

PREFACE TO THE EDITION

The rapid evolution of data science and machine learning continues to redefine the way organizations, industries, and societies generate knowledge, solve complex problems, and make informed decisions. As artificial intelligence moves beyond experimental research into mission-critical applications, the demand for robust, interpretable, scalable, and trustworthy machine learning systems has never been greater. The current issue of the Eduschool International Journal of Data Science and Machine Learning (EIJDSDL) brings together a carefully curated collection of scholarly contributions that examine these emerging directions, offering readers comprehensive insights into the latest theoretical advances and practical methodologies shaping the future of intelligent systems.

The opening article explores the integration of causal inference with modern machine learning, highlighting the crucial distinction between prediction and intervention. By examining frameworks such as potential outcomes, structural causal models, causal forests, and double machine learning, the study emphasizes how causal reasoning enables reliable decision-making across domains including healthcare, marketing, pricing, and public policy.

As machine learning systems increasingly operate in dynamic real-world environments, maintaining their performance has become an essential challenge. Addressing this concern, the second contribution investigates Data-Centric AI and MLOps, focusing on continuous monitoring, data validation, drift detection, and model governance. The article demonstrates how modern MLOps practices improve the reliability, reproducibility, and long-term sustainability of deployed machine learning systems.

Forecasting has also undergone a remarkable transformation with the emergence of foundation models. The third article reviews Time-Series Foundation Models for Zero-Shot Forecasting, presenting recent developments that enable pretrained models to generate accurate forecasts across previously unseen datasets without task-specific retraining. Through an examination of state-of-the-art architectures and comparative evaluations, the paper illustrates how foundation models are reshaping predictive analytics while identifying opportunities for future research.

Financial security remains one of the most important applications of machine learning, and the fourth article provides an extensive review of Graph Neural Networks for Financial Fraud and Anomaly Detection. By leveraging relational structures within transaction networks, graph-based learning models significantly improve the identification of coordinated fraudulent activities. The discussion of heterogeneous graphs, temporal networks, imbalance-aware architectures, and explainable graph learning demonstrates the growing importance of graph intelligence in financial analytics.

The concluding article examines one of the most transformative developments in artificial intelligence—LLM-powered agentic data science. Moving beyond conventional language models, the paper investigates autonomous AI agents capable of planning analyses, generating code, executing tools, validating outputs, and refining results through iterative reasoning. Alongside these remarkable capabilities, the study thoughtfully discusses challenges including reproducibility, hallucination, verification, and safe deployment, reinforcing the importance of responsible AI practices in automated scientific analysis.

Collectively, the articles in this issue reflect the ongoing transition from predictive algorithms toward intelligent, adaptive, and trustworthy data-driven systems. They demonstrate that future advances in machine learning will depend not only on increasing computational capability but also on improving interpretability, causal understanding, operational reliability, collaborative intelligence, and responsible deployment. Together, these contributions provide valuable perspectives for academics, researchers, practitioners, and students seeking to understand the evolving landscape of modern data science.

We extend our sincere appreciation to all authors for their valuable scholarly contributions and to the reviewers whose expertise and constructive evaluations have ensured the high academic standards of this publication. We also thank our Editorial Board members for their continued guidance and commitment to excellence. We hope that this issue of Eduschool International Journal of Data Science and Machine Learning (EIJDSDL) serves as a meaningful resource that stimulates further research, interdisciplinary collaboration, and innovative applications in the rapidly advancing fields of data science, machine learning, and artificial intelligence.

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Chief Editor

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