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1. Introduction for Editor-in-Chief, by Juyang Weng



It is my great pleasure to introduce Dr. Dongshu Wang as the new editor-in-chief of IEEE CDS Newsletters. The Newsletters started on April 24, 2004, when I was the first president of the AMD Technical Committee of the IEEE Computational Intelligence Society. The name AMD is the acronym for Autonomous Mental Development. The name AMD Newsletters has been changed to CDS Newsletters, where CDS is the acronym for Cognitive and Developmental Systems. From this new issue, the Newsletters editorial team plans to expand the scope to cover all subjects of science and technology for the Development of Natural and Artificial Intelligence. All publications in the Newsletters are peer-reviewed and we plan to have the newsletters indexed by major index services like Scopus. All contributions should be submitted to wangdongshu@zzu.edu.cn.

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2. Editorial Board



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3. Call for Papers | WTDL 2024

2024 Workshop on Transparentizing Deep Learning
(WTDL 2024)
January 16, 2024
in
5th AIEE
Bangkok, Thailand
<http://www.aiee.net/>

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<http://brain-mind-institute.org/>

The Deep Learning scheme has been the basis of a great recent increase in the number of AI related publications. Based on Deep Learning, many generative AI systems, such as ChatGPT and Large Language Models (LLMs), have also attracted much attention from the public, media, as well as policymakers, including those in the U.S., Europe, and China. “For LLMs to solve problems, people need better understand the successes and failures of these tools” (editorial, *Nature*, July 27, 2023). This workshop invites researchers knowledgeable about deep learning to exchange the latest results toward transparentizing deep learning, including LLMs.

Full research and position papers accepted will be published in the workshop section of the proceedings of AIEE 2024. Accepted abstracts will be presented during the workshop. After submitting your papers online to AIEE 2023, send them also to the workshop general chair via email.

Registration fee for the workshop is US\$80 by Dec. 31, 2023, and \$100 after. According to paper submissions, the Workshop intends also to hold a panel session to facilitate interactive discussions among the workshop participants. Workshop presenters will be onsite, but registered remote viewers are allowed who will be able to submit questions to the panel members and presenters. For more details, visit the website of the 5th AIEE <http://www.aiee.net/>.

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4. Call for Papers | IEEE ICDL 2023

The IEEE International Conference on Development and Learning 2023 (ICDL) will take place in Macau, China from November 9 to 11, 2023.

ICDL is a highly selective annual international conference that aims to showcase and share the very best interdisciplinary and multidisciplinary research on how humans and animals develop sensing, reasoning and actions.

ICDL community focuses on the understanding of how biological agents take advantage of interaction with social and physical environments to develop their cognitive capabilities. Moreover, how knowledge can be used to improve future computing and robotic systems.

Scope and Topics

- Principles and theories of development and learning
- Development of skills in biological systems and robots
- Nature vs nurture, developmental stages
- Models on the contributions of interaction to learning
- Verbal, non-verbal, and multi-modal interaction
- Models on active learning
- Architectures for lifelong learning
- Emergence of body and affordance perception
- Analysis and modeling of human motion and state
- Models for prediction, planning, and problem-solving
- Models of human-human and human-robot interaction
- Emergence of verbal and non-verbal communication
- Epistemological foundations and philosophical issues
- Robot prototyping of human and animal skills
- Ethics and trust in computational intelligence and robotics
- Social learning in humans, animals, and robots

Submission

Authors are invited to submit original and unpublished papers of six pages with the possibility of two extra pages at a fee. Submissions are in the IEEE conference template. Submission will be selected for either oral or poster presentation based on the reviews. Accepted and presented regular six-page paper submissions. All papers will be submitted for inclusion in IEEE Xplore.

Important Dates

- August 20, 2023:** Deadline for manuscript submission.
- September 10, 2023:** Notification of paper acceptance.
- September 30, 2023:** Submission of final papers in IEEE PDF format.

5. Dialogue Initiation: Is Post-Selection in Deep Learning Fatal to Deep Learning?



Juyang (John) Weng, Brain-Mind Institute and GENISAMA, Michigan, USA

Deep Learning [1], along with Large Language Models (LLMs) rooted in Deep Learning, has received much media hype. Well-known LLMs [2] include ChatGPT by OpenAI, Microsoft's Bing Chat, and Google's Bard, among many others. Many researchers are concerned about the black-box nature of Deep Learning. Few [3] argued that Deep Learning is misconduct: (1) cheating in the absence of a test and (2) hiding bad-looking data. What should researchers do? With an estimated \$154 billion at stake in the AI industry in 2023, this dialog initiation invites you to discuss this important issue. The following gives some possible answers that a respondent can start with:

1. It is simply a lack of perfection in the development of science. We should continue along this path.
2. We need more transparency in the successes and failures of these tools.
3. It is not true that Deep Learning amounts to cheating in the absence of a test if the paper is a willful repetition after being alerted of an early naïve mistake.
4. It is not true that Deep Learning amounts to hiding bad-looking data if the paper is a willful repetition after being alerted for an early naïve mistake.
5. Technically Deep Learning is correct because its reported *error of the luckiest network* on a validation set is a good estimate of the expected error on a future test.
6. Technically Deep Learning is incorrect because only *the average error of all trained networks* on a validation set is a good estimate of the expected error on a future test.

