climate change? <https://www.un.org/en/climatechange/what-is-climate-change>. Accessed: April 10, 2025.
- UNEP. Emissions gap report 2024. <https://www.unep.org/resources/emissions-gap-report-2024>, October 24, 2024. Accessed: April 10, 2025.
- Xin Zhao, Xiaowei Ma, Boyang Chen, Yuping Shang, and Malin Song. Challenges toward carbon neutrality in china: Strategies and countermeasures. *Resources, Conservation and Recycling*, 176: 105959, 2022.