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EDITORIAL

Neural Computing: A New Era of Intelligent Adaptation and Learning

Munir Ahmad[1,*]

[1] University College, Korea University, Seoul 02841, Republic of Korea

Abstract

The inaugural editorial of the *ICCK Transactions on Neural Computing* (*ICCK-TNC*) presents the revolutionary influence of neural computing that incorporates artificial intelligence (AI), machine learning (ML), and next-gen computation models in cognitive systems, robotics, and healthcare. Although there have been tremendous developments, some problems remain including computational scalability, model interpretability, ethical considerations, and data security. *ICCK-TNC* is dedicated to resolving these issues by facilitating high-impact research, interdisciplinary collaboration, and real-world applications. The magazine covers the following trends such as federated learning, explainable deep learning models, and neuromorphic computing while emphasizing transparency, reproducibility, and ethical AI practices. Simultaneously with the advantage of neural computing in terms of adaptability and efficiency, addressing the challenges of robustness, fairness, and sustainability remain critical. The journal requires consistent innovation, open-access collaboration, and industry-academia partnerships to push this area of study forward. *ICCK-TNC* is dedicated to achieving the highest standards of research and technological advances, and we welcome the most innovative contributions that are capable of taking the field of neural computing to new heights.

Keywords: neural computing, artificial intelligence (AI), machine learning (ML), neuromorphic computing, brain-inspired AI, cognitive systems, federated learning, explainable AI (XAI), deep learning, ethical AI, computational neuroscience.

1 Introduction

The technological advancement of neural computing which is the backbone of modern artificial intelligence is the trigger of innovations in parts of cognitive science, robotics, healthcare, and autonomous decision making. With its basis in artificial neural networks that were developed from the study of the human brain's shape and operation, neural computing has transformed the way systems learn, adapt, and process information [1]. Over the past years, successes in deep learning, reinforcement learning, and neuromorphic hardware have greatly improved the capabilities of computational models, leading to breakthroughs in pattern recognition, natural language processing, and

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***Corresponding author:**
Munir Ahmad
munirahmad@gmail.com

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real-time decision-making [2].

Nevertheless, the field after these great accomplishments is still afflicted by issues that impede the full utilization of its capacities. The pressure of understanding different neural network models, determining their computability, determining ethics for AI, and defending AI systems are problems that need to be solved immediately [3]. Nowadays, when data-saturated methods of operation are infiltrating the most crucial applications like healthcare diagnostics, financial modeling, and autonomous systems, the pressure for transparent, efficient, and scalable neural computing frameworks reaches an unprecedented level [4].

Given the significance of this discipline, we are happy to announce the establishment of *ICCK Transactions on Neural Computing* (*ICCK-TNC*) the innovation center for networking and collaboration across various disciplines [5]. To achieve our goal, we must use the platforms we have created to connect theory with practice while building a research community in touch with innovation and ethical AI development [6].

ICCK-TNC aims to be a platform not just for basic research but also for industry innovations and bringing new trends into the mix. The establishment of *ICCK-TNC* as a leading research platform is planned to initiate and shape the next generation of intelligent systems by encouraging the submission of papers that investigate the limits of neural computing [7]. In this first issue, we are reaching out through these editorial articles to researchers, engineers, and industry practitioners, to be part of this formative process and join us in coproduction that addresses the next challenge of the discipline.

2 Scope and Research Areas of the Journal

The evolution of the area of neural computing is rapid due to the merger of artificial intelligence, machine learning, and biologically inspired computing methodologies [8]. Together, these techniques have made neural computing adaptive, autonomous, and efficient, providing models capable of handling high-dimensional, complex data in real time.

ICCK Transactions on Neural Computing (*ICCK-TNC*) is the world's top platform to publicly innovate in fields that neural computing includes. It, therefore, wants contributors to bring pioneering algorithms, different methodological approaches, and eminently applicable innovations into a multi-disciplinary realm, crossing different sectors [9].

Key Research Areas

The scope of *ICCK-TNC* includes, but is not limited to, the following core areas:

2.1 Deep Learning and Neural Network Architectures

- Advanced deep learning architectures for neural computing.
- Transformer models facilitate the development of cognitive and decision-making systems.
- Graph neural networks help to analyze structured data.
- Sparse and efficient neural networks power real-time applications.

