

Computers learn to imagine the future

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by Garrett Kenyon

In many ways, the human brain is still the best computer around. For one, it's highly efficient. Our largest supercomputers require millions of watts, enough to power a small town, but the human brain uses approximately the same energy as a 20-watt bulb. While teenagers may seem to take forever to learn what their parents regard as basic life skills, humans and other animals are also capable of learning very quickly. Most of all, the brain is truly great at sorting through torrents of data to find the relevant information to act on.

At an early age, humans can reliably perform feats such as distinguishing an ostrich from a school bus, for instance – an achievement that seems simple, but illustrates the kind a task that even our most powerful computer vision systems can get wrong. We can also tell a moving car from the static background and predict where the car will be in the next half-second. Challenges like these, and far more complex ones, expose the limitations in our ability to make computers think like people do. But recent research at Los Alamos National Laboratory is changing all that.

Brain neuroscientists and computer scientists call this field neuromimetic computing – building computers inspired by how the cerebral cortex works. The cerebral cortex relies on billions of small biological “processors” called neurons. They store and process information in densely interconnected circuits called neural networks. In Los Alamos, researchers are simulating biological neural networks on supercomputers, enabling machines to learn about their surroundings, interpret data and make predictions much the way humans do.

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