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Recent advances in efficient computation of deep convolutional neural networks

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Motivation

- Deep neural networks have evolved remarkably over the past few years and they are currently the fundamental tools of many intelligent systems.
- DNN-based methods are both computational-intensive and resource-consuming, which hinders the application of these methods on embedded systems like smart phones.
- Network acceleration and hardware implementation have become more and more important.
- We want to provide a comprehensive survey of network acceleration, compression, and accelerator design from both algorithm and hardware points of view.

Reviewed Methods

- Network pruning
- Low-rank approximation
- Network quantization
- Teacher-student networks
- Compact network design
- Hardware accelerators

Future Trends

1. Scalable (self-adaptive) compression.
2. Network acceleration for object detection and other computer vision tasks.
3. Hardware-software co-design.

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Conclusions

- DNNs provide impressive performance while suffering from a huge computational complexity and a high energy expenditure.
- In this paper, we provide a survey of recent advances in efficient processing of DNNs from both the algorithm and hardware points of view.
- In addition, we pointed out a few topics that deserve further investigations in the future.