Press information

Dextra

A robotic hand that defeats humans at Rock-Paper-Scissors

Credits: Sensors Group, Institute of Neuroinformatics, ETH Zurich and University of Zurich, Switzerland and the University of Seville, Spain.

The Institute of Neuroinformatics Sensors Group demonstrates Artificial Intelligence (AI) technology at the ETH Zurich's "R**ETH**INKING INTELLIGENCE" exhibit taking place Davos during the World Economic Forum's 2018 Annual Meeting. Using a brain-inspired neural network and camera, Dextra – a robotic hand – essentially "reads your mind" anticipating your hand gestures to defeat you in the Rock-Paper-Scissors game.

Dextra sees the world in super slow motion. Like the Captain Marvel superhero, "The Flash," Dextra is so fast at seeing the symbol you are about to throw that it is able to both determine your next move and execute a winning symbol 30 times faster than the quickest human. Unlike conventional artificial intelligence (**AI**) vision systems based on image frames, Dextra wins by being "frame-free." Conventional robotic or computer systems must continually process frames at a very high rate in order to react quickly. High processing rates in the camera and the computing system sap energy and power. Dextra's AI vision technology drives the motion in the scene by using a "silicon retina" **Dynamic Vision Sensor** (**DVS**) camera and a custom neural network accelerator called, "**NullHop**." The robotic AI computation occurs only when necessary enabling the system to always react quickly, while at the same time, optimizing energy use. Nullhop is a digital convolutional neural network (ConvNet) accelerator that determines which symbol the human game player displays. NullHop, like the DVS, takes advantage of the sparse data reducing the number of necessary computations by a factor of four. By using NullHop and the DVS, the system driving Dextra can react in about 10 milliseconds, about 30 times faster than the quickest human.

ETH Zurich Professor, Tobi Delbruck and Dr. Shih-Chii Liu lead the Sensors Group (http://sensors.ini.uzh.ch) part of the joint Institute of Neuroinformatics. The institute is a joint collaboration between ETH Zurich and University of Zurich. Professor Delbruck and his doctoral researcher, Patrick Lichtsteiner developed the first DVS camera in 2007. Inilabs GmbH (http://www.inilabs.com) markets the most recent generation of DVS cameras. Doctoral researcher, Alessandro Aimar, also a member of the Sensors Group developed NullHop as part of the Neuromorphic Processor Project (http://sensors.ini.uzh.ch/npp.html).

Professor Tobi Delbruck, doctoral researcher, Lulia Lungu, developed the Rock-Paper-Scissors demonstration along with members of the inilab staff: Federico Corradi, Dee-Dee Delbruck, and partners from the Robotics and Technology of Computers Lab, University of Seville, led by Professor Alejandro Linares-Barranco.

Presentation and explanation of the demonstration:
http://sensors.ini.uzh.ch/news_page/roshambo.html

Video:
https://drive.google.com/file/d/12SzaCO7djQrIVFSP6MtwnbE5Mt39f9Yv/view?usp=sharing