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A Systematic Analysis of Artificial Intelligence Technologies Supporting the Sustainable Development Goals

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INTRODUCTION

In recent years, the development of the field of artificial intelligence (AI) and implicitly of associated technologies have contributed to a great extent to the way in which companies carry out their activity, namely the way in which they offer services and products, the way in which they consume the resources necessary for functioning and obtaining profit, the way in which they communicate with partners and stakeholders, etc. For this reason, it can be said that AI is slowly becoming an engine that, if used properly, can offer many advantages in terms of profitability and economic performance, the way in which a sustainable environment is maintained. The integration of systems based on machine learning, natural language processing, predictive analytics, intelligent robotics and the Internet of Things (IoT) in critical infrastructures and strategic sectors creates the premises for a new development paradigm – one oriented towards efficiency, optimization and informed decision-making in real time.

The research questions that the article attempts to answer are:

RQ1: What are the SDGs and what relevant projects have been carried out so far?

RQ2: What are the main AI technologies and what do they consist of?

RQ3: What AI technologies could be applied within the SDGs and what relevant projects have been carried out to support the SDGs?

DISCUSSION

To illustrate the practical impact of these technologies, representative projects and initiatives were identified for each technological category. These projects were selected based on criteria such as relevance to one or more SDGs, documented implementation, availability of reliable information, and demonstrable social, environmental, or economic benefits. The projects originate from diverse sectors, including healthcare, environmental monitoring, smart cities, agriculture, and education.

The article aims to provide a structured overview of how artificial intelligence technologies are currently being applied to sustain the development that it is considered as sustainable. The article also mentions specific projects that demonstrate the use of AI technologies in the real-world.

CONCLUSIONS

Artificial intelligence may play a major role in order to achieve the SDGs by analyzing large volumes of data-sets and by optimizing the use of resources in areas such as energy, health, agriculture or environmental management. By applying AI technologies, organizations and governments can develop more efficient solutions to reduce environmental impact, improve quality of life and promote sustainable economic development. This article describes the 17 SDGs, the main AI-based technologies, as well as some of the AI-based projects that have been developed in recent years with the aim of supporting the SDGs.

ABSTRACT

This paper provides an analysis of the role that artificial intelligence (AI) technologies play in achieving and fulfilling the Sustainable Development Goals (SDGs). The main goals of achieving these goals are to increase economic efficiency and protect the environment in a sustainable manner.

Achieving these goals using artificial intelligence technologies provides the premises for achieving sustainable development strategies in the medium and long term that can overcome the challenges that may arise.

The paper contains five sections. The first section is an introduction, the second aims to describe the SDGs, also presenting the specific objectives of each. Several specific initiatives and projects are also mentioned for each objective. The next section describes the main technologies related to artificial intelligence, also providing a correlation with the Sustainable Development Goals, objectives for which the contribution can be very large, considering the characteristics of each technology. To exemplify more practically, representative projects in which AI technologies were used are mentioned.

Keywords:

- artificial intelligence technologies,
- sustainable development goals,
- machine learning

RESULTS

No	AI Technology	SDGs	AI Projects for SDGs
1	Machine Learning (ML)	SDG 2 – Zero hunger SDG 3 – Good health and well-being SDG 7 – Affordable and clean energy SDG 11 – Sustainable cities and communities SDG 13 – Climate action	• Google Flood Forecasting Initiative • IBM Green Horizon • Microsoft AI for Earth • Climate TRACE
2	Computer Vision (CV)	SDG 2 – Zero hunger SDG 3 – Good health and well-being SDG 11 – Sustainable cities and communities SDG 14 – Life below water SDG 15 – Life on land	• Global Forest Watch • PlantVillage AI • Wildbook for Wildlife Conservation • TrashBot – Smart Waste Sorting
3	Natural Language Processing (NLP)	SDG 4 – Quality education SDG 10 – Reduced inequalities SDG 16 – Peace, justice, and strong institutions SDG 9 – Industry, innovation and infrastructure	• UN Global Pulse – AI for Crisis Monitoring • Microsoft AI for Accessibility • Google Neural Machine Translation (GNMT) • CrisisNLP Platform
4	Deep Learning (DL)	SDG 3 – Good health and well-being SDG 9 – Industry, innovation and infrastructure SDG 13 – Climate action SDG 15 – Life on land	• DeepMind AlphaFold • NASA Earth Science AI
5	Generative AI (GenAI)	SDG 4 – Quality education SDG 9 – Industry, innovation and infrastructure SDG 12 – Responsible consumption and production SDG 13 – Climate action	• ClimateBERT • Autodesk Generative Design
6	Edge AI (EAI)	SDG 9 – Industry, innovation and infrastructure SDG 11 – Sustainable cities and communities SDG 13 – Climate action	• Wildlife Protection Systems • Smart Traffic Systems
7	AI + Internet of Things (AIoT)	SDG 2 – Zero hunger SDG 7 – Affordable and clean energy SDG 11 – Sustainable cities and communities	• Smart Agriculture Systems • Smart Grid Projects
8	Digital Twins (DT)	SDG 9 – Industry, innovation and infrastructure SDG 11 – Sustainable cities and communities SDG 13 – Climate action	• Virtual Singapore • Siemens Digital Twin
9	Autonomous Systems (AS)	SDG 11 – Sustainable cities and communities SDG 8 – Decent work and economic growth SDG 13 – Climate action	• Waymo Autonomous Driving Project • Zipline Autonomous Drone Delivery
10	Reinforcement Learning (RL)	SDG 7 – Affordable and clean energy SDG 9 – Industry, innovation and infrastructure SDG 11 – Sustainable cities and communities SDG 13 – Climate action	• DeepMind – Energy Optimization for Data Centers • Adaptive Traffic Signal Control Systems