2.2 Neuromorphic and Brain-Inspired Computing

- Bio-inspired neural computing frameworks.
- Neuromorphic hardware and event-driven computing.
- Spiking neural networks and brain-like adaptation.
- Energy-efficient AI for edge.

2.3 Cognitive and Adaptive Learning Systems

- Autonomous agents and robotics using reinforcement learning.
- Meta-learning and few shots learning techniques.
- Neural models with self-learning and self-optimizing capabilities.
- Interpretable neural networks.

2.4 Federated Learning and Distributed AI

- Techniques for machine learning that are privacy-preserving.
- Neural computing architectures that are decentralized.
- AI models that are secure for data-sensitive applications.
- Higher intelligence at the edge and real-time cooperative learning systems.

2.5 Biomedical and Neuroinformatic Applications

- Diagnostics and personalized medicine driven by AI.

- Computers of the brain, with Neural Networks in the Brain-Computer Interface (BCI).
- Neural network applications in genomics together with bioinformatics.
- Wearable AI and real-time health monitoring.

2.6 Natural Language Processing and Speech Recognition

- Deep Learning Methods for Text Modeling.
- Speech Enhancement and Creation Using AI.
- Multilayer Neural Networks for Language Processing.
- Speech and Text Emotion Discovery.

2.7 Autonomous Systems and Robotics

- AI for adaptive control in robotics.
- The use of artificial neural networks in self-driving and autonomous vehicles.
- Models of perception and decision-making that can be made in real-time.
- The use of AI-powered drones for navigation and surveillance.

2.8 Security, Privacy, and Ethical AI

- Adversarial robustness and securing neural networks.
- Methods of cryptographic technique for AI model protection.
- Mitigation of bias and justice in AI decision-making.
- Ethical aspects in neural computing applications.

2.9 Emerging Topics in Neural Computing

- High-speed computing and quantum-inspired neural networks.
- Neuro-symbolic AI and hybrid learning.
- AI creativity and generative neural networks.
- Digital twin technology in neural modeling and simulation.

Through research both broad-ranging but focused, *ICCK-TNC* visions to bring fundamental discoveries to applications in the world of the real, especially through collaboration across disciplines, an alliance with industry, and innovative contributions that shape the future of neural computing [10]. The journal encourages interdisciplinary collaborations, industry partnerships, and innovative contributions that shape the future of neural computing.

3 Trends and Challenges in Neural Computing

With the quick rise of AI and the growing science of the brain, the sector of computing with neurons has changed drastically. The use of neural computation, the structuring of these computations in a mimetic fashion to the one in the brain, and computing, which is essentially a cooperative exercise of many computer devices are the capabilities that have the capability of achieving the very complex task of image recognition [11]. It is important to identify key drivers of innovation to inform the direction of development of this booming new field. The rapid growth of fetal cell-based regenerative medicine, combined with its legitimate scientific applications, highlights the need for experts who will lead the way in this field [12, 13].

3.1 Emerging Trends in Neural Computing

Because of the introduction of innovative technologies and methodologies, neural networks are now able to learn, adapt, and interact with data in an entirely different way. The following are some of the most important trends shaping the next wave in the development of neural computing:

3.1.1 Neuromorphic Computing and Brain-Inspired AI

Neuromorphic hardware is built such that it imitates biological neural systems and systems that are very resource-efficient [14]. Spiking neural networks (SNNs) and event-driven architectures are more reliant on energy-efficient computing and are the most suitable for real-time decision-making, thus they are used mainly for edge AI and robotics applications [15].

3.1.2 Explainable AI (XAI) and Interpretable Neural Models

The growing use of AI in critical industries such as healthcare and finance has led to a demand for models with a high level of transparency and interpretability [16]. The newly developed techniques of explainable AI (XAI) are giving insight into the neural network decision steps while ensuring fairness, accountability, and trustworthiness in AI systems [17].

3.1.3 Federated Learning for Privacy-Preserving AI

Amidst the accelerating concern about privacy particularly that of health data Electronics and software engineers are among the world's largest

corporations [18]. As a result, federated learning appears to be the answer to the specific problem of decentralized AI model training without disclosing sensitive data. This technique is especially valuable when data privacy is critical whether in medical diagnostics, financial transactions, or personalized recommendations [19].

