Editorial

Advances in Science, Technology and Engineering Journal (ASTESJ) remains committed to publishing high-quality interdisciplinary research that advances scientific understanding and addresses contemporary technological challenges. The papers presented in this issue demonstrate the transformative role of artificial intelligence, probabilistic computing, data science, and cybersecurity in solving complex real-world problems. From educational analytics and theoretical computational frameworks to intrusion detection and intelligent security operations, these contributions reflect the growing integration of innovative methodologies with practical applications across diverse domains.

Educational data analytics continues to benefit from advances in explainable artificial intelligence, as demonstrated by an interpretable gradient boosting framework for student performance prediction. By integrating SHAP-based feature selection, hybrid resampling, cost-sensitive decision thresholds, and optimized hyperparameter tuning, the proposed methodology achieves high predictive performance while maintaining model transparency and fairness. The ability to identify influential factors affecting academic achievement provides valuable support for evidence-based educational policies and personalized learning strategies, illustrating the increasing importance of interpretable machine learning in academic environments [1].

Novel computational paradigms are explored through the introduction of HLLSet, an enhanced probabilistic data structure capable of supporting complete set operations while representing semantic relationships without storing explicit elements. Built upon category-theoretic principles and supported by the Bell State Similarity metric, the proposed framework establishes a rigorous mathematical foundation for contextual representation, directed similarity, and self-regulating system dynamics. The demonstrated conservation properties and sheaf-theoretic formulation offer promising directions for the evolution of intelligent systems and probabilistic knowledge representation [2].

The increasing complexity of Internet of Things environments demands intrusion detection systems capable of handling high-dimensional, imbalanced, and heterogeneous network data with both accuracy and computational efficiency. A hybrid feature selection strategy combining filter and embedded methods with weighted feature fusion demonstrates exceptional detection performance across multiple benchmark IoT datasets. The integration of statistical feature ranking with Random Forest feature importance significantly enhances classification effectiveness, highlighting the value of optimized feature engineering for securing next-generation connected infrastructures [3].

Reliable cybersecurity operations require intrusion detection frameworks that extend beyond conventional threat recognition by addressing distribution shifts, operational reliability, and false-positive reduction. A decision-centric architecture integrating deep representation learning, graph neural networks, XGBoost classification, and meta-learning provides an effective solution for Security Operations Centers. The inclusion of SHAP-based interpretability further enhances transparency by offering meaningful explanations for detection decisions, while extensive evaluation demonstrates robustness across both time-series and cross-dataset scenarios. This contribution represents a significant advancement toward trustworthy and operationally effective intrusion detection systems for modern cyber defense environments [4].

The research contributions presented in this issue illustrate the continued convergence of artificial intelligence, mathematical modeling, data analytics, and cybersecurity in addressing complex

scientific and engineering challenges. Collectively, these studies advance theoretical knowledge while delivering practical solutions with significant societal and industrial relevance. It is anticipated that the innovative methodologies and insights presented will stimulate further interdisciplinary research and contribute to the ongoing development of intelligent, secure, and data-driven technologies.

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