PREFACE TO THE EDITION

The **International Journal of Information Technology Research Studies (IJITRS)** is pleased to present its forthcoming issue, featuring six review articles that examine significant developments, emerging applications, and continuing challenges across the field of information technology. As digital technologies increasingly influence scientific research, education, data management, environmental sustainability, and cybersecurity, a critical understanding of their capabilities and limitations has become essential. The contributions in this issue address these interconnected concerns through reviews of published research, offering readers insights into current technological directions and areas requiring further investigation.

The issue begins with confidential computing and trusted execution environments, examining hardware-assisted approaches designed to protect sensitive data during processing. The article reviews architectural models, remote attestation, implementation overheads, and documented attack categories, while considering applications in machine learning and the relationship between confidential computing and homomorphic encryption. Its discussion highlights the importance of understanding the assumptions and limitations underlying security mechanisms.

The second article explores data lakehouse and data mesh architectures, focusing on the evolution of analytical data platforms, distributed ownership of data, governance, metadata management, and open table formats. By distinguishing technological architecture from organizational operating models, the review examines the evidence supporting these approaches and identifies gaps in the measurement of outcomes associated with data mesh adoption.

The growing computational demands of artificial intelligence are addressed in the article on the energy and carbon footprint of AI. It examines the differences in reported estimates arising from measurement boundaries, methodologies, and the inclusion of operational and embodied emissions. The review also considers mitigation strategies such as smaller models, improved hardware, optimized scheduling, and transparent reporting, emphasizing the need for careful interpretation of environmental impact assessments.

The educational applications of artificial intelligence receive attention through a review of large language models for course recommendation on massive open online course (MOOC) platforms. The article considers how these models can support course representation, ranking, conversational recommendations, and explanations of suggested learning opportunities. It also examines the limitations of existing evaluation methods and the challenges associated with recommendation accuracy, privacy, bias, and equitable treatment of learners.

Another contribution examines machine learning for weather prediction, reviewing the development of neural-network-based forecasting models, probabilistic and hybrid approaches, and precipitation nowcasting. The article considers published benchmark results alongside reported limitations involving forecast uncertainty, small-scale physical processes, extreme weather events, and the representation of forecast errors. This balanced assessment provides a useful perspective on the opportunities and continuing challenges of integrating machine learning into weather forecasting.

The issue concludes with a review of passkeys and FIDO2-based passwordless authentication, examining the security foundations, usability considerations, and deployment challenges of modern authentication systems. The article discusses phishing resistance, formal security analyses, reported attacks, and practical concerns surrounding fallback mechanisms, account recovery, and credential synchronization. It highlights the importance of implementation and deployment practices alongside the strength of the underlying cryptographic mechanisms.

Collectively, these articles demonstrate the breadth of contemporary information technology research and the importance of critically evaluating technological advances in their practical contexts. From protecting sensitive data and organizing analytical information to improving artificial intelligence applications, understanding environmental costs, and strengthening digital authentication, the

contributions share a common concern: technological progress must be accompanied by careful assessment of evidence, limitations, security, and real-world applicability.

The Editorial Team hopes that this issue will be valuable to researchers, academicians, information technology professionals, and students seeking a deeper understanding of these evolving areas. We also hope that the reviews will encourage further research, informed discussion, and the development of solutions that are secure, efficient, responsible, and responsive to emerging technological needs.

We extend our sincere appreciation to the authors for their contributions and to the reviewers and editorial colleagues for their efforts in supporting the publication process. We invite readers to engage with the articles and to continue contributing to the advancement of knowledge in information technology.

Dr. Mini T. V.

Chief Editor

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