

MEMRISTOR CROSSBAR CIRCUITS FOR IMPLEMENTING CONVOLUTIONAL NEURAL NETWORKS

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Abstract

Internet-of-Things (IoT) technology generates a huge amount of unstructured data for making human life safer and more convenient. However, the large amount of data generated from uncountable IoT sensors needs a massive amount of processing energy. Moreover, if all the data are delivered to the data center, an amount of communication energy should be extremely large, too. To mitigate the energy problem, the computation burden for processing the big and unstructured data should be divided between IoT sensors and cloud servers. For this purpose, memristor crossbar circuits can be considered a promising candidate for implementing low-cost and low-energy edge intelligence, where a memristor-CMOS hybrid circuit can be added to IoT sensors. By dosing so, low-precision and low-performance neural networks such as Quantized Convolutional Neural networks (QCNN) can be implemented with IoT sensors. In this presentation, we explain how to design memristor crossbar circuits to implement QCNN and then show simulation results.

Key words: memristor crossbar circuits, convolutional neural networks, edge intelligence