

Blueprinting the human brain

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SAN JOSE, Calif.—A 3D computer simulation of 10,000 neurons firing in the human brain produces a terabyte of data—a fraction of what it would take to map the brain’s billions of neurons in algorithms.

That’s according to Henry Markram, a scientist working on the Blue Brain project, a collaboration of IBM, the Ecole Polytechnique Federale de Lausanne, or EPFL, in Lausanne, Switzerland, and others. The project is an attempt to create a blueprint of the human brain to advance cognition research.

Last year, EPFL [bought a multimillion-dollar model](#) of IBM’s Blue Gene/L supercomputer for the two-year project, which is being conducted in Switzerland. The group only recently simulated the firing of 10,000 neurons in a single column in the neocortex, the largest area of the human brain governing high-level thinking and action. (A column typically contains 100,000 neurons.)

“This is the first step,” said Markram, speaking here Wednesday at the Cognitive Computing conference, a two-day gathering hosted by [IBM’s Almaden Institute](#).

To deal with the enormous amount of data generated from the project, Markram said, the group relies on visualization tools to locate and earmark interesting results in the computations for further research. Blue Brain bought a supercomputer from SGI to create a small media center to display the 3D simulations, which Markram said is like sitting inside the brain.

“(This) immediately allows us to assess the value of the data to discern: Is this something we want to save and analyze later?” he said. “It’s also a lot of fun.”

It’s also trying to convince the Swiss government to spring for two more Blue Genes to handle the data, but Markram said they are expensive even with a generous discount from IBM. With enough money, he believes, current technology could compute the billions of neurons in the brain.

So far, Blue Brain has written two software packages for cognitive computing. Markram’s 3D simulation showed only about 10 percent of the 10,000 neurons firing, but he said the simulation is “going to get a thousand times better” with new technology. The tool, for example, can zoom in to a single cell and examine exactly how the neuron is firing.

Still, some scientists attending the conference are unsure whether the massive amounts of data generated will produce anything insightful. "It may just be too much data," said Vinod Menon, a professor in cognitive science at Stanford University.

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