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## **AN EMPIRICAL STUDY ON SUPPORT OF AI IN ACHIEVING SUSTAINABLE DEVELOPMENT GOALS**

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### **ABSTRACT :**

The emergence of artificial intelligence (AI) and its progressively wider impact on many sectors requires assessing its effect on achieving the Sustainable Development Goals. Using a consensus-based expert elicitation process, we find that AI can enable the accomplishment of 134 targets across all the goals, but it may also inhibit 59 targets. However, current research foci overlook important aspects. The fast development of AI needs to be supported by regulatory insight and oversight for AI-based technologies to enable sustainable development. Failure to do so could result in transparency, safety, and ethical standards gaps. The SDGs cover 17 integrated priorities identifying global quantifiable targets through social, economic, and environmental development factors. They are meant to be a universal collection of metrics and a reference structure to be utilized by the international society to motivate initiatives and adoption by 2030. In 2015, the United Nations set these targets as a follow-up to the Millennium Development Goals, which established a basis for collaboration to eradicate extreme poverty. This new paradigm facilitates a long-term shift towards more sustainable growth.

Keywords - Sustainable development goals, Artificial intelligence, UN SDGs, Sustainable energy

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### **INTRODUCTION :**

The emergence of artificial intelligence (AI) is creating more and more businesses. For example, artificial intelligence should have an impact on global productivity, equality and participation, environmental impact, and many other areas in the short and long term. The potential impact of artificial intelligence has been reported to show both positive and negative effects on sustainability. However, to date, no published research has assessed the extent to which AI, as defined in this study, could impact many aspects of sustainable development; these are the 17 international development goals and specific target 169 endorsed by the 2030 Agenda for Sustainable Development (SDG). This is an important research distinction when we find that intellectual ability can influence the ability to achieve any developmental goal. Here, we show and discuss how AI can support or hinder the achievement of all 17 goals and 169 targets set in the 2030 Agenda. Sustainable development. The criteria published at the end of this study provide the social characteristics that can be achieved by the expert's reporting criteria and drew on previous studies to determine the relationships between the Sustainable Development Goals. Although there is no universal acceptance of AI, for this study, we consider AI to be a software technology that has at least one of the following capabilities: understanding – including voice, vision, text, and touch (e.g., recognizing faces). ); decision-making (e.g., medical diagnosis), prediction (e.g., weather forecasting), extracting information from data and pattern recognition (e.g., detecting fake news on social media), interactive communication (e.g., social robots or catboats), and Logical reasoning ( for example, site development). This theory covers many subfields, including machine learning. Over the past decade, many industries have experienced major disruptions due to technological advances. One of the main players is artificial intelligence (AI), a field of research that is rapidly laying the foundation for the future and driving the Fourth Industrial Revolution (4IR) transformation. Driverless cars, medical diagnostics, and social robots are just a few of the technologies that make up our current reality. So it's not crazy to think that AI could be a catalyst for achieving the United Nations Sustainable Development Goals (UN Sustainable Development Goals).

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### **AI & CLIMATE CHANGE :**

Today's modern technology is leading to incredible advancements in imagination. In sectors such as health, agriculture, education, and transportation, artificial intelligence will enable people to use information more and be more productive. We also see how AI-powered informatics can help doctors eliminate medical errors, increase efficiency, educate students, and distribute expertise. Artificial intelligence and climate change are areas that have attracted attention in recent years. For example, AI can be used to manage environmental changes and impacts across many different sectors and situations. Intelligent, decentralized renewable energy networks, safer devices, environmental management and control, and weather forecasting are just some of the possible applications. Research conducted by PwC and Microsoft in the UK shows that the use of artificial intelligence in environmental technologies could contribute US\$ 5.2 trillion to the global economy by 2030, an increase of 4.4% compared to the past.

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## AI IN HEALTH CARE SECTOR:

Report on disease recognition AI developed by researchers at McKinsey, Heidelberg University, and Stanford University to determine if they are cancerous using visual analysis of natural images, such as images of skin flesh. The study found that knowledge-based experts outperformed dermatologists. Another example of the use of artificial intelligence for health is a device that detects early signs of diabetes using heart rate data. If the cost is right, this device could help more than 400 million people with diabetes worldwide. Human error is also a major problem in healthcare. Incomplete medical records and large patient populations can be fatal. AI is immune to these causes and can predict and diagnose diseases faster than most doctors. For example, in one study, an artificial intelligence model using algorithms and deep learning detected cancer at a higher rate than 11 doctors.

