A Study and Application on Cross-Disciplinary Proficiency Learning of Artificial Intelligence

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Abstract—This paper broadly elaborated the concept, significance and main strategy of cross disciplinary proficiency learning as well as the basic structure of cross disciplinary proficiency learning system. By combining several basic ideas of main strategies, great effort are laid on introducing several cross disciplinary proficiency learning methods, such as Memorizing a type of learning, Reason–based learning, Learning from instruction, Learning by deduction, Learning by analogy and Inductive learning, Learning by Experts etc. Meanwhile, comparison and analysis are made upon their respective advantages and limitations. At the end of the article, it proposes the research objective of cross-disciplinary proficiency learning and points out its development trend. Cross-disciplinary proficiency learning is a fundamental way that enable the computer to have the intelligence ; Its application which had been used mainly the method of induction and the synthesis rather than the deduction has already reached many fields of Artificial Intelligence area.

Index Terms - Cross Disciplinary Proficiency(CDP) learning , AI , System   structure , learning strategy , algorithm .

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1 INTRODUCTION

Along with the latest development of modern Internet technology and multimedia technical, Artificial Intelligence (AI) research has emerged a number of new challenging issues.AI has captured increasing attention in many area and disciplines, which is an edge of line disciplines that is used to simulate the process of human thought. Scientists who are in many different professional backgrounds get some new thoughts process and new methodologies in the fields of AI . As a branch of computer science, these systems are showing a human intelligence and behavior characteristics. AI expert system for sub as a branch of AI has entered a stage of practical application in various departments on the national economy and government as well as many aspects of social life in sociology to play a role and continue moving in the direction of in-breadth and in-depth development.

2 THE CONCEPT AND SIGNIFICANCE OF CDP LEARNING

2.1   The Concept of CDP Learning

CDP   learning (CDPL) is studying how the computer   to simulate or to realize the study and behavior of human being of there thoughts. The intention is to obtain the new derived knowledge or the skill , organize the knowledge representation structure ,which can make drastic and progressive improvement of it's own potential and performance. It is the core part of AI; It is a elementary and fundamental way that enable the computer to have the intelligence ; The application of it is reach in many application areas of AI and is mainly emphasize uses the method of induction and the synthesis but not the deduction or other knowledge representation . The CDPL research establishes the computation model or the Comprehensive understanding model, according to the study mechanism of humanity through the sociology physiology, the cognitive science and philosophy develops each kind of study aspect and the study method, studies the general algorithm and carries on the theoretically analysis, and establishes study approach that has the specific application facing the duty.

2.2. The Significance of CDPL Learning Research

Whether CDPL ability can surpass the human's or not, the main argument that many human beings who are holding denial opinion is:
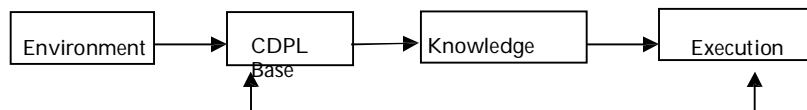

Figure 1.   C D P Learning system basic structure

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The CDPL is man-made, its performance and the movement are completely stipulated by the architect or designer , therefore its ability cannot surpass designer in any case. This opinion is right for the CDPL which do not have study ability , but is worth considering for the learning capability CDP. Because the ability of this kind of CDP can be increased constantly in the application, after period of time, even the designer would not know the level of it's ability. The CDPL has the extremely important status in the AI research work. The intelligent machine system which does not have the learning capability is difficulty to be called a true one, but the former intelligent machine system generally lacks of the study ability . Its application has been throughout the various branches of AI area , such as gaming system ,expert or domain systems, automated reasoning system ,NLP, understanding Comprehension,PR, computer vision, intelligent electromechanical robots and other fields. Specific applications such as any search engines, medical diagnosis and medical search engines, detection of credit card fraud, stock market analysis applied in e-commerce, DNA sequencing sequences in bio-informatics, voice and handwriting detection and recognition , strategy games and the use of machinery robots .

