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SIGDA News

1. **Exploring the Industrial Relevance of QNLP**

One of the most demanding—yet fascinating—challenges that researchers, scientists and academics are facing is understanding the mathematics of language. In this context, the discipline that deals with defining and applying models and tools to the treatment of natural language is called computational linguistics (CL). By nature, CL is interdisciplinary, as it combines methods and techniques of linguistics with those of computer science, artificial intelligence (AI) and statistics.

2. **Micron Pushes DRAM Node for Mobile First**

Micron Technology has been setting the pace for DRAM advancement of late. Its 1-beta DRAM technology continues the trend, but other major vendors are keeping up, even as it looks like DRAM prices will be lower in 2023.

3. **Samsung, Micron Battle for NAND Supremacy**

The memory industry has always gone through a predictable boom-and-bust cycle, but the pandemic and geopolitical instability has introduced new twists to the market over the course of 2022, and uncertainty will continue to play a role in 2023.

4. **AV Radar Moves to Domain Controller for First Time**

At CES 2023, Ambarella demonstrated its centralized architecture for radar processing in autonomous vehicles (AVs), which allows fewer radar sensors to be used in each AV. Ambarella's offering is a combination of its

Messages from the EiCs

Dear ACM/SIGDA members,

We are excited to present to you February E-Newsletter. We encourage you to invite your students and colleagues to be a part of the SIGDA newsletter.

The newsletter covers a wide range of information from the upcoming conferences to technical news and activities of our community. Get involved and contact us if you want to contribute articles or announcements.

The newsletter is evolving. Please let us know what you think.

Happy reading!

Debjit Sinha, Keni Qiu,
Editors-in-Chief,
SIGDA E-News

CV3 family of domain controller chips with AI algorithms and software from Oculii, which Ambarella acquired in 2021.

5. **Experts: U.S. Military Chip Supply Is Dangerously Low**

The U.S. Department of Defense (DoD) will probably take years to wean itself from Asian chip supplies because of a dearth of investments in domestic production capacity, according to industry insiders and government observers.

What is

Contributing author: Mohsen Imani, UC Irvine <m.imani@uci.edu>

AE: Xun Jiao, Villanova University <xjiao@villanova.edu>

What is Hyperdimensional Computing?

The human brain remains the most sophisticated processing component that has ever existed. The ever-growing research in biological vision, cognitive psychology, and neuroscience has given rise to many concepts that have led to prolific advancement in artificial intelligent accomplishing cognitive task. HyperDimensional (HD) Computing is introduced as an alternative paradigm that mimics important brain functionalities towards high-efficiency and noise-tolerant computation [1]. HD computing is motivated by the observation that the human brain operates on high-dimensional data representations. In HD computing, objects are thereby encoded with high-dimensional vectors, called hypervectors, which have thousands of elements [2, 3]. HD computing incorporates learning capability along with typical memory functions of storing/loading information. It mimics important functionalities of the human memory model with vector operations, which are computationally tractable and mathematically rigorous in describing human cognition [4, 5]. HD computing relies on the algebraic properties of their key operations to incorporate the advantages of structured symbolic and vector distributed representations. It operates over a well-defined and hardware-friendly set of mathematics: Binding is well suited for associating two hypervectors and used for variable-value association. Bundling is a memorization function that keeps the information of input data into a bundled vector. Permutation is an operation to represent sequences by creating a near-orthogonal but reversible hypervector. Reasoning is done by measuring the similarity of hypervectors.

HD computing has shown several advantages as the next generation of cognitive machines. First, its training capability in one or few shots, where

partial data are learned from one or few examples as opposed to many iterations [6, 7]. Second, HD operations are highly parallel and do not require frequent weight updates, thus empowering online learning on processing in-memory [8]. Third, HD computing has natural robustness to noise and bit errors provided by the high-dimensional distributed representations. This enables greater tolerance for device variability and unreliable emerging technologies, such as non-volatile memory or nanoscale devices with low signal-to-noise ratio [8-10]. Finally, HD computing has been shown great potential to enable lightweight privacy and security [11-14].

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Paper Deadlines

GLSVLSI’23 – ACM Great Lakes Symposium on VLSI
Knoxville, TN
Deadline: Feb. 6, 2023
June 5-7, 2023
http://www.glsvlsi.org

ISVLSI’23 – IEEE Computer Society Annual Symposium on VLSI
Iguana Falls, Brazil
Deadline: Feb 23, 2023
June 20 - 23, 2023
http://www.ieee-isvlsi.org

MDTS'23 – IEEE Microelectronics Design & Test Symposium
Albany, NY
Deadline: Feb 26, 2023
Tentative Date: May 8-10, 2023
http://natw.ieee.org

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[14] F. Yang and S. Ren, "Adversarial Attacks on Brain-Inspired Hyperdimensional Computing-Based Classifiers," arXiv preprint arXiv:2006.05594, 2020

SIGDA Awards

1. **IEEE Gustav Robert Kirchhoff Award @ ASP-DAC 2023**

28th Asia and South Pacific Design Automation Conference (ASP-DAC 2023) (aspdac.com)

Yoshisuke Ueda

2. **Best Paper Award @ ASP-DAC 2023**

ASP-DAC 2023 Technical Program (tsys.jp)

2C-2: Approximate Floating-Point FFT Design with Wide Precision-Range and High Energy Efficiency

