



# The Future of Artificial Intelligence: Empowering Humanity and Help Protecting Planet <sup>†</sup>

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**Abstract:** Artificial intelligence systems (AISs) have become a part of our lives, with many even allowing themselves to be “programmed” by AI-based applications. However, AI can also aid people in carrying out various activities. The third hype of AI has focused on the exploration of an exponentially growing amount of data, most of which are not managed. What might the fourth hype be? The pursuit of the dream of AI initiators of building a machine more intelligent than humans and the race to achieve computer power raise some questions: is this compatible with human and planetary sustainability? How far can AI research and applications go? What future directions could AI research and businesses take? This paper will present perspectives on the synergy between humans and AI systems. Two aspects are discussed: the empowerment of humans through AI, and the use of AI to protect the planet, with the aim of trying to answer the difficult question of how we can balance researchers’ ambitions, greedy businesses, and sustainable development with protecting the planet.

**Keywords:** artificial intelligence; systems; empowering humanity; planet protection; climate change; future of AI



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## 1. Introduction

Building a machine more intelligent than human has always been a dream of some researchers. Since its official birth in 1956, artificial intelligence (AI) has made tremendous progress, which can be seen in both knowledge-based and connectionist AI. The latest hype consists mainly of exploring a huge amount of multimedia data, generated by many actors, using various algorithms, and perfecting robots, drones, and IOTs. Such exploration, as well as the development of military and humanoid robots, has raised ethical questions. Organizations such as UNESCO, the European Union (EU), and others have defined the main principles for protecting humans, and encourage the ethical development of AI applications [1–3]. The International Federation for Information Processing (<https://ifip.org/>, last accessed 2 August 2023) has initiated a Working Group on AI Governance.

The miniaturization from computers to smartphones has provided access to worldwide information (including fake information) to many people. Various applications, often with embedded AI, are accessible to all smartphone users. This “empowerment by a smartphone” and trust in the provided content is causing the deterioration of cognitive capacity, critical thinking, and communication with real people, especially among young users. Another key example of “empowerment by AI” comes from Chat GPT, and other generative AI, to the point that teachers are required to innovate their teaching methods and programs. However, various AI techniques and devices have huge potential to empower humans.

Technology as a whole (hardware and software) also generates a huge amount of waste [4]. Many devices are designed using the “planned obsolescence” principle: they are quickly outdated, thrown out, and replaced by a new model with better performance. It

is the same for software. The famous software used worldwide offer many possibilities, and the user cannot remove unnecessary blocks. The trend for collecting data generates the need for data center and cooling systems, usually located in the North.

The recent interest in climate change and planet protection at all levels of society has led to some statements but few actions. However, the twofold effect (benefits and waste) generated by AI may help us to achieve a deeper understanding of the possible causes of climate change, and to design and plan actions with an optimal impact.

This paper focuses on two aspects of AI: the empowerment of humanity, and a deeper understanding of various aspects of climate change, with the aim of using the right AI to protect the planet.

It provides some elements toward answering a very difficult question: is it possible to balance greedy businesses, researchers' ambitions, and the needs and wellbeing of humanity, without destroying our home? What AI do we need for a sustainable future?

The main method applied to this research focuses on finding the best way of combining human intelligence, AI, and computer power, when addressing complex problems. Sometimes, inspiration from natural ecosystems (the intelligence of nature) may help.

## 2. Empowering Humans with AI

Chat GPT answers: "AI has the potential to empower humans in numerous ways by augmenting our capabilities, improving decision-making processes, and enhancing overall productivity". It also enumerates intelligent decision support (which we have known since the late 1980s), personalized experience (the third hype of AI), improved healthcare outcomes, access to technology for the impaired people, lifelong learning, and creative assistance.

There is nothing about consistency checking, which is extremely important in detecting fakes, and nothing about wellbeing, nor about combining human and computer "intelligences".

It is true that AI has the potential to empower humans in many fields. The conditions, however, for a sustainable relationship require an even greater trust and sustainable synergy between human and computer intelligence, and probably do not involve building a super AI (AGI) or replacing humans with robots if not necessary. For example, intelligent assistants should be personal, with the embedded capacity to improve through multimodal learning, regarding its users' needs.