3.THE BASIC STRUCTURE OF THE CDPL LEARNING SYSTEM

Fig. 1 is the basic model and structure of CDPL. The environment provides certain energy information's to the learning part of system, and the learning part revisions knowledge base or library by using these information. To enhance the unique performance of system implementation part. In the environment of complete application, the knowledge base and library and the execution part have decided the precise work content the learning part which needed to solve the task to be determined completely by the above three parts. We are going to narrate the impact of these three parts to design the CDP learning system separately as follows:

The most important factor which affects to CDP learning machine system design is the information which is provided to the system by the environment, specifically, or the information quality. Knowledge stored in guiding the development and implementation of part of the general principles of action. However, the overview and environment and to the CDP learning system is provided by a variety of information. If the information quality is higher and the difference of the general principle of equality is smaller, then the learning part is quite little easy to deal with. If CDP learning system to provide guidance and disorderly implementation of specific action specific information, the learning system deletes of the unnecessary details after gaining sufficient data(Deduction), sums up the promotion, to form the general principles of guiding the action, and puts it into the knowledge base. Then the task of learning some of is heavier, the design is more tedious ,difficult and complex .

Because the information obtained from the CDP learning system is often incomplete, reasoning is not entirely reliable which is carried out by reasoning . The rules summed up by reason is fact possibly, or not. This must be tested through the implementation of the effect. The fact(correct) rules make the system efficiency improve, it should be retained; The incorrect rules should be modified or be deducted or deleted from the knowledge database.

The knowledge base is the second factor which affects to the CDP learning system design. The knowledge expressed in different forms, for instance, characteristic vector, step comparing sentence, reproduction pattern rule, semantic network ,association and frame and so on. These expressions have their feature characters respectively, when you choose any one of these expressions, you must take into four or many aspects account: For example the four aspects for our work (1) Ability to express strong (2) Easy reasoning (3) It is easy to modify Knowledge Base (4) Knowledge Representation is easy to expand and interpret.

A problem finally needs to explain which regarding the knowledge base library is studies the system not to be able not to completely have in any knowledge situation the baseless knowledge base in acquisition, each CDP learning system all requests to have certain knowledge to understand the environment provides the information, the analysis comparison, makes the supposition, examines and revises these structured suppositions.

Therefore, to be precisely , the learning system is to the existing knowledge expansion and the dynamic improvement. The execution fourth part is core of the entire CDP learning system, because operative part of the action is targeted and aimed at improving learning action. With the development and implementation of some related three issues are: complexity©, feedback(F) and transparency(T).

4.SEVERAL COMMONLY LEARNING METHOD BASED ON LEARNING STRATEGY

The learning strategy is a reasoning strategy which is used in the process of CDP learning system. The learning system is always composed by the learning and the environment had two parts. Learning Strategies is on the basis of the division and classification criteria for converting an electronic message students to achieve the necessary degree of difficulty reasoning and how to classify and follow simple to complex messages , from small to many multi-order divided into the following five basic types:

4.1 Memorizing OR Rote Learning

The rote learning is the most simple machine learning method. The rote learning is the memory. That is, the new fact of knowledge is stored, the supply and demand wants when retrieves transfers, but does not need to compute and the inference.

When the rote learning system operative to solve specific problems, the learning system remembers this query and the solutions. We can regard the learning system execution part as some function abstractly, before computing and outputting the function value (y1, y2,…, yp), this function obtains the independent variable input value (x1, x2,…, xn). The rote learning makes a simple memory storage in the memory ((x1, x2,…, xn),(y1, y2,…,yp)). When it needs f(x1, x2,…, xn), but the execution part on (y1, y2,…, yp) retrieves from the memory stored rather than recomptation. This kind of simple learning pattern is as follows:

(x1,x2,…x n) f (y1,y2,… yp) store ((x1,x2,…x n), (y1,y2,…yp))

4.2 Expert or Learner Explanation-Based Learning

The target goal concept, a specific example, the domain expert theory which provides according to the teacher and learner's operational guidelines. First, a struct explanation showed satisfies the target goal idea for the assorted this qualified example. Then, explained the promotion explains for target concept may operate the criterion the sufficient condition. EBL has been widely applied in the knowledge base refinement and the improvement of the learning system performance by explanation.

