Paper ID: 57187
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IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Tools and Technology in Support of Integrated Applications (1)

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DEEP LEARNING DEVELOPMENT PLATFORM FOR AEROSPACE APPLICATIONS

Abstract

Artificial intelligence (AI) technology based on deep learning has brought an unprecedented revolution in intelligent perception and decision-making. With the advance of space exploration, increasingly complex space missions are in urgent need of the support of artificial intelligence. However, equipping the spacecraft with intelligence is a great challenge. Firstly, there are not enough AI professionals in aerospace applications. Traditional technicians are usually very proficient in the aerospace industry, but they generally do not have experience in artificial intelligence. Secondly, compared with the traditional mission in computer vision, the aerospace applications are usually more complicated. They usually composed of multiple neural networks, which significantly increases the difficulty of development. Finally, the network model is mainly deployed on the commercial GPU platform in most businesses, but the trained model has to be deployed on the specialized hardware platform for aerospace applications, which is not a trivial work. Therefore, how to provide rapid model design, training, and deployment aimed at complex aerospace application scenarios has become a hot topic. In this paper, we have designed a deep learning development platform for spacecraft intelligence, which can provide different customized services for junior, senior and expert users. Firstly, this platform can visualize the design and training of convolutional neural networks (CNNs), thus greatly simplifies network design and super parameter adjustment. In intelligent application, it makes developers pay more attention to business, rather than model design and training. Secondly, according to different scenarios, we design different granularity deep network models and components to create a model library. Through the dynamic assembly of multiple models, designers can realize the rapid models' integration of complex aerospace applications. Finally, based on the aerospace intelligent hardware platform, we can achieve the efficient deployment and scheduling of multiple intelligent models. With CNN's quantization, pruning, and more compact convolution structure, the trained model is further accelerated without significant degradation of their performance. The aerospace engineers, who are not very proficient in artificial intelligence, can use our development platform to rapidly produce the intelligence algorithm models for aerospace missions. Our platform can provide essential support for intelligent aerospace applications and promote the rapid development of aerospace intelligence.