

Principles of Functioning of Autonomous Agent-Physicist

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Abstract

An interesting approach towards human-level intelligence has been proposed at BICA 2011 [1]. Namely, it is proposed that an intelligent artificial BICA agent would be able to win a political election against human candidates.

The current work proposes another approach. Our approach is based on the fact that *the most serious cognitive processes are processes of scientific cognition*. The background of this approach is the report by Modest Vaintsvaig at the Russian conference “Neuroinformatics-2011” [2]; that report considers the models of an autonomous agent that tries to cognize elementary laws of mechanics. The agent observes movements and collisions of rigid bodies, forms its own knowledge about interactions of bodies. Basing on these observations, the agent can generalize its knowledge and cognize regularities of mechanical interactions. So, modeling of such autonomous agents, we can try to analyze, how agents could discover (by themselves, without any human help) elementary laws of mechanics. Ultimately, such agents could discover three Newton's laws of mechanics. Thus, we can investigate autonomous agents that could come to the discovery of the laws of nature. It is natural to think that these agents have human-level intelligence.

Using our knowledge about scientific activity of Isaac Newton, we can represent intelligence of such investigating agent in some details. The agent should have an aspiration for the acquisition of the new knowledge and for the transforming of its knowledge into compact form. The agent should have the curiosity that directs the agent to ask the questions about the external world and to resolve these questions by executing real physical experiments. The agent should take into account the interrelations between different kinds of the scientific knowledge. It is

natural to assume that a certain society of cognizing agents exists; the agent of the society informs other agents about its scientific results. For example, considering Isaac Newton as a prototype of the main agent, we can consider also agents that are analogous to Galileo Galilei, Rene Descartes, Johannes Kepler, Gottfried Wilhelm Leibniz, Robert Hooke. The agent should have the self-consciousness, the emotional estimation of the results of its cognition activity and the desire to reach the highest results within the society. Agents should have the tendency to get the clear, strong and compact knowledge, such as Newton's laws or Euclidean axioms.

References

- [1] Chella, A., Lebiere, C., Noelle, D.C., Samsonovich, A.V.: On a roadmap to biologically inspired cognitive agents. In Samsonovich, A.V., Johansdottir, K. (eds.) *Biologically Inspired Cognitive Architectures 2011. Proceedings of Second Annual Meeting of the BICA Society*, pp. 453-460. Amsterdam, Berlin, Tokyo, Washington, DC: IOS Press (2011)
- [2] Vaintsvaig, M.N.: Learning to control of behavior in the world of objects of space-time. In Tyumentsev, Yu.V. (ed.) *XIII All-Russian Scientific Engineering Conference "Neuroinformatics-2011": Lectures on Neuroinformatics*, pp. 111-129. Moscow: NRNU MEPhI, (2010) (In Russian)