



GPU Computing

Evolved Machines | Neural Circuit Simulation

May 24, 2007

CHALLENGE

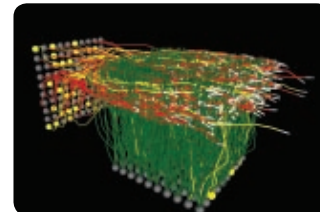


Evolved Machines is reverse-engineering brain circuits to develop a new paradigm for device technology. Their research work requires the large-scale simulation of neurobiologically realistic neural circuits which require enormous parallel computing capacity. Simulation of a

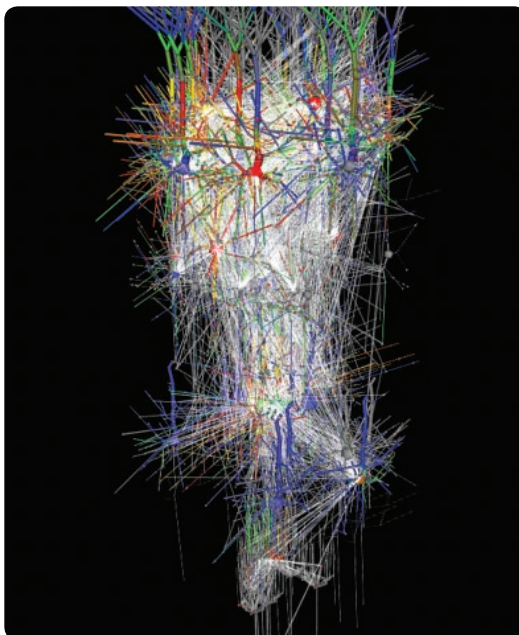
single neuron involves 200,000,000 differential equation evaluations per second, requiring approximately 4 gigaflops. A neural array engaged in sensory processing requires thousands of neurons, and so the detailed simulation of neural systems in real time requires >10 teraflops of computing power.

SOLUTION

Evolved Machines started working with NVIDIA in September 2006 on GPUs. They achieved accelerations of approximately 130-fold against simulations with current-generation x86 microprocessors. They are now engaged in the design of a rack of GPUs, which will rival the world's top systems, at 1/100 their cost.



IMPACT



Applications under active development at Evolved Machines include visual object recognition and odorant recognition. To develop devices which can learn objects and then recognize them in real world environments, the synthetic neural circuitry gradually “wires” itself during exposure to sensory input, much as a baby learns to recognize objects in its environment over the first 6 months of life.

With the GPU, devices with the ability to learn and sense odors to detect explosives in real environments or monitor food for freshness become possible. Further advances in image detection for building image databases based on content and self guided robotics can exploit neural simulation processing to bring a level of capability not currently possible.

For more information about NVIDIA GPU computing solutions, visit www.nvidia.com/tesla