

Virtual Program Modules of AI Systems

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ABSTRACT: *Artificial intelligence (AI) is concerned with intelligent behaviour, primarily with non-numeric processes that involve complexity, uncertainty, and ambiguity and for which known algorithmic solutions do not usually exist. Artificial intelligence provides techniques for flexible, non-numerical problem solving. These techniques include symbolic information processing, heuristic programming, knowledge representation, and automated reasoning. No other fields or alternative technologies exist with comparable capabilities. And nearly all complicated problems require most of these techniques. Systems that reason and choose appropriate courses of action can be faster, cheaper, and more effective and viable than rigid ones. AI can be considered to be the top layer of control on the hierarchical road to autonomous machines and systems. Important areas of AI application and research include: - expert systems, - natural language processing, - computer vision, - robotics, - intelligent computer-assisted instruction, - automatic programming, - planning and decision support. In artificial systems knowledge is most often provided through processes of hardware engineering and software programming. This paper provides some information and conclusions, which authors gained during analyzing and projecting some of above-mentioned systems within the frame of "KEGA" research project "Virtual Program Modules of AI Systems"*

1 INTRODUCTION

Machine and robot intelligence is scope of many sciences that we usually name like Artificial Intelligence. On theoretical basis of Artificial Intelligence many technical systems with artificial intelligence were made. These systems are like subsystems of many smart products or advanced machines or equipments. Therefore education systems offering education in frame of automation and control have to answer to this challenge about advances in technology and they have to adapt their study programs and laboratory equipments to practice needs accordingly.

2 PROJECT OF LABORATORY OF ARTIFICIAL INTELLIGENCE SYSTEMS

At present time Department of Automation and Control of Mechanical Engineering Faculty in Košice realizes capital investment project of Laboratory of Artificial Intelligence Systems like fundamental component of department. Project is based on knowledge and model access of solution and their combination. Characteristic tasks for solution in above mentioned laboratory are:

- Capability of perception of environment and to recognize what is relevant and important for algorithm control statement
- Capability to predict changes in environment with help of model of environment and knowledge acquired by learning
- Capability to evaluate received information and knowledge and used them for decision making

- Capability to plan operations with reference to recognize situation and knowledge
- Capability to communicate with other intelligent systems (artificial or nature) in time of solving problem
- To learn on the base of historical solutions and to generalize where it is useful
- To adapt of system behavior with regard to situation to fulfill specified goal.

Generally concern on Artificial Intelligence (AI) is application of computers and computing technologies for solving so problems that frequently need knowledge, perception, reasoning, learning, understanding and other similar capabilities. AI is possible to consider like the top solution of autonomous machines and equipments and this solution represents wider range like same of traditional automation. AI offers flexible techniques for nonnumeric problem solving. Processing of symbolic information, heuristic programming, knowledge representation and automatic thinking represents these techniques.

At present time two principal forms of intelligence implementation exist:

1. Symbolic access. In this access we assume that there are some regularities that we can understand and model and program. Typical application areas of symbolic access are expert systems, systems for understanding of natural language, systems image processing, systems for problem solving and planning, systems for automatic programming, systems of machine learning, systems of ICAI, robotics systems etc.
2. Sub-symbolic access. This access is based on copy of nature and assume that intelligence is made by great number of inter-network elements of processing. Neural nets solve problems by learning and self-organizing. Their common intelligence is divided from collaboration of elementary neurons. Typical application areas of neural nets application are analyze and processing of signals, image processing, signal noise filtering, control, data analyze and knowledge systems, optimalization.

3 SPECIFIC INTENT OF LABORATORY REALIZATION

In frame of above-mentioned project following plan was stated:

Study and collection of information about applied systems with artificial intelligence and software for specific problems:

- Transfer methods, techniques, and tools to education process in frame of study program Automation and Control.
- Design of virtual education software modules.
- Integration of software modules with technical laboratory equipment.
- Implementation and testing.

4 CONCLUSIONS

This paper provides some information and conclusions, which authors gained during analyzing of above-mentioned systems within the frame of project. Laboratory of Artificial Intelligence Systems will represent the main workplace for students in third level of study. Project is realized under support of Slovak Cultural and Education Grant Agency, No 3/120103 “Virtual Program Modules of Artificial Intelligence Systems”.

REFERENCES

GÓTS, I., SMRČEK J., RIMÁR, M., PEREČINSKÁ, V., HENRICZYOVÁ, T. & ŠIDLOVSKÁ, L. 2000. *Kybernetický prístup k hodnoteniu kvality univerzitnej výučby*. Košice: Acta Mechanica Slovaca. 3/2000. pp. 57-66. ISSN 1335-2393.