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## AI IN AGRICULTURE & FIGHT HUNGER:

According to the United Nations, global food production will need to increase by more than 70% by 2050 to feed the world's population. Since time is of the essence, using artificial intelligence services can speed up the search for solutions. Our goal is to make food smarter and more economical. Today, half of the world's food is wasted, even a surprising amount. TOMRA Sorting Solutions machines are equipped with artificial intelligence and can sort food and categorize it into "good" and "bad." For example, if an algorithm needs to identify a tomato, it can decide whether it is suitable for a salad. If this fruit is not enough for salads, it can also be used to make tomato juice. Big data and machine learning are also used in the Nutrition Early Warning System (NEWS) to identify areas at risk of food shortages, drought, floods, rising food prices, and land degradation. It was sent to Colombia to warn producers of impending floods and remind them of the growing season. 170 farmers, who followed the instructions throughout the dry season and did not miss the planting season, saved greatly on planting costs.

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## INCREASING EQUALITY & AI EMOTIONS:

Solutions that promote equality, diversity, and self-determination, including reducing or reducing stigma based on race, gender, ethnicity, religion, and disability, are critical to creating better lives for all global citizens. In her report, McKinsey mentioned Affectiva (and MIT Media Lab competition) and Autism Glass (a Stanford University research project) which use artificial intelligence to help people with autism by recognizing thoughts and building relationships. Communicate in a social environment. Another example would be introducing another form of identification, such as a driver's license, for people who do not have one.

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## OBJECTIVE OF THE STUDY:

- The main goal of sustainability education is to use resources without compromising the balance and stability of natural processes.
- Research on the Sustainable Development Goals includes reducing inequalities, health and well-being, and quality education.
- Research has uncovered options for sustainable development and can solve many problems. It can solve economic problems such as poverty and environmental problems such as climate change, water damage, and greenhouse gas emissions.
- Adoption studies will allow us to assess the required ecosystem balance.

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## LITERATURE REVIEW:

Cui et al. (2018) investigated the role of intelligence in health by analysing 160 pieces of social impact intelligence. Although few studies have investigated the impact of intelligence on different areas of sustainable development, Vinuesa et al. reported another important study that addresses all Sustainable Development Goals. (2020). Using expert opinion, we assess the role of AI in achieving the Sustainable Development Goals and argue that AI can not only contribute to achieving 134 goals but also influence progress on 59 goals. In contrast, Ye et al. (2021) analysed public perception of the connection between the two occupations. Another study divided the Sustainable Development Goals into five categories based on the type of impact AI will have (Sætra, 2021). This increases the negative impact of artificial intelligence that can arise from control by large corporations and individual countries, especially in the field of artificial intelligence application management. Gupta et al. (2021) conducted a more detailed study on the use of artificial intelligence in the Sustainable Development Goals indicator. Another popular book in this field is "Multi-Purpose Intelligent Energy Management for Microgrids" written by Chaouachi et al. (2012) proposed a system based on linear programming, multi-objective optimization, artificial intelligence, and cognitive problem solving for the microgrid energy estimation and optimization problem, published in the IEEE Transactions on Industrial Electronics journal. Another study explores the impact of AI research on various areas where AI applications can improve social relationships (Wamba et al., 2021). Goralski and Tan (2020) examined three research areas (water, agriculture, sanitation, and health) on the use of artificial intelligence to improve the performance and efficiency of resource management. They liken intelligence to a double-edged sword and stakeholders need to be careful. This is especially important when AI is used for sustainable development, which requires the creation of well-defined models (Vinuesa and Sirmacek, 2021) or in complex contexts such as diffusion (Vinuesa et al., 2020b). In particular, some studies in this field look at the relationship between artificial intelligence and sustainable development in China (Liengpunsakul, 2021) and India (Singh et al., 2022). The use of these studies suggests a good analysis of existing information and data, and we can find only a few recent quantitative analysis articles, such as Wamba et al., 2021 and Liu et al., 2023. The "Artificial Intelligence for Sustainable Development Goals Think Tank10" was created to evaluate the good or bad aspects of AI projects in goal development.

