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2026-07-07

Deposited version:
Accepted Version

Peer-review status of attached file:
Peer-reviewed

Citation for published item:
Strazzullo, S., Cortez, P. & Moro, S. (2024). Data science approaches for sustainable development. Expert Systems. 41 (7)

Further information on publisher's website:
10.1111/exsy.13613

Publisher's copyright statement:
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Expert Systems

Editorial: Data Science for Sustainable Development

1. Introduction

In today's fast-evolving world, the intersection of technological innovation and sustainable development has emerged as a beacon of hope for addressing global challenges. The application of data science in this context represents a powerful and transformative force, amplifying our capabilities to navigate complex societal and environmental issues. This Special Issue of Expert Systems on "Data Science for Sustainable Development" is a testament to the dynamic and promising fusion of these disciplines. This last analyses how data science tools contribute to achieving the objectives established in September 2015 by the United Nations General Assembly, UN, within the document known as the 2030 Agenda for Sustainable Development. The objective of the Agenda is to achieve a level of growth for all countries, such as guaranteeing a sustainable future, through objectives that can be summarized in three main groups, namely the environmental, economic, and social, in the perspective of the protection of the planet. These are ambitious objectives that require adopting measures aimed at their fulfilment. The governments of the G20 were the first to represent the forerunners for the realization of this development. Given the interdisciplinary nature of data science, this can be applied to the implementation and monitoring of the achievement of the 17 objectives. The latter includes methods of collection, pre-processing, extraction of meaning / useful characteristics, methods of data exploration and predictive models.

Although the results obtained are relevant, the literature on the advantages of implementing the main data science technologies in sustainability is mostly qualitative-inductive (Hoosain et al., 2020). In fact, at the moment, the empirical evidence regarding the advantages provided by data science to sustainability is reduced. However, there are numerous cases of implementation of data science applications aimed at fostering a transition towards an economy based on reuse and recovery and reducing the consumption of resources, and, above all, polluting emissions (Dantas et al., 2021; de Miranda et al., 2021; Strazzullo et al., 2023).

Data science is often applied to solve business problems and brings several benefits such as process optimization, real-time monitoring, production efficiency and automation of production management. In this context, then, it is important to understand how to use data to enable measurement of the progress being made in achieving the SDGs. We have conceptualized this special issue in order to collect a series of articles that apply data science methodologies to the concept of the triple bottom line of sustainability considering environmental, social and economic aspects and their combinations. Indeed, the contributions in this issue encapsulate a spectrum of pioneering research, each exploring a distinctive facet of how data science intertwines with sustainable development. Through the lens of diverse scholarly articles, we delve into the symbiotic relationship between data analytics, artificial intelligence, and sustainable practices. These contributions not only underscore the pressing need for innovative solutions but also illuminate the profound impact that these advancements can have on our planet and society.

2. Contents of the special issue

In the first article "A SCORPAN-Based Data Warehouse for Digital Soil Mapping and Association Rule Mining in Support of Sustainable Agriculture and Climate Change Analysis in the Maghreb region", Belkadi et al., (2023) elucidate the pivotal role of data warehousing in advocating sustainable agricultural practices and discerning the ramifications of climate change in the Maghreb region. The insights garnered from this study hold immense promise for fostering resilient agricultural systems.

In the second article "Artificial Intelligence Governance: Ethical Considerations and Implications for Social Responsibility", Camilleri (2023) delves into the ethical dimensions of AI governance" highlights the ethical imperatives entwined with the advancement of artificial intelligence, emphasizing the imperative for social responsibility in the development and deployment of AI technologies.

In the third article "Digital Innovation and Transformation Capabilities in a Large Company", Gupta et al. (2023) shed light on the transformative capabilities of digital innovation within large corporations" underscores the necessary capabilities for achieving sustainable growth, offering invaluable insights for organizations striving towards sustainable transformations.

In the fourth article "A Sustainable Circular Supply Chain Network Design Model for Electric Vehicle Battery Production using Internet of Things and Big Data", Tavana et al. (2023) elucidate the integration of IoT and big data in designing a sustainable supply chain for electric vehicle battery production. This research paves the way for environmentally conscious practices in the electric vehicle industry.

In the fifth article "Progress and Prospects of Quantum Computing in Sustainable Development: An Analytical Review", Sood & Chauhan (2023) present a comprehensive review of quantum computing's potential applications in advancing sustainable development. Its insights open new avenues for harnessing quantum computing's potential for addressing sustainability challenges.

Finally, in the sixth article "Edge Computing Driven Sustainable Development: A Case Study on Professional Farmer Cultivation Mechanism", Yuan & Nie (2023) provide a meticulous case study, showcasing the applicability of edge computing in advancing sustainable practices, specifically in professional farmer cultivation mechanisms.

These articles collectively underscore the versatility and relevance of data science in fostering sustainable development across multifarious domains. Each piece stands as a beacon of innovation and knowledge, offering unique perspectives that contribute to a deeper comprehension of how data science can be leveraged to confront the intricate challenges of sustainable development.

The amalgamation of data science and sustainable development not only presents a convergence of disciplines but also represents an opportunity for researchers, practitioners, and policymakers to collaborate and innovate for a sustainable future.

In conclusion, the comprehensive body of work presented in this Special Issue on "Data Science for Sustainable Development" aims to inspire and catalyze further research and initiatives in this domain. We extend our deepest appreciation to the esteemed authors for their invaluable contributions and to the rigorous reviewers for their commitment to maintaining the quality and significance of the content presented in this issue.

We hope that the insights gleaned from this compilation serve as a cornerstone for shaping a future where data science and sustainable development stand as pillars for global progress and well-being.

Acknowledgements
We would like to thank the authors, who contributed with their papers, the reviewers and the EXSY journal Editors.

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