Recent advances of deep learning for HPC and GPU computer systems

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In recent years, many researchers have been interested in machine learning techniques. Especially, deep learning is quite active research area after significant improvement in 2012's image recognition competition, ImageNet Large Scale Visual Recognition Competition (ILSVRC). Such techniques are applied to widespread areas not only visual recognition problem for general image but also autonomous robots, medical image and so on. Also, in Earth science that requires large scale observation and computer simulation, some researches (e.g., Ichiura et al., 2017; George and Huerta, 2017) using the deep learning were proposed and have received remarkable attention. The reasons why the deep learning has progressed are 1) algorithmic improvement and 2) computer infrastructure makes it easy to collect larger data. On the other hand, since the deep learning requires large dataset and deep model to achieve high accuracy, it takes a longer time to train the model. Therefore, many researches using deep learning utilize GPUs to make their methods faster. In this presentation, I introduce how such HPC researches are using deep learning techniques and review recent hardware and software from a perspective of computer science.

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