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Developing Models of Mental Behavior

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The research is aimed to advance in answer to the fundamental question whether models of mind can be mental not being living realties (LR), assembled from LR or developed from the springs of LR? In other words, whether are models of mind which do not depend from LR but are classified as mind possible if mind uses the same criteria when forms the class mind?

To answer the question constructive models of mind and criteria of measuring their mentality as well as the exhaustive experiments on revealing the truth are needed.

A measurable approach to the models of mind, cognizers, is studied [Pogossian 2010] and the criteria and experiments of testing of mentality of cognizers are questioned.

The approach roots in fundamental works by [Flavell,1962, Neuman,1966, Botvinnik,1984, Atkinson1993, Pylyshin,2004, Roy,2005, Shrodinger,1956, Winograd, 986, Mendler,2004] and develops the ideas in [Pogossian, 1983,2005-7] on interpretation of the recognized views on mind by models having unanimous communalized meanings followed by experiments on validity of those models.

Valid cogs, if constructed, confirm the assertion that mind is a modeling based problem formation and solving procedure able to use knowledge gained from the solutions to promote the utilities of LR in their negentropic games.

Synchronously, mental cogs provide a constructive model of mind as the ultimate instrument for cognition.

Knowledge on the nature of instruments for revealing new knowledge gives a new look on the knowledge already gained or expected and raise new consequent questions.

Therefore, revealing by cogs the new knowledge on the instruments of cognition it is worth to question the new aspects of relationships between mind and the overall knowledge mind creates and uses.

Ongoing experiments on study of cogs are based on the technique of evaluating adaptive programs and their parts by local tournaments and use the game solving package Fig1,2. with its kernel Personalized Planning and Integrated Testing (PPIT) and Strategy Evaluation units specified for the class of problems where space of solutions can be represented by reproducible game trees (SSRGT class, Fig.2) [Pogossian,1983, 2005-7].

Common structures for problems, the space solutions and representation of expert knowledge allows to vary the problems in focusing particular research questions followed by natural generalization for the SSRGT class. Particularly, the studying of chess vocabulary and winning by Zermelo classes of chess positions and strategies [Pogossian, 2006] argues that real implementation of the models of human expertise for SSRGT problems , in principle, can only approximate game tree structures due to irresistible complexity of computations to prove correctness of the models. Thus, for the same

requests both game players and computers will, as a rule, use different models of realities essentially based on their individual experience, any preferences between those models include uncertainty and interpretations of units of vocabulary along with communalized dimension have to essentially relay on certain personalized experiences of the communication parties.

Viability of the package was demonstrated for the intrusion protection SSRGT problems and the *Intermediate Goals At First* (IGAF) algorithms [Pogossian2005]. The IGAF algorithms as well as [Botvinnik,1984] are based on a common knowledge planning and dynamic testing of the plans in the corresponding game trees. It was proven that the IGAF2 algorithms are able to acquire a range of expert knowledge in the form of goals or rules and to increase the efficiency of strategy formation with an increase in the amount of expert knowledge available to the algorithm. The effectiveness of the IGAF2 algorithms was successfully tested for the network intrusion protection problems against representatives of four classes of attacks: SYN-Flood, Fraggle, Smurf and Login-bomb, allowing to formulate, in particular, the following statements:

- Number of nodes searched by the IGAF2 algorithm for making decisions with all expert rules and subgoals is the smallest compared with the IGAF1 algorithm or with the minimax algorithm in which the depth of the search is increasing up to 13
- The recommended version of the IGAF2 algorithm with all expert rules and subgoals, for the depth of search 5 and 200 defending steps, is outperforming the productivity of the minmax algorithm by 14% while using 6 times less computing time and searching 27 times less nodes of the tree.

Knowledge based strategies for another SSRGT problem where supply chain management agents compete in a market to gain max profit for different customer requests were studied in [Bagdasaryan, 2005]. For each request the agents generate possible offers and for each offer a game tree is constructed to allow simulation and tracing further actions with suppliers, production and delivery. In the mean time, strategic plans based on the handbook common expert knowledge are generated followed by the quantification of the plans for strategy analysis and their evaluation for final decision making.

Publications

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