



Morpho Provides “SoftNeuro” to Highly Resolved Galaxy Simulations Project for Universities: Supporting 3D Simulation with Supercomputer Fugaku

Tokyo, Japan –December 5th, 2022– Morpho Inc. (hereinafter, “Morpho”), a global leader in image processing and imaging AI solutions, announced today that Morpho will provide its core product “SoftNeuro®”, the world's fastest deep learning inference engine, to a project promoted by the University of Tokyo, Tohoku University, and Kobe University to accelerate forecasting the expansion of supernova shells for highly resolved galaxy simulations using deep learning. “SoftNeuro” will accelerate the inference of 3D simulations (galaxy formation simulations) using deep learning on the supercomputer Fugaku.

“SoftNeuro” supports major deep learning frameworks and performs faster processing in various edge-device environments. Since it is a general-purpose inference engine, it can be used not only for image recognition but also for speech recognition and text analysis. Morpho has proposed and provided “SoftNeuro” for multi-platform and high-speed inference for various detection applications based on image data.

For this project, Morpho has realized 3D CNN inference acceleration on Fugaku (SVE optimization of Conv3D and application of 3D Winograd) through the original development of “SoftNeuro” for use in 3D simulations. Through the project and collaboration, Morpho will support further acceleration of 3D simulations (galaxy formation simulations) using deep learning on supercomputer Fugaku.

About the Project

The project is to accelerate highly resolved galaxy formation simulations.

We have developed the 3D-CNN-based deep learning model that predicts anisotropic shell expansion of supernova (SN) explosions and identifies particles with small timesteps. Our model is based on Memory-In-Memory Network (Wang et al. 2018), which consists of 2D-CNNs and predicts future images.

“Morpho has worked on optimization on SoCs for smart devices in the past, but through the 3D CNN acceleration of ‘SoftNeuro’ on Fugaku, we were able to take on the new challenge. I expect that the experience gained from this project will enable us to utilize our technology for optimization of 3D calculations and optimization on supercomputers in the future.”
(Hitoshi Matsuo, Senior Researcher, CTO Office, Morpho Inc.)

With the growing need for faster and more efficient 3D simulations using deep learning, Morpho will continue to further improve the convenience and technical capabilities of “SoftNeuro” and develop technology on a global level to realize a fruitful culture through the provision of various services and solutions.

“SoftNeuro” product page: <https://www.morphoinc.com/en/technology/sie>

Related Information

Program for Promoting Research on the Supercomputer Fugaku

<https://www.r-ccs.riken.jp/en/fugaku/org-relations/promoting-research/>

Toward a unified view of the universe: from large scale structures to planets

(Junichiro Makino, Kobe University)

https://jicfus.jp/fugaku_ap/en/

Sub-project A: Revealing the Formation History of the Universe with Large-scale Simulations and Astronomical Big Data

(Michiko Fujii, the University of Tokyo)

https://jicfus.jp/fugaku_ap/en/research/subtask/subtaska/

Galaxy formation simulation using ASURA-FDPS

<https://www.asj.or.jp/nenkai/archive/2021a/pdf/Z307a.pdf>

(Takayuki Saitoh, Kobe University)

Abstracts of the Autumn Meeting 2022 of the Astronomical Society of Japan

Accelerating Predicting the Expansion of Supernova Shells for Highly Resolved Galaxy Simulations Using Deep Learning

<https://www.asj.or.jp/nenkai/archive/2022b/pdf/X52a.pdf>

Related Press Releases

2021/10/20

Published: Research Paper on Accelerating Deep Learning Inference: The Technical Details of the Acceleration Method of SoftNeuro, Now Available for Free Trial

https://www.morphoinc.com/en/news/20211020-epr-softneuro_rp

* This free trial has ended.

About Morpho, Inc.

Established in 2004, Morpho is a research and development-led company in image processing technology. It has globally expanded its advanced image processing technology as embedded software, for domestic and overseas customers centered on the smartphone market, broadcasting stations and content providers. It has also provided image recognition technology utilizing Artificial Intelligence (AI), collecting image information captured by cameras into devices and clouds and analyzing it, for fields such as automotive devices, factory automation, and medical care. Morpho will provide broad support, making a wide range of innovations happen with its imaging technology and Deep Learning technology. For more information, visit <https://www.morphoinc.com/en> or contact m-info-pr@morphoinc.com.

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