## RESEARCH METHODOLOGY:

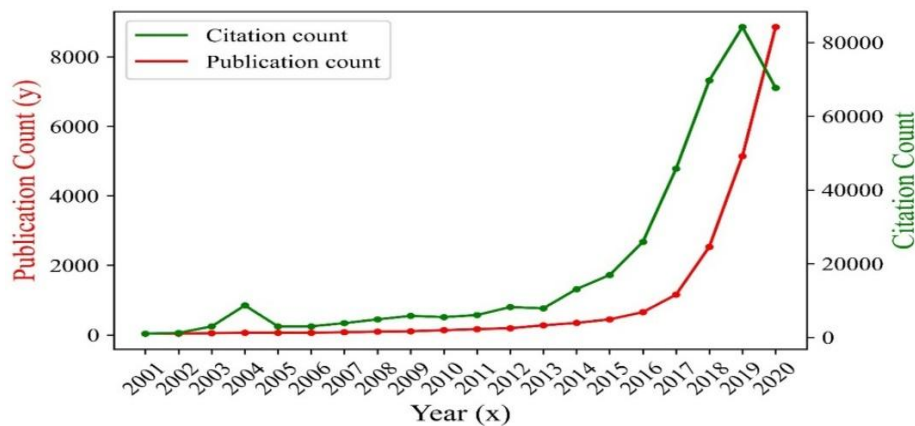
Research design- Secondary research

Statistical tool used- Quantitative methodology

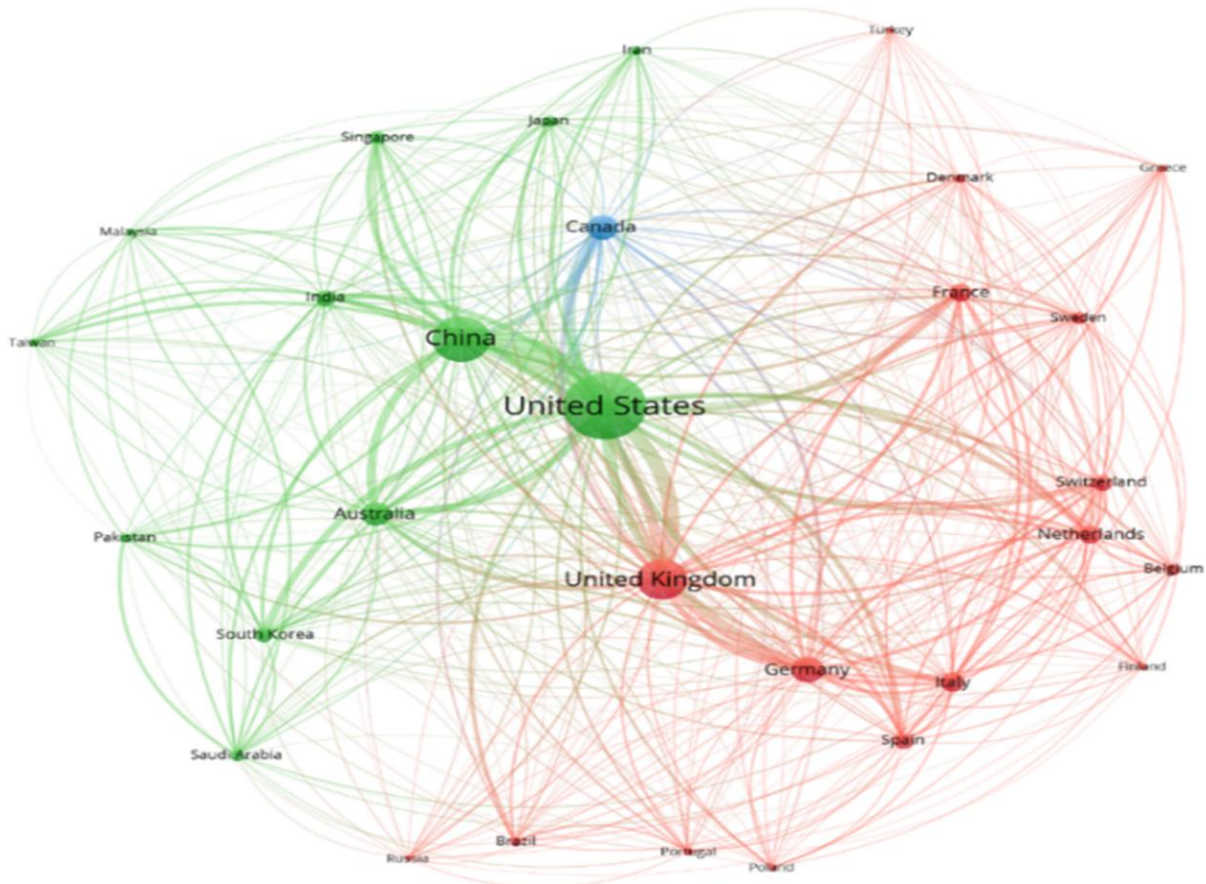
Source of data- Secondary

Data presentation- Graphs & tables

This section describes the process used to obtain the results described in this study and is shown in the second section. Goal: “Is there evidence that AI can support this specific mission?” This is to answer the question. For each of the 169 targets of the 17 Sustainable Development Goals. To this end, we have made recommendations based on requests from experts and based on previous research on the interaction techniques between the Sustainable Development Goals and implementation research conducted by Butler et al (67) and Morgan (68). The authors of this study are researchers in a variety of disciplines, including engineering, natural sciences, and social sciences, and are experts in elicitation techniques. The authors have conducted expert-driven data research to support the connection between AI and multi-purpose use, where the following are considered as evidence: More studies on real-world applications (taking into account different locations (given differences in quality between locations), we approved. Included in the review publications are good enough); Published evidence on control/clinical status (we confirmed that the publications included in the analysis were of sufficient quality, given the difference in quality across sites); from reports by recognized organizations (such as the United Nations or government organizations) and written business-level practices. On the other hand, the following information is not considered an initial recommendation: predictive learning, real-world application of research without analysis; news, public opinion, or other information.

