Science on the verge of creating 'emotional' computer

July 8 2016

Researchers from the National Research Nuclear University MEPhI are developing an emotion-based artificial intelligence.

An intelligent agent called Virtual Actor that has both narrative and emotional intellect is under development at MEPhI, expected to be online within the next year and a half. It will have both an emotional and a narrative intellect. It will understand the context of what is going on, as well as unfolding scenarios. Based on this information, it will make plans and set targets. One of its capabilities is to be an actor, a virtual robot playing the role of a particular person.

"Our principal goal is to formulate the basic principles that natural intelligence in the human brain is built upon. Biological solutions are in many respects superior to artificial solutions in terms of their adaptability, learning ability, resistance to unexpected interventions, and so on, and we would like to model these principles on the computer," explained Professor of the Cybernetics Department Alexei Samsonovich.

Ideally, people and computers will eventually have a mutual understanding, in a future when humans will perceive machines not as tools, but as partners and assistants. Computers will understand human emotions and goals, as well as the situation in the outside world.

The specific approach of MEPhI scientists is that they try to understand and reproduce the principles of information processing in the human

brain, assuming that it is unnecessary to reproduce all neurons and ion channels to do so.

"Let's take the hippocampus (the brain section responsible for memory). Its perception of space is based on a large population of neurons. If they are positioned on a certain plane according to certain rules, their aggregate activity will be focused on a single point with the coordinates X and Y. The question is: Do we have to reproduce millions of neurons, tens of thousands of connections between each of them and hundreds of thousands of millions of ion channels just to represent two numbers? There are more effective ways of doing this. Needless to say, neural networks can solve certain problems with maximum efficiency. But do they have to be made biologically realistic? Is it necessary to make them identical to the human brain? I'm sure that existing computers, their parameters in terms of speed and memory volume, are already sufficient for creating humanoid intelligence," commented Alexei Samsonovich.

Meanwhile, the researchers plan to create this agent in a simplified form as a computer game. "A virtual agent and a real person control the figures on a computer screen, interacting with each other, thus building social rapport based on emotionally charged actions. They can attack, welcome, give way, help move a stone, and so on. Any action has an emotional connotation, as a result of which certain relations develop, such as trust, subordination, leadership, etc. If a person in the virtual world is unable to tell man from machine, this goes to show that we have reached a human level, albeit in a limited sense."

Finally, the machine needs the ability to study not through programming or "carrot and stick" reinforcement learning, but as a thinking person. It is necessary that the machine itself could set learning goals, formulate questions to achieve these goals and actively seek the answers. This active learning process requires logical thinking, all aspects of perception, decision-making, meta-thinking, and many other cognitive

functions.

"I very much hope that artificial intelligence will be free of human flaws. Now, amid the development of biological and genetic weapons, artificial intelligence is the most harmless of upcoming discoveries. I believe it will be a major step forward, a big event for humankind," Alexei Samsonovich said.

Provided by National Research Nuclear University