3.1.4 AI-Empowered Robotics and Autonomous Systems

The integration of deep learning and control systems has led to the emergence of intelligent robots of a high level, namely autonomous robots. Drones powered by AI, robot assistants, and self-driving vehicles are using neural computing technology in the area of real-time perception, navigation, and predictive modeling, thereby expanding the potential of intelligent automation [20].

3.1.5 Quantum-Inspired Neural Networks

By leveraging data processing capacity, quantum computing principles are being explored to enhance the efficiency of neural networks. The introduction of quantum-inspired algorithms can lead to the provision of an adequate risk management system in finance and the forecast of climate change scenarios [21, 22].

3.2 Challenges and Open Research Problems

Even with these advancements, the field of neural computing still faces significant hurdles that need to be addressed to utilize its full potential. The following are some of the challenges:

3.2.1 Computational Complexity and Scalability

Deep learning models often need a lot of computational power, which makes it difficult to use them in real-time situations and places with energy limitations. The design of feasible architectures, model size reduction methods, and neuromorphic computing mechanisms are important for the scalable employment of such systems [23].

3.2.2 Robustness and Generalization of Neural Networks

Datasets used for training specific neural models can cause the models not to generalize well. Making AI systems robust to adversarial attacks, noise, and data shifts will be key in getting them deployed successfully in mission-critical applications [24].

3.2.3 Ethical AI and Bias in Neural Models

AI-driven decisions, especially in hiring, healthcare, and law enforcement, can be unfair due to the bias of training data. Responsible AI development must include addressing bias mitigation, fairness-aware training, and ethical considerations in neural computing [25].

3.2.4 Data Privacy and Security Concerns

The need for personalization of user data has resulted in privacy risks becoming more significant in neural models. To keep users' data secure and maintain the same level of AI efficacy, techniques such as differential privacy, homomorphic encryption, and federated learning are being studied [26].

3.2.5 Bridging the Gap Between Research and Industrial Applications

Although neural computing has made great strides in academia, its adoption in industry is frequently held up by doubts about its scalability, dependability, and compliance with safety and other regulations [27]. The way to bring academic research and industry undertakings together is by creating strong links between them, thereby converting theoretical innovations into practical applications.

3.3 The Path Forward

The research sector must prioritize the issues caused by the challenges and the possibilities brought by neural computing:

- Designing AI models that are energy-efficient and can operate in real-time and resource-constrained environments.
- Improving the interpretability and trustworthiness of neural networks using explainable AI methods.
- Fostering collaborative efforts among disciplines by integrating the area of neural computing with other areas of knowledge such as neuroscience, robotics, cybersecurity, and quantum computing.
- Facilitating innovation and sharing of information by way of open-access datasets and reproducible research.

The *ICCK Transactions on Neural Computing* (*ICCK-TNC*) invites researchers, practitioners, and industry leaders to take part in the discussions that will shape its future direction. The aim is to enable interdisciplinary collaboration and innovation to promote the advancement of neural computing, which is a technology that can have a significant impact on many areas of life.

4 Vision and Mission of the Journal

Rapid advancements in neural computing have presented new avenues and problems that necessitate a dedicated platform for research dissemination, interdisciplinary cooperation, and technological transformation. The *ICCK Transactions on Neural Computing* (*ICCK-TNC*) was established to be the primary channel for ground-breaking scientific efforts in the areas where neural networks, artificial intelligence, and computational neuroscience intersect. In this journal, we aspire to:

- Close the theoretical-experimental gap between neural computing breakthroughs and practical solutions.
- Innovate research via a merger of neural computing and robotics, cognitive sciences, cybersecurity, and bioinformatics.
- Support the academia-industry dynamic and thus cut the time to the market for neural computing inventions.
- Ensure scientific rigor, ethics, and reproducibility through peer review to submit research findings and comply with ethical guidelines with scientifically founded research.
- Encourage the participation of an inclusive research community especially those from underrepresented groups, novice researchers, and bright new domains in neural computing.

