LA-UR 10-05903

Licensable Technologies

NeuralViz: Petascale Synthetic Vision Cognition

Applications:

NeuralViz can be used for robust object recognition in imagery. Potential markets include automated monitoring of video and still imagery for: content-based search; security, safety, and inspection applications; aerial / satellite remote sensing for defense; intelligence and civilian applications; and autonomous robots.

Benefits:

The speed at which the algorithms can recognize objects as well as learn new objects (to add to the library of recognized objects) is unlike any other tool available.

Intellectual Property Status:

NeuralViz is protected by international copyright and LANL is seeking patent protection on the algorithms related to the technology also.

Licensing Status:

Available for licensing

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Technology Transfer Division

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Summary:

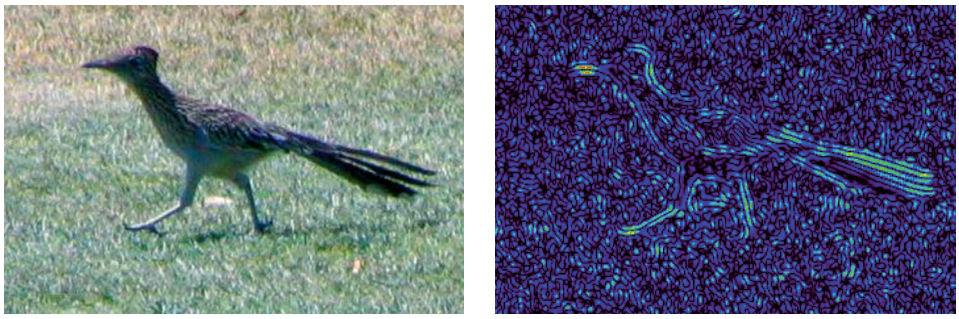
Scientists at LANL are exploring how the brain sees. Their goal is to develop computer vision software with human-level speed, accuracy and robustness.

NeuralViz is an evolving software technology developed by the Synthetic Visual Cognition Team at Los Alamos National Laboratory (LANL) to demonstrate full-scale, real-time models of visual cortex, the part of the human brain responsible for vision. The code runs on Roadrunner, LANL's 1,000-teraflop ("petaflop") super-computer.

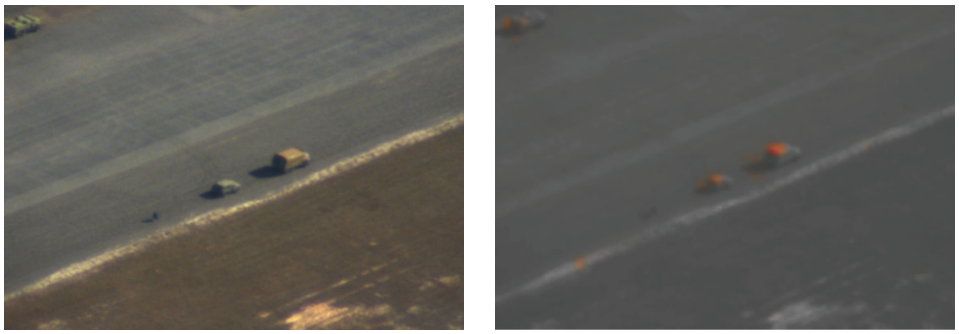
Small mammals are also capable of excellent visual acuity and object recognition with brains orders of magnitude smaller than humans. Thanks to the revolution in cluster-on-a-chip computing driven by the gaming/entertainment industry, NeuralViz can also run visual cortex models of these animals using commercial-off-the-shelf workstations. For example, a graphical processing unit (GPU) for a standard workstation provides 1 teraflop of computing power for less than $500 and has the processing power of a mouse's visual cortex. NeuralViz thus has the potential to enable widespread use of fast, accurate, robust computer vision systems for a wide range of real-world applications.

Development Stage:

Below are initial results for object extraction from still imagery and streaming video. Team publications are available at http://synthetic-cognition.lanl.gov. As computing technology increases in computing power and decreases in size, weight and power requirements, the applications for NeuralViz will continue to grow.



Left: A roadrunner, the New Mexico state bird, used as input to the NeuralViz program. Right: NeuralViz model of neural activity across primary visual cortex. NeuralViz uses biological learning rules to build brain-like hierarchical representations of natural imagery that can support accurate and robust extraction of objects from images.



Left: Frame from an aerial video clip (public release UAV video provided by DARPA). Right: initial results with NeuralViz show that visual cortex models can be trained to perform standard image analyst tasks, such as vehicle detection in aerial video. We are currently working to demonstrate NeuralViz for a number of real-world tasks.

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