

PREFACE

This book constitutes a comprehensive exploration of two pivotal domains that are indispensable for comprehending the contemporary challenges confronting science and society: artificial intelligence (AI) and data science. These disciplines profoundly influence the generation of knowledge, the development of innovations, and the resolution of complex problems in various domains of social, economic, political, and cultural life. Entitled *Artificial Intelligence and Data Science Practices in Scientific Development*, this book compiles studies and applications from research groups collaborating at the intersection of technology, information, and scientific innovation and cultural areas.

These groups include *Technopoetics*, *Digital Art*, and *Neuroaesthetics*. *Creativity* investigates the physiological foundations of aesthetic experience, exploring topics such as the philosophy of technology, communication, digital art, and the impacts of AI on the visual arts. The *Data Science and Engineering Laboratory* conducts telehealth research. The *LEMME Lab's* research in AI focuses on its applications in services and products. The *Metric Studies in Data Librarianship and Geosciences* research endeavors encompass the domains of computational science and metrification. The *Sphere Information Ecosystem in Science, Technology, Innovation, and Sustainability* has three primary initiatives: data engineering, interoperability, and research information systems.

This collection comprises nine chapters, each one addressing distinct aspects of the application of computational intelligence and data analysis in fields such as health, the arts, political science, bibliometrics, scientific communication, and knowledge management. The outcome of this convergence is presented in these chapters. Despite the heterogeneity in the objects and methodologies of the chapters, they are unified by a shared axis: the pursuit of technological solutions that are firmly rooted in scientific foundations. This pursuit entails a meticulous examination of the social, ethical, and epistemological ramifications of automation, algorithmic analysis, and extensive data processing.

The first chapter, entitled *Art, Technology, and Creative Processes: A New Paradigm for Artistic Production*, offers a thought-provoking reflection on the impact of AI and neuroscience on creative processes in contemporary art. The central question guiding this study is as follows: How are algorithms reshaping the artist and

creativity in the 21st century? The integration of foundations from art theory, neuroimaging, and computational intelligence is demonstrated in the text, which reveals how creative processes can be simulated and expanded by algorithmic models capable of emulating human cognitive patterns. The chapter proposes a concept that extends beyond the realm of mere automation in aesthetic production, namely that of computational mannerism. This novel form of creation is defined by the human-machine interface, which serves as the medium through which novel artistic expressions emerge, thereby challenging the conventional boundaries of authorship, intuition, and originality. By problematizing the role of the artist in the age of AI, the chapter opens the book with a bold, transdisciplinary approach that challenges the traditional paradigms of aesthetic creation.

The second chapter, entitled *Obstetric Decision-Support System: An Informational Model for Maternal Autonomy Towards the Agenda 2030 Health Goals*, sets out an informational model for maternal autonomy in relation to the United Nations' Agenda 2030 health goals. The model focuses on the interface between information, health, and reproductive autonomy. The study recommends a model of an informational system designed to support decision-making by pregnant women, in light of the Sustainable Development Goals of the 2030 Agenda, especially SDG 3. The authors have developed an informational architecture of dynamic and static layers, integrating World Health Organization guidelines, lived experiences, and personalization algorithms. The system has been developed for the purpose of mitigating information asymmetries in obstetric contexts, with the objective of promoting user empowerment without compromising clinical safety. This chapter is noteworthy for its integration of scientific evidence, principles of humanized care, and requirements engineering methodologies, offering a replicable model tailored to the needs of vulnerable populations.

The third chapter, entitled *Data Provenance and Blockchain: An Approach in the Context of Health Information Systems*, discusses the application of blockchain technology to data traceability and integrity in health information systems. The objective of this study is to investigate the potential contributions of data provenance and the immutable attributes of blockchain to the security, interoperability, and reliability of health data. A comprehensive review of the extant literature and a qualitative analysis were conducted,

with a specific emphasis on electronic health records (EHR) and personal health records (PHR). By cross-referencing international interoperability standards with the technical characteristics of distributed systems, the authors construct a critical and propositional analysis of the limits and potential of using blockchain in this strategic sector. The chapter proposes methodologies for the development of data ecosystems that are characterized by enhanced transparency, auditability, and patient-centeredness.

In the fourth chapter, entitled *Structuring a Data Lake for the Management of Scientific Information in Brazil*, the initial steps in constructing a data lake designed to organize scientific information within the Brazilian research information system (BrCris) are outlined. The authors delineate a meticulous technical process for the collection, transformation, indexing, and visualization of scientific data from platforms such as OpenAlex and DOAJ. Utilizing techniques such as author disambiguation, cross-referencing data by DOI, and journal stratification, the chapter demonstrates the potential for the organization of substantial scientific data into structures that facilitate robust inferences, institutional intelligence, and strategic planning of national science. This case exemplifies the implementation of data engineering methodologies within the context of public science administration.

