BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Artificial Intelligence Advances
https://ojs.bilpublishing.com/index.php/aia

EDITORIAL

Learning in AI Processor

Xinhua Wang* **Weikang Wu**

Communication software and ASIC design NERC, The 54th Research Institute CETC, China

ARTICLE INFO

Article history
Received: 26 October 2021
Accepted: 26 October 2021
Published Online: 31 October 2021

AI processor, which can run artificial intelligence algorithms, is a state-of-the-art accelerator,in essence, to perform special algorithm in various applications. In particular,these are four AI applications: VR/AR smartphone games, high-performance computing, Advanced Driver Assistance Systems and IoT. Deep learning using convolutional neural networks (CNNs) involves embedding intelligence into applications to perform tasks and has achieved unprecedented accuracy [1]. Usually, the powerful multi-core processors and the on-chip tensor processing accelerator unit are prominent hardware features of deep learning AI processor. After data is collected by sensors, tools such as image processing technique, voice recognition and autonomous drone navigation, are adopted to pre-process and analyze data. In recent years, plenty of technologies associating with deep learning Al processor including cognitive spectrum sensing, computer vision and semantic reasoning become a focus in current research.

According to different applications, deep learning AI processor can be divided into a high performance processor for neural network deployed in a cloud computing center and a low-power processing unit deployed in a mobile platform.

In recent years, almost all research departments of technology companies around the world such as IBM, Intel, and NVIDIA are dedicated to the study of the AI processors. Many scholars proposed various novel AI processor architectures, which can satisfy their companies' demands for different applications. Eyeriss is a spatial architecture for energy-efficient dataflow for convolutional neural networks and minimizes data movement energy consumption, proposed by Yu-Hsin Chen from MIT. Eyeriss is realized by exploiting local data reuse of filter weights and feature map pixels, i.e., activations, in the high-dimensional convolutions, and minimizing data movement of partial sum accumulations [2]. ShiDianNao is a shifting vision processor and designed by Zidong Du, a professor of Chinese Academy of Sciences. It is 60× more energy efficient than the previous state-of-the-art neural network accelerator, placed next to a CMOS or CCD sensor. Zidong Du and his team present a full design down to the layout at 65 nm, with a modest footprint of 4.86 mm^2 and consuming only 320mW, but still about 30× faster than

**Corresponding Author:*
Xinhua Wang,
Communication software and ASIC design NERC, The 54th Research Institute CETC, China;
Email: tonywang1202@126.com

 https://doi.org/10.30564/aia.v3i2.3878

high-end GPUs [3].

The artificial intelligence research still has a big gap with living things intelligence, especially in processor and smart chip, although many fields have got great achievements last several decades. Fully utilize AI processor research to benefit all sectors of industry. The challenges confronting AI processor are profound and there is still extensive research work to carry out. Therefore, the author lists three promising AI processor technologies for discussion.

Most AI processors are suitable for task in a specific application, like autonomous driving of drones and cars. A general and powerful architecture of AI processors will emerge to eliminate the customization hardware work.

Accompanied by the sharp increase in computation of signal processing, multi-core interconnection and real-time and low-power will be the hard parts of Al processor, when a heterogeneous multi-core architecture SoC is designed [4].

Another problem of CNN is categorization, both in image and semantic. While the solution to bridge the gap remains elusive, there are many promising algorithms to propose toward this goal [5] .

Finally, as editorial board members, we would like to thank the authors for their submissions. By compiling these articles, we hope to enrich our readers and researchers with recent trends. Certainly, all AI topics could be accepted to publish on this journal.

References

[1] M.Sankaradas et al., “A massively parallel coprocessor for convolutional neural networks," in Proc.20th IEEE Int. Conf.Appl.-Specific Syst., Archit.Process., Jul. 2009, pp.53-60.

[2] Yu-Hsin Chen;Joel Emer;Vivienne Sze. " Eyeriss: A Spatial Architecture for Energy-Efficient Dataflow for Convolutional Neural Networks," in Computer Architecture (ISCA), 2016.

[3] Zidong Du et al. "ShiDianNao: Shifting vision processing closer to the sensor," in Computer Architecture (ISCA), 2015.

[4] K.He, X.Zhang, S.Ren, and J.Sun. "Deep Residual Learning for lmage Recognition,"in IEEE CVPR, 2016.

[5] J.Cong and B.Xiao. “Minimizing computation in convolutional neural networks." in ICANN, 2014.

https://doi.org/10.30564/aia.v3i2.3878