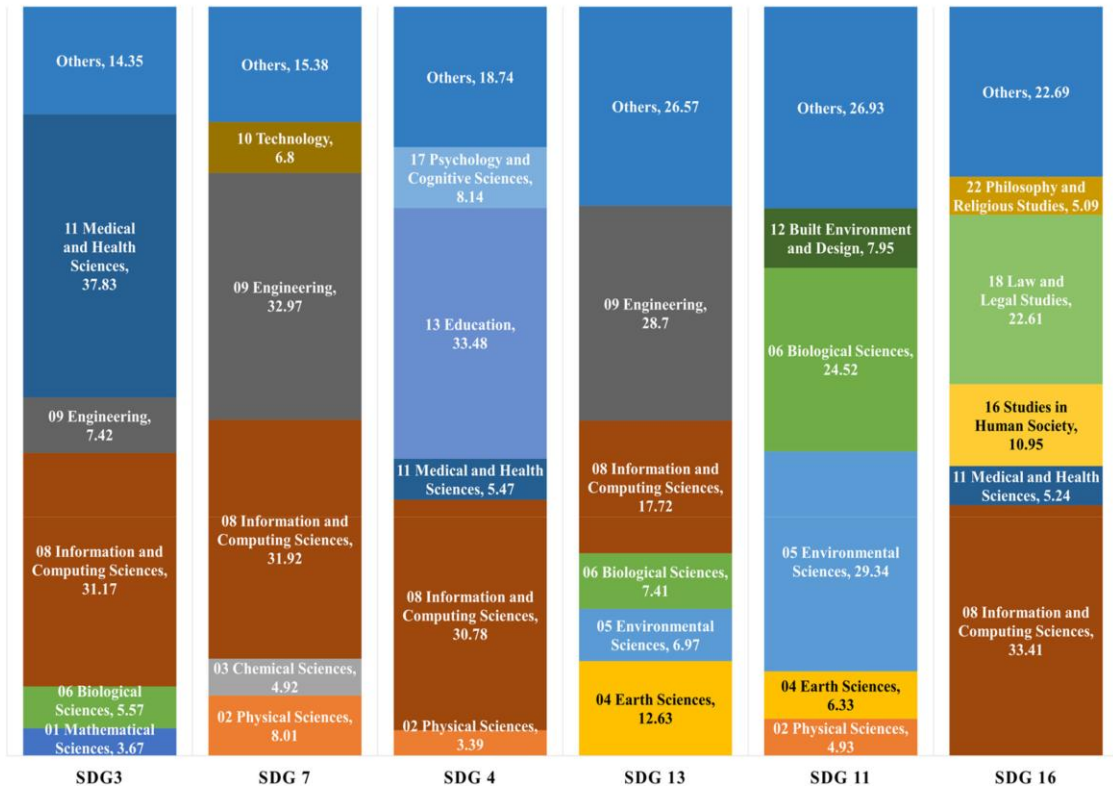


The year-wise trend in publication counts for papers in AI applications on SDGs. A sharp increase in the number of publications can be seen from 2016 onwards, after the adoption of SDGs in 2015: AI, artificial intelligence; SDGs, and