4.1 Core Values and Commitments

To reach our vision, *ICCK-TNC* fully endorses the following principles:

4.1.1 Scientific Excellence and Innovation

The journal strives to disseminate high-quality, original research articles that advance the neural computing frontier. We foster submissions that include new methodologies, innovative theories, and transformative applications [28].

4.1.2 Interdisciplinary and Cross-Domain Collaboration

Neural computing covers many areas such as artificial intelligence, machine learning, neuroscience, and quantum computing. In particular, *ICCK-TNC* proudly supports research that encourages interdisciplinary collaboration, linking theoretical development with practical applications [29].

4.1.3 Ethical AI and Responsible Research

Due to the critical integration of AI and neural computing into various applications, ethical issues must be placed on priority lists. The Journal promotes ethical guidelines and the well-being of society by creating AI-driven neural computing systems that are fair, transparent, and accountable [30].

4.1.4 Open Knowledge and Global Engagement

Taking into consideration the issues regarding knowledge accessibility, the *ICCK-TNC* is for open-access research, reproducibility, and collaborative initiatives. We encourage authors to openly share their datasets, codes, and methodologies to increase the global impact of research [31].

4.1.5 Industry Relevance and Real-World Impact

The journal acts as a connecting link between the academic and the industrial world, encouraging researchers to work on projects that lead to real-life implementations, scalable solutions, and innovations in the field of neural computing. To facilitate the adoption of state-of-the-art neural computing methods and devices, *ICCK-TNC* intends to forge partnerships between industry and researchers [32, 33].

4.2 Supporting the Research Community

In order to cultivate a research ecosystem that is dynamic and engaged, *ICCK-TNC* will:

- There shall be special issues and thematic collections created by utilizing advanced neural computing techniques, such as neuromorphic AI, federated learning, and AI-driven healthcare.
- Appreciating the exemplary research contributions through the best paper awards and the early-career researchers will be acknowledged.
- Through the alliance of international conferences, workshops, and academic societies, opportunities for networking and mentoring will be provided to facilitate the exchange of ideas and create an open atmosphere for discussion.
- Apart from the regular, high-quality research outputs, certain actions have been taken to encourage the capacity and willingness of often less-represented groups to be involved as part of the activity of neural computing.

4.3 Looking Ahead: The Future of Neural Computing

ICCK-TNC is committed to maintaining its status as a pioneer by incorporating the developments of the neural computing field steadily as it progresses. Research scientists and engineers together with industry experts are requested to join us in the responsible development of the future of neural computing by submitting astute research, taking the job of reviewers to check the reliability of the methods, and cooperating with us in the suggested initiatives.

ICCK-TNC looks for the guiding power of scientific excellence, interdisciplinary research, and technological ethics, as it utilizes cutting-edge technology with AI-driven systems through environmental problems for the benefit of society.

5 Editorial and Peer Review Process

Ensuring the highest standards of scientific rigor, integrity, and impact is a fundamental goal of *ICCK Transactions on Neural Computing* (*ICCK-TNC*). To achieve this, the journal employs a transparent, fair, and rigorous peer review process that upholds academic excellence while fostering innovation.

5.1 Submission and Review Workflow

The review process at *ICCK-TNC* follows a structured, multi-stage workflow designed to ensure that only the highest-quality research is published.

5.1.1 Manuscript Submission

Authors submit their manuscripts via the online submission system of the journal. Information regarding the submission must conform to the journal's formatting and ethical guidelines, which also include requirements for data availability, reproducibility, and disclosure of any conflicts of interest.

5.1.2 Initial Editorial Assessment

The editorial team initiates a secondary investigation into the study under consideration in the journal, as well as its reliability and the way the author has adhered to ethical rules. Any manuscripts that do not fall within the scope of the journal or fail to meet the journal's criteria could be desk-rejected here.

5.1.3 Peer Review

ICCK-TNC adopts a single-blind peer-review method whereby the reviewers remain anonymous. At least two independent reviewers with expertise in the relevant research area are assigned to the manuscript. Reviewers assess the manuscript based on the criteria below:

- Novelty and significance of the contribution.
- Technical soundness and methodological rigor.
- Clarity, organization, and presentation.
- Reproducibility and ethical considerations.