For possible publication in the next issue of the Newsletter, send your Dialog response to juyang.weng@gmail.com and wangdongshu@zzu.edu.cn by Dec. 15, 2023. The size of your response is limited to 1 to 2 Newsletter pages.

References:

- [1] Y. LeCun, L. Bengio, and G. Hinton, "Deep Learning", *Nature*, 521, pp. 436-444, 2015.
- [2] A. Radford, K. Narasimham. T. Salimans, and H. Sutskever, "Improving Language Understanding by Generative Pre-Training", Open AI, p 12, 2018. https://cdn.openai.com/research-covers/language-unsupervised/language_understanding_paper.pdf.
- [3] J. Weng, "On 'Deep Learning' Misconduct", in Proc. 2022 3rd International Symposium on Automation, Information and Computing (ISAIC 2022), Beijing China, 8 pages, Dec. 9-11, 2022. arXiv:2211.16350.

6. Concept Snapshot: Forgetting



In recent years, an emerging theory has emerged that forgetting isn't actually bad, it's just an adaptive function of the brain that helps with learning and memory renewal.

Livia Autore, Ph.D., lead author of the study, said, "These findings suggest that competition between imprints can affect memory, but that similar cues from natural conditions or human stimuli can cause memories to reappear."

This could be very enlightening for some diseases, such as Alzheimer's patients often experience memory loss, but is it possible that they still have memories but have forgotten how to activate them, or have overactivated the adaptive forgetting process?

Article reference:

Livia Autore, James D. O'Leary, Clara Ortega-de San Luis, Tomás J. Ryan. Adaptive expression of engrams by retroactive interference. *Cell Reports*, 42(8): 112999. DOI: <https://doi.org/10.1016/j.celrep.2023.112999>.

Article access:

<https://www.sciencedirect.com/science/article/pii/S2211124723010100?via%3Dihub>

7. Insect-Inspired: Neuromorphic Sequence Learning

For many robotics applications, it is desirable to have relatively low-power and efficient onboard solutions.

Insects and other arthropods effortlessly navigate complex environments despite having relatively simple nervous systems. This is often attributed to robust and efficient motion control strategies where action and perception are closely coupled.

Le Zhu et al. took inspiration from insects, such as ants, that are capable of learning and following routes in complex natural environments using relatively constrained sensory and neural systems. They used a bioinspired event camera on a terrestrial robot to collect visual sequences along routes in natural outdoor environments and applied a neural algorithm for spatiotemporal memory that is closely based on a known neural circuit in the insect brain. They show that this method is plausible to support route recognition for visual navigation. By encoding memory in a spiking neural network running on a neuromorphic computer, their model can evaluate visual familiarity in real-time from event camera footage.

Article reference:

Le Zhu, Michael Mangan, Barbara Webb. Neuromorphic sequence learning with an event camera

on routes through vegetation. *Science Robotics*, 2023, Vol. 8, No. 82. DOI: 10.1126/scirobotics.adg3679.

Article access:

<https://www.science.org/doi/10.1126/scirobotics.adg3679>

8. Prosthetics: A Highly Integrated Bionic Hand



The ability to interact with everyday objects and perform mundane and complex tasks is greatly damaged after the amputation of a hand. The research on bionic hands helps amputees and other people who need to improve their quality of life to gain a better life experience.

Restoration of sensorimotor function after amputation has remained challenging because of the lack of human-machine interfaces that provide reliable control, feedback, and attachment.

Recently, Max Ortiz-Catalan's team presented the clinical implementation of a transradial neuromusculoskeletal prosthesis—a bionic hand connected directly to the user's nervous and skeletal systems. Operation of the bionic hand in daily life resulted in improved prosthetic function, reduced postamputation, and increased quality of life. Sensations elicited via direct neural stimulation were consistently perceived on the phantom hand throughout the study. The functionality of conventional artificial limbs is hindered by discomfort and limited and unreliable control. Neuromusculoskeletal interfaces can overcome these hurdles and provide the means for the everyday use of a prosthesis with reliable neural control fixated into the skeleton.

Article reference:

Max Ortiz-Catalan et al. A highly integrated bionic hand with neural control and feedback for use in daily life. *Science Robotics*, 2023, Vol.8, No. 83. DOI: 10.1126/scirobotics.adf7360

Article access:

<https://www.science.org/doi/10.1126/scirobotics.adf7360>

9. Recent Advance: Non-Invasive Language Brain-Computer Interfaces



When it comes to brain-computer interfaces, several studies have successfully decoded speech sounds and other motor signals from brain signals to restore subjects' lost ability to speak. While effective, these decoders are neurosurgically plugged into the brain and are not suitable for most scenarios.

In the past, non-invasive decoders using non-invasive records

can only identify stimuli from a small group of letter words or phrases, and have been limited in application.

A recent study published in Nature Neuroscience describes a new, non-invasive way of decoding that uses functional magnetic resonance imaging (fMRI) to record the reconstruction of continuous natural language from cortical representations of sentence meaning. This non-invasive brain-computer interface can be used to identify meaning in perceived, imagined, and silent videos and generate understandable sequences of words.

Article reference:

Tang, J., LeBel, A., Jain, S. et al. Semantic reconstruction of continuous language from non-invasive brain recordings. Nature Neuroscience 26, 858–866 (2023). <https://doi.org/10.1038/s41593-023-01304-9>.

Article access:

<https://www.nature.com/articles/s41593-023-01304-9>

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