Sustainable Development Goals.

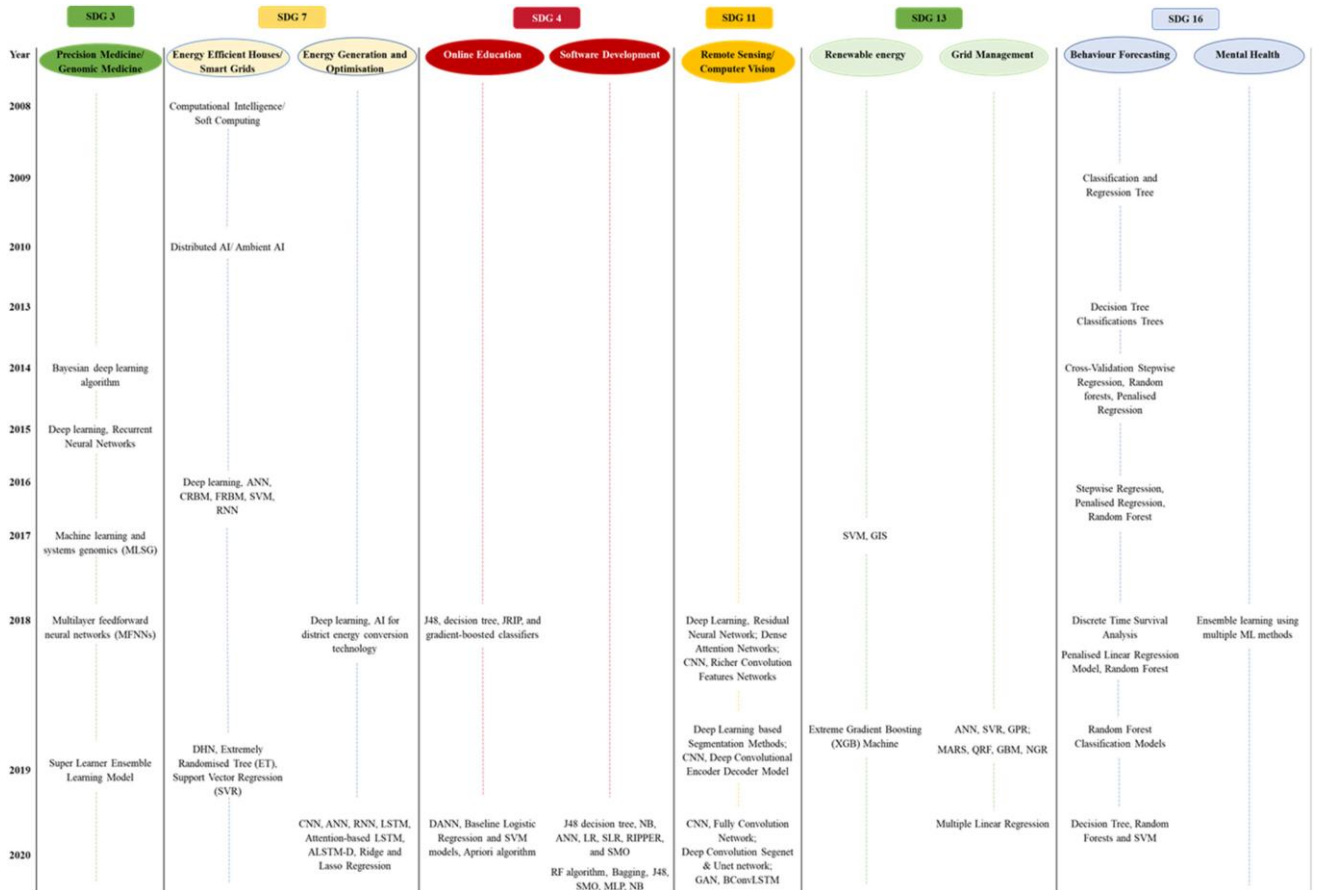


Region-wise publications and collaborations between different countries are shown by arcs, in AI for SDGs research: AI, artificial intelligence; SDGs, Sustainable Development Goals.