5.1.4 Reviewer Recommendations and Editorial Decision

The academic editor recommends the following to the Editor-in-Chief:

- Accept as is (only minor editorial changes required).
- Minor revisions (to be made based on reviewer comments).
- Major revisions (substantial improvements are needed before resubmission).
- Reject (the manuscript is below the journal's level).

The authors must have a time frame to submit revisions of their manuscripts.

5.1.5 Final Decision and Publication

If there is a need for a second round of review, the revised manuscript is reviewed again before the final decision is made. Papers that are accepted are fair and final version proofs are done, then published with a digital object identifier (DOI). Also, *ICCK-TNC* encourages researchers to have their codes, datasets, and additional materials shared to establish transparency and reproducibility.

5.2 Ethical Standards and Research Integrity

In *ICCK-TNC*, we are promoting the ethical standards of the highest level in academic publishing. We always adhere to the guidelines provided by reputable organizations such as the Committee on Publication Ethics (COPE).

5.2.1 Plagiarism and Duplicate Submission Policy

All the submissions are checked for plagiarism using automated tools. All manuscripts should be original and they must not be currently under consideration at any other journal or conference site.

5.2.2 *Authorship and Contributor Transparency*

All authors listed must possess a major amount of knowledge of the research. At the time of submission, all conflicts of interest must be highlighted.

5.2.3 *Data Transparency and Reproducibility*

Authors are highly encouraged to publish datasets, repositories, and methodologies online for others to duplicate the experiment. They also must indicate any use of any synthetic data, AI-generated data, or any proprietary datasets.

5.2.4 *Handling of Ethical Concerns and Retractions*

The journal has a detailed process for whenever unethical behaviors, like fabrication, falsification, and image manipulation take place. If such problems arise after the publication of the materials, the editorial committee might make corrections, and acknowledge the expressions of concern, however, in any case, retractions will follow if the need arises.

5.3 Reviewer Recognition and Editorial Board Contributions

For *ICCK-TNC* to function correctly and to the highest standards, it truly values the contribution of all reviewers and editors, who are academia's gatekeepers. It presents recognition through the following:

- Each year, exceptional reviewers will be acknowledged for their contributions.
- By request, the efforts of reviewers may be credited through Publons or ORCID.
- The journal receives nominations for new editorial boards or guest editors for special issues.

5.4 Open Science and Accessibility

To support a culture of open knowledge research and innovation, *ICCK-TNC* champions open-access publishing options as a way of increasing worldwide coverage of research. Moreover, the specific journal has an open preprint policy which permits authors to disclose their post-publication research. *ICCK-TNC* has also members of the community participate in discussions of papers, they can thus improve the rationale of the ones already submitted and published by them earlier.

ICCK-TNC employs a thorough editorial and peer review process through which it guarantees that all research published is held to the highest standards of scientific excellence, ethical integrity, and real-world impact.

6 Call for Contributions and Future Directions

As the domain of neural computing keeps on progressing, *ICCK Transactions on Neural Computing* (*ICCK-TNC*) calls on scientists, practitioners, and industry experts to join in and express their ideas for the transformation and expansion of this fast-changing field. The journal wants to harness a collaborative, interdisciplinary, and high-impact research atmosphere to be at the forefront of the progress of neural computing and its applications.

6.1 Invitation to Authors

We very much welcome original articles, review papers, and illustrations that present various aspects of neural computing, with creativity at the forefront, and the newest methodologies, and the most applicable cases at the back. The main topics of interest to us include, but are not limited to:

- Neural computing and cognitive systems, through the lens of deep learning architectures.
- Brain-inspired AI models and Neuromorphic computing.
- The protected distribution of data through federated learning and decentralized AI.
- Explainable AI instruments (XAI) for the 'adequate' and 'responsible' neural models.
- Quantum-inspired neural networks that are fast in computations.
- Neural computing in the fields of healthcare, robotics, and cybersecurity.
- Human language processing, understanding of speech, and smart analysis of multimedia by AI.
- Energy-saving and ultra-low-power AI models for IoT and embedded systems.

Each submission has to be an area on a theoretical basis, algorithmic novelty, experimental proof of concepts, or the application of neural computing in real life.

