Cognitive science and technologies in economics and management: from mind-body and free will problems to semantic capital

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Abstract

In the conditions of rapid dissemination of intellectual and cognitive technologies it is important to understand the essence of a human thinking through solving of mind-body and free will problems for the development of economic theory as well as the effective, responsible management. We consider reproducing of human abilities in artificial system on this base as a mean of solving economic and social problems.

Keywords: cognitive science, free will, mind-body problem, artificial intelligence, cognitive technologies in economics and management, semantic spaces, semantic capital

1 Overview

These are the following achievements of the development of intellectual systems:

- creating speech synthesis systems that use brain activity;
- managing the public opinion and human behaviour;
- applying the game theory to create human opponent programs, in particular, to play the poker which is able to bluff and will be used in the defence sector;
- inventing the OpenAI GPT-2 algorithm which creates great essays on any pre-defined topics;
- using intelligent systems for optimal distribution of resources (material, financial, human) in marketing and management;
- applying artificial intelligence at enterprises: change of chains creating values (production, logistics, marketing); emergence of new sources of income (indirect monetization (advisory systems), direct monetization (applications with artificial intelligence)); increase of efficiency (optimization of supply, HR management, the use of client experience).

However, the following problems appear during this process:

1. Can we recreate a human type of behaviour? If yes, so, how?
2. How can we create, develop, manage agents with artificial intelligence?
3. What will be the consequences of saturating the economics with agents with artificial intelligence?
4. What will be the responsibility for the effects of the created artificial intelligence? How will its activities affect the future of mankind?

These ethical problems arise from the contradiction between the moral (unclear) criteria of a man's choice and the rational (which is being formed) criteria of choosing the artificial intelligence. Implementation of effective artificial intelligence will be faster without taking into consideration security-related issues. This may lead to artificial intelligence to become unmanageable and dangerous.

2 Decision

We believe that discovery and reproduction of the mechanisms of human thinking is the best way to create and safely develop more universal (for a wide range of environments and tasks) agents with artificial intelligence. The neuropsychologist Vilayanur Ramachandran emphasizes that "the question of how neurons encode meaning and evoke all the semantic associations of an object is the Holy Grail of neuroscience, whether you are studying memory, perception, art, or consciousness" [1]. The researches of mind-body and free will problems in the field of neuropsychology, epistemology, system theory, and philosophy of consciousness allow us to affirm that the basis of human free behaviour is self-reflected meaningful processing of information that is studied within the system of cognitive sciences [2].

Interdependence and mutual influence of cognitive sciences and economics have been noted by the sociologist Pierre Bourdieu: "classical economics is [historically] connected with the philosophy of consciousness" [3]. The economic approach can help create and effectively interact with artificial intelligence. To achieve this goal, the economic approach that studies mind (thinking) can offer the following principles and tools:

- axioms: maximizing behaviour, stable preferences, markets that coordinate actions of agents, distribution of scarce resources through prices;
- comparing expected benefits when choosing behaviour alternatives;
- minimizing costs / maximizing benefits;

- economics of energy of thinking (Friston's free energy principle).

3 Conclusion

The cognitive approach applied in economics can help deviate the inefficient mechanization of the economic agent through the consideration the freedom of choice of real economic agents. The tool for this can be the semantic capital [4] as a set of factors that can influence the values, meanings and hence the formation of preferences of market participants as a transformation in semantic spaces.

References

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