4.3 Learning from Instruction

The student (teachers or other information sources such as journals, articles, textbooks and so on) gains the

information from the environment, transforms the

knowledge into the expression form which the interior to

exterior may use, and combines the new knowledge with the original knowledge non-mechanically and organically. Therefore, the student is required to have certain degree inference caliber and ability. However, now the environment still have to do a lot of work.

The teacher proposes and organizes knowledge base by some form, to increase the knowledge base which the student has continuously. This learning method is similar with human being society's university teaching way. The learning duty is to establish a learning system that enables it to accept the opinion , guidance and the suggestion, stores and implies the learning knowledge method effectively. Now, At present, many expert domain systems use this method to realize the knowledge base gain when they established the knowledge domain.

4.4 Learning by deduction

The deductive reasoning is used by the learner . The reasoning embarks from the lemma , axiom ,implications infers the conclusion after the logical transformation. This kind of reasoning is a process that is from "fealty or *allegiance*" transform to specialize (specialization) , the learner can obtain the useful knowledge in the reasoning process. This learning method contains macro-

operation learning, the knowledge edition and the chunking technique . The inverse process of deductive reasoning is inductive reasoning.

4.5 Learning by Cognitive Process or Analogy

The module maintains analogy prodigy is one kind of useful and effective inference method, it can succinctly describe similarity clearly between the entities ; At the same time, it also (either departer, d) shifts certain test similar nature duty from the orator to the listener (or learner ,l).Through the analogy, using the similarity between two different domains of the knowledge, (including similar characteristic and other nature) infers the goal territory from the source territory knowledge the corresponding knowledge, we can learn from it. The analogy learning needs more case reasoning than the three kinds of learning ways above. It requests to retrieve the available knowledge generally from the knowledge source, then transforms it into the new form, apply it to the new condition . The analogy learning is playing the vital role in the human science ,engineering and technology history, many scientific discoveries are obtained by the analogy.

4.6 Inductive Learning

The inductive learning is the most widely as a symbol learning logics and methods. It expressed conceives the supposition from the example the process. The teacher or the environment provides some examples or the counter-example in some concept, lets the student obtain the general description in this concept through the inductive reasoning.

This kind of learning reasoning work load is more heavier than the demonstration learning and the deduct learning , because the environment does not provide the general concept description (for example axiom).To some extent, the number of induction learning reasoning is heavier than he analogy learning , because there is no one similar concept can be used as " source concept ". The inductive learning is the most basic method, its development is a mature learning method as well, it has been used to research and apply widely in the artificial intelligence, knowledge management domain.

5. CROSS-DISCIPLINARY PROFICIENCY LEARNING RESEARCH AIM

There are three aims in the Machine learning: General learning algorithm theoretical analysis and development; Develops the humanity to learning the process the computation model; The structure special-purpose learning system face the duty research.

5.1 General Learning Algorithm

This direction research is the theoretical analysis duty and the development uses in the non-usable learning duty the algorithm. There is no limit to the algorithm type. The algorithm not necessarily is similar the method which uses in the humanity. Some person thought studies the knowledge structure which produces to be supposed to be similar humanity's knowledge structure at least, even if the learning process is different.

At present, some scientists are researching the possible learning algorithm the theory space.

5.2 Cognitive Model

This direction is a studying human's learning computation theory and an experimental model for prediction. Not only had this kind of research vital significance of humanity education, but also of developing the machine learning system in diversity model.

5.3 The Goal of the Project

This direction is aimed at solving the special actual problem, and developing to accomplish these tasks the project system. Not only do these questions often concern on the learning but also on other questions, for example, input signal by reasonable explanation or development question special-purpose data conversion and transformation .

6. Conclusion

AI science is the only way that raises the CDP learning intelligence level . Only improve the CDP-learning function and model continuously, can we make the CDP machine close to or surpasses the humanity's intelligent leve(interface). To the CDPL discussion and the CDPL research progress, will certainly make the artificial intelligence and the entire science and technology further development in current era.

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