6.2 Special Issues and Thematic Collections

ICCK-TNC intends to help new developments and tackle necessary issues regularly by organizing special issues and thematic collections. It is, therefore, a recommendation that specialized & domain experts should suggest guest-edited special issues in the fields such as the following:

- Neuromorphic AI for Edge Computing and IoT.

- AI-Driven Healthcare: Neural Computing for Medical Diagnostics.
- Quantum Computing and Neural Network Integration.
- Ethical AI and Bias Mitigation in Neural Computing.
- Federated Learning and Privacy-Preserving Neural Models.

Concerned authors who are willing to participate in or suggest a special issue should contact the editorial board.

6.3 Opportunities for Collaboration and Engagement

As a means of strengthening the global research community, *ICCK-TNC* offers a variety of engagement opportunities, including:

6.3.1 Reviewer and Editorial Board Membership

Research experts with not less than five years of experience are invited to join the journal's reviewer pool and thereby, help in the manuscript assessment and the peer review process. Experts from the industry who are the first authors in prominent publications and patents may be accepted as a part of the editorial board to influence the decisions of the journal directly.

6.3.2 Industry-Academia Collaborations

ICCK-TNC is also advocating partnerships between academia and industry through presentations of applied cases and research projects which will give a voice to industry leaders on the real-world neural computing challenges. In addition, articles showcasing companies that are successfully using AI in healthcare, autonomous systems, telecommunications, finance, etc., among others will be published in the journal.

6.3.3 Early-Career Researcher Support

Young researchers are provided with a special and very good support system for the early stages of their careers. The journal aims to do this by:

- We will make AI models that are very low energy, and they can run in real-time on very small power devices.
- We should make a connection that some scientific problems should be solved using our current knowledge (which is taking a long time) before it can be used in practice.
- We have to talk about the ethical and legal sides of AI the issue of especially AI-driven neural computing.
- You should not exclude from the subject some of the issues mentioned above, such as quantum computing and other derivations, neuromorphic AI, and brain-inspired learning models, they should be covered as well.

The *ICCK-TNC* is dedicated to being an active player in these advances, a fundamental place for breakthrough research, knowledge dissemination, and community engagement.

6.4 Submission Guidelines and Contact Information

The authors who would like to submit their work are encouraged to go to the journal's website for updates regarding submission guidelines, the required formatting, and ethics policies:

Website: https://www.icck.org/tnc

Questions regarding submissions, special issues, or fellowship & editorial policies are to be addressed through:

Editorial Contact: office@icck.org

We are eager to receive top-notch research contributions, thus creating an energized community dedicated to neural computing advancement

7 Conclusion

Neural computing, the field leading the array of innovations in artificial intelligence, is on top of nearly every industry, thus affecting the way intelligent systems learn, adapt, and operate. Currently, from new deep learning techniques to neuromorphic computing and quantum-inspired neural networks, this area continues to be the most innovative in computational intelligence. The successful and responsible execution of neural computing approaches will depend on addressing issues such as the scalability of computation, ethical problems in AI, data privacy, and the interpretability of models.

The goal of *ICCK Transactions on Neural Computing* (*ICCK-TNC*) is to be the best platform for cutting-edge research, cross-disciplinary cooperation, and real-world neural computing applications in its field. *ICCK-TNC*, through tackling major issues, supporting open science, and partnering with industry academia, will stimulate the most revolutionary research that transforms the future of intelligent systems.

We appeal to researchers, practitioners, and professionals from the industry to submit unexpected groundbreaking work, get familiar with innovative views, and exchange thoughts in useful conversations that will be the basis of further neural computing studies. Together we will create a more intelligent, less wasteful, and thus more ethical AI future to come.

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Conflicts of Interest

The author declare no conflicts of interest.

Ethical Approval and Consent to Participate

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Munir Ahmad is a distinguished professional with over 16 years of experience. He holds a Ph.D. in computer science from the School of Computer Science, National College of Business Administration and Economics, and a Master of Computer Science degree from the Virtual University of Pakistan. As the Executive Director/CIO at United International Group, Lahore, Pakistan, he has excelled in data management and resource optimization within multinational organizations. Munir Ahmad is renowned for his extensive research in sentiment analysis, AI applications in healthcare and animal facial identification. His expertise lies in data mining, big data, and artificial intelligence. (Email: munirahmad@korea.ac.kr)