Author: **Chenyi Wen, Ying Wu, Xunzhao Yin, Cheng Zhuo (Zhejiang Univ., China)**

3D-1: **Rethink before Releasing your Model: ML Model Extraction Attack in EDA**

Author: **Chen-Chia Chang, Jingyu Pan (Duke Univ., USA), Zhiyao Xie (Hong Kong Univ. of Science and Tech., Hong Kong), Jiang Hu (Texas A&M Univ., USA), Yiran Chen (Duke Univ., USA)**

ISLPED'23 – ACM/IEEE Int'l Symposium on Low Power Electronics and Design
Vienna, Austria
Deadline: March 13, 2023
(Abstracts due: March 6, 2023)
Aug 7-8, 2023
http://www.islped.org

ESWEEK'23 - Embedded Systems Week
Hamburg, Germany
Deadline: March 23, 2023
(Abstracts due: March 16, 2023)
Sept. 17-22, 2023
http://www.esweek.org

IWLS'23 - International Workshop on Logic & Synthesis
EPFL, Lausanne, Switzerland
Deadline: April 10, 2023
(Abstracts due: April 3, 2023)
June 5-6, 2023
https://www.iwls.org

ICCAD'23 – IEEE/ACM Int'l Conference on Computer-Aided Design
San Francisco, CA
Deadline: May 22, 2023
(Abstracts due: May 15, 2023)
Oct 29 - Nov 2, 2023
http://www.iccad.com

VLSI-SoC'23 – IFIP/IEEE Int'l Conference on Very Large Scale Integration
Dubai, UAE
Deadline: May 23, 2023
(Abstracts due: May 16, 2023)
Oct 16-18, 2023
http://www.vlsi-soc.com

3. **Special Feature Award @ ASP-DAC 2023**

ASP-DAC 2023 Technical Program (tsys.jp)

2E-1 : ViraEye: An Energy-Efficient Stereo Vision Accelerator with Binary Neural Network in 55 nm CMOS

Author : Yu Zhang, Gang Chen, Tao He, Qian Huang, Kai Huang (Sun Yat-sen Univ., China)

4. **Best Design Award @ ASP-DAC 2023**

ASP-DAC 2023 Technical Program (tsys.jp)

2E-5 : A fully synchronous digital LDO with built-in adaptive frequency modulation and implicit dead-zone control

Author : Shun Yamaguchi, Mahfuzul Islam, Takashi Hisakado, Osami Wada (Kyoto Univ., Japan)

Who's Who

Aman Arora
Graduate Fellow
The University of Texas at Austin

Research interests: Reconfigurable computing, Domain-specific acceleration, Hardware for Machine Learning
Email: aman.kbm@utexas.edu
Personal webpage: https://amanarora.site

Upcoming Conferences

FPGA'23 – ACM/SIGDA Int'l Symposium on Field-Programmable Gate Arrays
Monterey, CA
Feb 12 - 14, 2023
http://www.isfpga.org

ISSCC'23 – IEEE Int'l Solid-State Circuits Conference
San Francisco, CA
Feb 19-23, 2023
http://isscc.org

DATE'23 - Design Automation and Test in Europe
Antwerp, Belgium
Mar 17-19, 2023
http://www.date-conference.com

ISPD'23 – ACM Int'l Symposium on Physical Design
Virtual Conference
Mar 26 - 29, 2023
http://www.ispd.cc

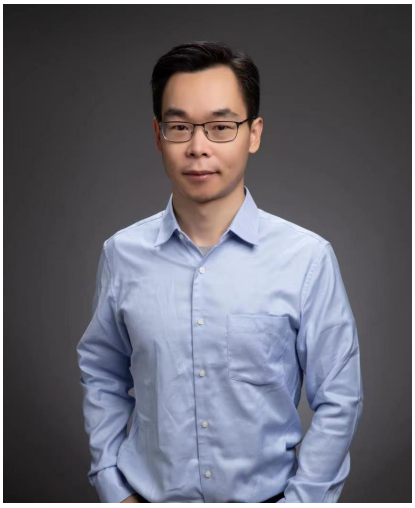
ISQED'23 - Int'l Symposium on Quality Electronic Design
San Francisco, CA
April 5-7, 2023
http://www.isqed.org

HOST'23 – IEEE Int'l Symposium on Hardware-Oriented Security and Trust
San Jose, CA
May 1-4, 2023
http://www.hostsymposium.org

FCCM' 23 - IEEE International Symposium On Field-Programmable Custom Computing Machines

Heba Abunahla
Assistant Professor
Quantum and Computer Engineering department, TU Delft, Netherlands

Research interests: Emerging RRAM devices, Smart sensors, Hardware security, Graphene-based electronics, CNTs-based electronics, Neuromorphic computing
Email: Heba.nadhmi@gmail.com



Wang Ying
Associate Professor
Institute of Computing Technology, Chinese Academy of Sciences

Research interests:
Domain-Specific chips, processor architecture and design automation
Email: wangying2009@ict.ac.cn
Personal webpage: https://wangying-ict.github.io/

Los Angeles, CA
May 8 - 11, 2023
https://www.fccm.org/

ISCAS'23 – IEEE Int'l Symposium on Circuits and Systems
Monterey, CA
May 21 - 25, 2023
http://iscas2023.org

RTAS'23 - IEEE Real-Time and Embedded Technology and Applications Symposium
San Antonio, Texas
May 9-12, 2023
http://2023.rtas.org

DAC'23 – Design Automation Conference
San Francisco, CA
July 9-13, 2023
http://www.dac.com/

ICDCS'23 – IEEE Int'l Conference on Distributed Computing Systems
Hong Kong, China
Jul 18 - 21, 2023
https://www.icdcs.org/

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