Top fields of research contributing to publications for selected SDGs



Top fields of research contributing to publications for the six SDGs considered. The percentage contribution of each field is shown along with the classification code for the field in Dimensions data.



Thematic research areas and the AI methods used in studies focused on SDGs 3, 4, 7, 11, 13, and 16 for articles identified through path analysis: AI, artificial intelligence; SDGs, Sustainable Development Goals.

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## FINDINGS:

The findings of the study present a comprehensive picture of the research and application landscape of AI concerning the SDGs. Some of the practical uses/ implications of the results are as follows.

- In today's world AI is a powerful technology because it has the potential to change the work life of humans.
- This technology can be more beneficial as well as has some cons to be derived
- According to studies from 1990 to 2019 it has shown that AI will be a great asset for humans
- AI can impact on the life cycle as well as the work life of the Humans.
- Artificial intelligence is when machines and software are programmed to replicate human decision-making processes.
- It can help humans discover new solutions by using advanced data processing. As a result, it can help fight against climate change through means of problem-solving, predictability, and forecasting.
- Using satellite imagery, and applied algorithms, AI can analyse the potential of deforestation based on information such as the distance to water sources, cities, and other factors. It was found that the overall number of publications on AI for SDG has increased all across the world, with a major focus on six SDGs (3, 4, 7, 11, 13, & 16). Two of these, SDG 3 (Good Health & Well-being) and SDG 7 (Affordable and Clean Energy) were found as the areas with the most applications of AI. Simple machine learning and data analytics techniques such as Decision Tree, Random Forest, SVM, SVR, Multiple linear regression, and so forth, were widely used in some of the most influential studies. Some studies also used recommendation analysis using models such as J48, SVM, and so forth. Additionally, AI for SDG now uses more sophisticated deep learning techniques such as neural networks and computer vision, such as GAN, CNN, ANN, and their variants. In recent years, researchers have used some combinatorial methods (SegUNet, LSTM two-way convolution, etc.) and general methods (GBM, XGB, etc.) to enable deep learning and machine learning. Additionally, application techniques vary depending on the application.

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## CONCLUSION:

This study presents an in-depth analysis of the available literature in the area of AI for SDG. The path-analysis and content-analysis sections highlight the important areas of activity and identify the most prominent literature in the respective areas. This work quantifies the total research activity on AI for SDGs from different parts of the world, analyzes how it has changed over time, identifies which regions of the world are working towards AI applications to SDGs, and how they collaborate for this purpose (1 and 1). Our results reflect an incremental trend in overall publications on the application of AI for SDGs across different regions of the world. SDGs 3 (good health & and well-being) and 7 (affordable and clean energy) are found in the areas with the most applications of AI. SDG 4 (quality education), SDG 13 (climate action), SDG 11 (sustainable cities and communities), and SDG 16 (peace, justice, and strong institutions) are the other SDGs where AI approaches and techniques are applied. In addition, the study has analysed the knowledge flows in AI research for SDGs and has identified major application areas along with AI methods and models applied to address different SDG targets.

These observations can form the basis for researchers, and universities to invest in the upcoming or neglected areas of SDG research, including the application of AI for the purpose. Governments can realign their policies and programs to boost certain activities based on their national and regional preferences. Some of the observations especially from the content-analysis section are subjective and may vary in future studies depending on the analytical framework chosen by the researchers, but they provide valuable insights into the growth and development of the discipline. Alternative methods for conducting these analyses can be explored in future studies. Researchers can focus on domain-specific studies to provide a microscopic picture of the progress in selected domains. Regional differences in trends of research are another area where similar studies can be directed to prepare country/region-specific recommendations for policy and governance interventions (Goh & Vinuesa, 2021) for accelerating progress towards the achievement of the SDGs.

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