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Sony Makes "Core Libraries" of its Deep Learning Tools Available as Open Source

Tokyo - June 27, 2017 - Sony Corporation today announced that it has made its "Neural Network Libraries" (https://nnabla.org/) that serve as a framework for creating deep learning programs for artificial intelligence, available in open source. Software engineers and designers will now be able to make use of these core libraries free of charge to develop deep learning programs and incorporate them into their products and services. This shift to open source is also intended to enable the development community to further build on the core libraries' programs.

Deep learning refers to a form of machine learning that uses neural networks modeled after the human brain. By making the switch to deep learning-based machine learning, the past few years have seen a rapid improvement in image and voice recognition technology, even outperforming humans in certain areas. Compared to conventional forms of machine learning, deep learning is especially notable for its high versatility, with applications in a wide variety of fields besides image and voice recognition, including machine translation, signal processing, and robotics. As proposals are made to expand the scope of deep learning to fields where machine learning has not been traditionally used, there has been an accompanying surge in the number of deep learning developers.

The work of neural network design is very important for deep learning program development. Programmers construct the neural network best suited to the task at hand, such as image or voice recognition, and load it into a product or service after optimizing the network's performance through a series of trials. The software contained in Sony's core libraries (operation module group) efficiently facilitates all the above-mentioned development processes, and incorporates the following necessary elements for deep learning R&D.

· **All-purpose Execution Environment**

The software in Sony's core libraries is predominantly written in C++11, a programming language that runs in a variety of environments (OS and hardware, including GPUs) and operates on Linux, Windows, and a multitude of other platforms.

· **High Efficiency Development Environment**

On top of the C++ core libraries, Sony provides a layer of Python interface functions. Python is the prevailing programming language for deep learning development which allows for easy prototyping and high efficiency development. Because this allows for intuitive neural network design with fewer lines of code, it allows developers to focus on creating neural networks while developing technology that uses deep learning more efficiently, in less time, and at lower cost.

· **Multifunctionality**

They are equipped with the flexibility and expressiveness to keep up with the latest in the ever-innovating field of deep learning while also coping with the dynamic nature of neural networks

· **High-speed Operation**

Compatible with Nvidia GPUs, Sony's core libraries can carry out neural network learning and execution at the highest available speeds, allowing for deep learning supported tech development with lower iteration time.

· **Modification Made Easy**

Furthermore, developing and adding new functions as needed on the leading edge of deep learning is simple. For example, it is easy to add optimizer modules as well as function blocks, which are structural elements of neural networks.

· **Simple Hardware Transplanting**

The core libraries were built with transfers to new hardware in mind, and enable simple transplants to hardware such as smartphones and IoT devices.

Sony's R&D Platform and System R&D Group have used these core libraries as a base for products and services that incorporate deep learning. These include AR Effect, a SmartAR (augmented reality) app for the Xperia™ smartphone series' camera; Lifelog, an activity tracker app that uses action recognition technology; and the Price Estimation Engine, which provides highly accurate contract price estimates when buying and selling real estate.

This policy forms one part of Sony's AI environmental improvement initiative. In a world where more goods and services are expected to make use of artificial intelligence to provide higher levels of convenience, Sony is making its core libraries open source in the hope that a wider range of developers and researchers will build on its programs, and with the aim of contributing to the development of society.