Industry 4.0 and 5.0 introduced, among others, cobots and the factory of the future [5,6]. For example, Schneider Factory Vaudreuil includes EcoStruxure, using augmented reality in instant diagnosis and contactless maintenance, and the related Asset Advisor for predictive maintenance. It also includes decision-support systems working in a complex industrial environment. The main French energy provider (EDF) introduced smart chatbots to guide technicians working on the maintenance of nuclear plants. They also include a connection to expert knowledge for difficult cases [7].

Regarding healthcare, AI empowers medical staff in multiple activities. MYCIN was one of the first AI applications for medical diagnosis. Today, AI systems provide effective support in cancer cells diagnosis, and shorten the development time of drugs and vaccines. Rural areas in France, and certainly in other countries, lack medical doctors, which is why it is important to offer diagnosis online but, despite significant improvements in AI-based diagnoses, some cases require verification by a human doctor who knows the patient. Surgery robots work in collaboration with human doctors, and allow for more accurate surgery.

The COVID-19 pandemic highlighted the need for the real-time scheduling of medical staff and equipment; constraint programming may be of great help here.

Constraint programming [8] is very helpful in optimization, planning, scheduling, resource and route allocation, generating timetables, and dealing with other related problems. These include, in particular, quickly finding the best solution respecting given constraints, among many other possibilities.

An AI-based simulation is very useful in understanding all possible impacts, and aiming to identify the best option. For example, on the website of the World Economic Forum (WEF), we can display the various impacts of AI [9]. Expert knowledge is vital for building such simulators. The French government is proposing a simulator for the evaluation of retirement pensions, but we need more of them, especially for evaluating the consequences of decisions before doing.

To face the rise in crime and cybercrime, we require early detection, before the damage is done. While many cities, and other sensitive places, are equipped with cameras, predicting and avoiding an event is still not easy, because criminals constantly invent new methods [10]. Dealing with crimes, and detecting them before they happen, is among our biggest challenges. It requires the collection and verification of all available data, information, and knowledge. AI is also able to empower the agents in charge of video recording analysis [11]. Such an application is not yet implemented into Smart Cities.

The Smart City concept groups various AI applications, such as the optimization of transportation, energy, and water. The AI Magazine mentions 10 main benefits of the application of AI to Smart City [12]; among them are security, maintenance of infrastructures, prediction of future needs, control of pollution, optimization of parking systems and public transportation, waste and traffic management, energy usage, and carbon emission tracking.

AI empowerment in teaching, training, and learning is not new. The first AI-based tutor systems appeared in the middle of the 1980s. The COVID-19 pandemic accelerated online learning, as it was the only possibility to learn during lockdown. Various AI techniques have been integrated into learning systems, with the aim of making educational and training systems attractive to learners; among them are immersive learning and training, and games [13]. Learners have been offered a large spectrum of technological possibilities, although generative AI pushes teachers to invent new methods, considering the capacity of Chat GPT and others to generate moderately good answer to teachers' questions [14].

Correctly applied Knowledge Management powered by AI, augments human capabilities, via easy access to collective knowledge. The quality of "knowledge" generated only from data is, in many cases, not sufficient. This is why we need the fourth generation of AI, combining Knowledge-based AI and Connectionist AI (including generative).

AI may also help in managing the natural disasters that are more and more numerous, by firstly understanding the real causes, and then aiming to fix what it is possible to. Powered by AI, forecast predictions help in preparing preventive actions, and managing rescue actions, via the optimized exploration of local resources.

Mentioned by Chat GPT, "creative assistance" may be useful in generating new ideas. Its use in writing books or articles, or in generating images, raises copyright questions.

A personalized experience is useful in marketing, to push visitors and clients to buy more. However, an effort can be made to use AI to make marketing activities greener, through its applications in intelligent e-commerce, and targeted advertisement and mailing, among others.

The coming AI for Good Summit (<https://aiforgood.itu.int/summit23/>, last accessed 2 August 2023) announces, "AI for Good Global Summit takes action to ensure AI benefits humanity". However, they focus mainly on the 17 UN Sustainable Development Goals.

Another WEF "simulator" is useful for seeing the links to Sustainable development [15] and Climate Change [16].

### 3. AI for Planet Protection

Since the second UN Summit in Rio, 1992, a plethora of conferences, events and reports have discussed the various aspects of climate change. Most of the proposed actions are good wishes and quick fixes.

Despite the adoption of the Paris Agreement (COP21) on climate change, and the establishment of the 17 United Nations Sustainable Development Goals, significant gaps remain

between the scientific, business, and political communities when it comes to understanding how climate change risks cascade through all our systems.