In the fifth chapter, entitled *Dialogic Bridges: Voices between Ideological Frontiers*, the focus is shifted to the political sphere, and a methodology is proposed based on network analysis to identify parliamentarians with greater potential for articulation between ideological blocs. Utilizing metrics such as bridge coefficient, betweenness centrality, and bridge centrality, the study suggests a replicable methodology for identifying political mediation agents in multiparty and fragmented contexts. By analyzing voting patterns and agreements in legislative houses, the chapter contributes to studies on governability, coalition building, and the mitigation of extreme polarizations. In this context, AI is employed as a tool for the structural analysis of complex social phenomena.

The sixth chapter, entitled *Analysis of Patent Production in Brazil: A Perspective from the Lattes Platform*, undertakes an analysis of the production of patents in the country, utilizing data extracted from the Lattes platform. The analysis correlates the patent production with the level of training of researchers. Through the development and application of extraction and validation algorithms, the authors identify patterns of technical production

over time and delineate an institutional panorama of the culture of innovation in Brazil. The findings indicate a notable concentration of patents among researchers who hold a doctoral degree, thereby corroborating the hypothesis that heightened inventive capacity is closely associated with advanced educational training and academic integration. The integration of scientific and technological metrics with systematic data analysis offers a valuable contribution to the development of public innovation policies.

In the seventh chapter, entitled *A Framework for Collecting, Processing, and Analyzing Scientific Data on Social Media*, the authors propose the Social4Science platform, which is designed for the collection and analysis of social data associated with the dissemination of scientific publications. The primary focus of the Social4Science platform is the YouTube platform. This study explores the emerging field of altmetrics, investigating how scientific research is received, commented on, and shared on social networks. This investigation aims to broaden the understanding of contemporary flows of knowledge circulation. The platform enables the correlation of social data with scientific metadata, facilitating analysis of trends, patterns of engagement, and the social impact of science. The chapter presents an innovative contribution to the field of science communication by suggesting tools that facilitate greater public engagement with science in digital environments.

The eighth chapter, entitled *Design Without Data? A Study of Methodological Transparency in Contemporary Design Science*, problematizes the scarcity of methodological transparency in design publications. A comprehensive analysis of over 7,500 articles from specialized journals reveals that only a limited number of these articles explicitly articulate their methodological approaches. Utilizing OpenAlex for metadata collection and ChatGPT-4o for automated classification of abstracts, the authors identify a predominance of speculative, conceptual, or practice-based research, devoid of declared methodological rigor. The chapter puts forth the argument that standardization and qualification of methods in design science are imperative for enhancing its credibility and facilitating interdisciplinary integration.

Finally, the ninth chapter, entitled *Bibliographic Analysis of Scientific Literature on Health Knowledge Management*, carries out a bibliometric analysis of scientific production on Health Knowledge Management (HKM) between 1990 and 2023, based

on data from Web of Science and PubMed. Based on the co-occurrence of terms and the mapping of authors and institutional collaborations, the study identifies four central thematic axes: the impacts of COVID-19 on health information management, strategies for improving the performance of health systems, challenges related to electronic medical records, and advances in big data and information technologies. The chapter reveals the centrality of the United States in academic production on the subject and highlights the need for investment in technological infrastructure and international collaboration to promote more effective health systems integrated with knowledge management.

This book is, therefore, an interdisciplinary mosaic that combines theory and practice, critical analysis and technological development, and experimentation and reflection. The chapters herein demonstrate the diversity of applications of AI and data science in scientific development. Moreover, they highlight the importance of approaches informed by ethical values, social commitment, and epistemic responsibility.

The integration of diverse disciplinary domains in this collection underscores the imperative for contemplating technological solutions that are not divorced from human needs, public policies, cognitive justice, and the democratization of knowledge. I would like to express my profound gratitude to the authors who have contributed to the creation of this book, dedicating their time and knowledge to writing consistent, innovative, and relevant chapters.

Additionally, gratitude is extended to the institutions that promote research and the generation of interdisciplinary knowledge, particularly those that have directly or indirectly contributed to the realization of this work. It is our hope that perusing this book will inspire reflection, provoke questions, and stimulate the creation of new investigative paths at the intersection of technology, data, and knowledge.

Dr. Alexandre Ribas Semeler
Universidade Federal do Rio Grande do Sul