On Understanding Of Human Requests By Computers

Edward Pogossian (epogossi@aua.am)
Cognitive Algorithms and Models Laboratory
Academy of Sciences and State Engineering University of Armenia
24 Marshall Bagramyan Avenue, 375019, Yerevan, Armenia

We separate functions of a human mind into three categories based on the separation used in languages to describe human activity. Namely, there are three main types of activities – *production, exchange/communication,* and *understanding being*, corresponding to verbs "do", "have" and "be". We then consider the subject of Artificial Intelligence as (approximately) composed of three research directions: problem identification and solving, vocabulary understanding and content formation, understanding being.

Such categorization, along with an effort to identify topics of research in AI that do not fall into any of the three categories, can help in designing tests aimed at comparing human performances to those of programs. In particular, the well-known question-answers based Turing tests can now be supplemented by more focused tests based on the on-the-job performance analysis of individual problem solutions (Pogossian,2005).

We consider the problem of understanding expert's requests (UER) by a chess playing computer given the goals and contexts of those requests. We aim to answer to the following questions:

1. Is it possible to adequately simulate UER?
2. Are models of realities corresponding to the same requests common to all participants of the communication acts, or they are personalized?
3. To what extent, and by what means, one should try to integrate common expert knowledge and personal experience.

To study the UER problem we use a collection of units of chess vocabulary (UCV) with their interpretations (Pogossian,83). UCV consist of specific words, phrases, idioms, names, etc. used to communicate about chess. We will refer to the collection of UCV with their interpretations as chess repository , and its elements will be called units of chess repository .

A UER solution must take UCV expert requests as input and perform the following functions:

1. Interpret an UCV request and represent it as a formal query to the base of chess positions
2. Search in the base of chess positions using formal query
3. Reveal a discrepancy between the respond set of positions and the set needed by the expert
4. Correct the query if necessary to repeat the 2d function or to end the search if its quality is satisfactory.

The quality of UER solutions are tested not by language level answers to the queries but by their on-the-job-performances and by discrepancy between sets of positions the solutions and experts correspond to the queries.

The correspondence revealed between about 300 units of chess vocabulary and winning by Zermelo classes of chess positions and strategies indicates that constructive models to represent the content of the UCV are possible.

However, real implementation of the models, in principle, can only give approximate specification of winning game tree structures due the prohibitive complexity of computations necessary to prove correctness of the models.

Thus, to process the same requests chess players as well as computers will, as a rule, use different models of realities, essentially based on their individual experiences.

Different organizational forms of regular knowledge and personal experience, the forms of their integration and usage, and correlation with known behavioral views on them can be discussed at this point. However, one can make recommendations about their merits only after experiments currently in progress.

The results of analysis of 300 UCV as well as the behavioral views and observations of chess language and intuition described by H.Simon, de Groot, J.Adamar, G.Atkinson, F.Gobet, M.Krogius, P.Smolensky, D.Roy will be discussed in the presentation**.**

References

Atkinson G. (1993) *Chess and Machine Intuition*. Ablex Publishing Corporation, Norwood, New Jersey

Gobet, F., & Simon, H.A.. (1998). *Expert chess memory*: Revisiting the chunking hypothesis. Memory, 6, 225-255.

Pogossian E.. (1983) *Adaptation of Combinatorial Algorithms,* Academy of Sciences of Armenia, 293 pp. (a monograph in Russian)

Pogossian E. (2005) *Combinatorial Game Models For Security Systems.* NATO ARW on "Security and Embedded Systems", Porto Rio, Patras, Greece August 22-26, 8-17.

Roy D. (2005) *Grounding Language in the World*: Signs, Schemas, and Meaning Cognitive Machines Group , MIT, http://www.media.mit.edu/cogmac/projects.html

Zermelo E. (1912) *Uber eine Anwendung der Mengenlehre auf die theorie des Shachspiels.* Proceedings of the fifth International Conference of Mathematicians, Cambridge, Cambridge University Press, 501-504.