The World Meteorological Organization (WMO) has established seven climate indicators, to provide a bigger picture of the global climate system, and the risks posed by altering it. The ultimate aim of the indicators is to improve the collective understanding of the complex ways in which climate change threatens sustainable development, and to encourage more drastic and immediate climate action. The proposed indicators are: the CO<sub>2</sub> concentration, sea ice extent, sea level rise, ocean acidification, glacier mass balance, global mean surface temperature, and ocean heat content. It is a good beginning; however, the proposed climate indicators [17] do not consider the positive and negative impacts of technology [4], or the waste produced by hospitals, the fashion industry, globalization, and others.

It is true that AI has the potential to make a significant contribution toward protecting the Planet, through understanding the origins of multiple interrelated crises, using the simulators, before selecting the most impactful actions, and using a suitable assessment to evaluate progress.

Again, the response of Chat GPT provides some interesting insights: “AI technologies can enhance our understanding of complex environmental challenges, develop innovative solutions, optimize resource allocation, and enable more informed decision-making”. It mentions energy optimization, smart grid management, sustainable agriculture, environmental monitoring, waste management, climate modeling and prediction, sustainable transportation, conservation, and biodiversity.

Some of these points, such as energy optimization, smart grid management [18], sustainable transportation, and waste management are already included in Smart Cities. Considering them separately does not produce the expected impact; for example, governments pushing to replace traditional cars with electric ones, without evaluating the overall impact of this decision.

Waste management today uses the pattern recognition system for sorting. Nevertheless, we can do better. For example, electronic waste can be reduced through modular design (Xiaomi smartphone). Smart packaging can be inspired by nature, for example, seed shells. As the trend of shrinkflation produces more waste, an AI-based application may help consumers with smart buying.

Sustainable transportation is not only about green cars and bikes (mostly electric) but also about optimizing routes, minimizing distances by finding local activity (AI apps), and buying local products.

Sustainable agriculture requires more than the analysis of data from sensors, satellites, and drones. Even a minimization of the amount of watering, fertilizers, and pesticides in intensive agriculture leads to the depletion of farmland, and of related ecosystems (bees in charge of pollination). The preservation of ancestral knowledge about crop rotation, the associations between vegetables, the use of natural fertilizers, and other actions lead to sustainable agriculture. The new concept of agroecology, probably introduced by INRAE [19], is also being explored by Sony CSL (<https://csl.sony.fr/sustainability/>, last accessed on 2 August 2023).

Today's main space industry actors collect satellite images of Earth. These images allow us to study Earth's conditions, with the aim of proposing preventive or curative actions, for example, the protection of rainforests.

The data collected from satellites, sensors, and other sources can serve to monitor and analyze environmental conditions, such as air quality, deforestation, and wildlife populations. They can also serve to detect the ripeness of, for example, oranges and coffee.

The analysis of climate data, the generation of predictive models, and the assessment of the potential impacts of climate change can help policymakers and organizations to make better decisions, and develop mitigation strategies.

AI is also helpful in preserving biodiversity [20]. Specific robots are used to remove quickly proliferating species, such as lionfish in the Mediterranean Sea.

Of course, many other types of AI research and applications are available to help preserve natural ecosystems. The EU program LIFE (<https://www.ecologie.gouv.fr/programme-europeen-financement-life>, last accessed 2 August 2023) is devoted to this and related topics.

Some suggestions on how AI can help with achieving the 17 UN SD Goals are presented in [21].

#### 4. Conclusions and Future Work

AI approaches and techniques have a great role to play, today and in the future, with a focus on empowering humanity, greening AI (and technology), and contributing to protecting the Planet via smart and green technologies and applications. After separately considering the Green Deal and digital transformation, the new EU trend is the “twin transition”—green and digital. The “smart” has to be added; this consists of using the best-suited AI techniques, or inventing new ones, to address the complex challenges of today. Such challenges require a deep understanding, before the application of adequate AI techniques.

In the near future, we will understand the limitations of “big data and machine learning” approaches, and switch from data processing to the smart combination of data with knowledge. The conceptual knowledge models described by Alan Newell and implemented in KADS (the EU-sponsored project) and Stanford ontology may be very useful in the art of problem solving using AI.

Such an approach to problem solving can also be used to reach a deeper understanding of the interrelated crises and causes of Climate Change, with the aim of proposing impactful actions, and assessing their results.

We also hope that AI will inspire businesses to become wiser and greener.

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