

# Machinery Cognition and Artificial Intelligent

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**ABSTRACT** In this paper authors show some heuristic thinking first, and then proposed an engineering definition of artificial intelligence in artificial brain that is the abilities to obtain knowledge, to use knowledge and to operate knowledge. There are still two open important problems: one is the expression of knowledge for this goal and the other is how to construct the integration up operation and detailed down operation.

**Keywords:** Artificial Intelligence, Creating intelligence, Knowledge, cognition, Evolution of intelligence.

## I. Introduction

Animal Brain's basic function is to process the information received from the sensing organs build in the body. That means it could process the visual sensing information, auditory sensing information and others simultaneously, which include tactual, gustatory and olfactory information. However, the observations results from the wolf boy told us that although the wolf boy has human's sensing organs and human's brain, but he has only the intelligence level of wolf. The reason is that his "mother" is a wolf but not human's mother. His ability to cognize the world surrounded him is kept in the level of wolf. So, the appearance of intelligence is not only depends on the physical device—Brain, but also mother's teaching and communication with the "society" surrounded him.

If we want to create a machine which possesses certain intelligence, the machine has to have two functions, one is to cognize the outer world by perceptron equipped on its "body", the other is to accept the teaching and communication from "mother" (or "teacher") and the other members in the "society" surrounded it. In animal world mammal mother teaches their child how to find food and avoid enemy by her body language and very simple primitive natural language (different voice).

Usually, the results of cognition are the understanding outer world. It must be expressed

as memory of something, this kind memory is different from the process in computer. For biological individuals, usually the memory in brain is a gradual process to accept and strength a cognized result. Once it is be memorized and understood, it is formed a scheme in which possesses certain structure. The knowledge we talked in this paper can be expressed as a relation of several schemes, and this relation is with fixed pattern. So far, we did not see this kind of knowledge warehouse. If we want to implement a true artificial intelligence based on knowledge using some equipments and machine or computer, machinery cognition must be needed. Following this introduction we will explain and describe more deep thinking.

## II. Emerge multiple -modal information

Now many achievements about computer vision and computer hearing appeared and new equipments related them have been developed very fast. The problem is how to emerge this kind of information as the result of machinery cognition.

### 2.1 Scheme

General speaking, the computer vision and

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hearing are different type of information, vision is image information and hearing is sonic information, processing methods of them are different. When mother shows baby an apple in her hand it gives baby an **impression** that consists of a moving picture and mother's voice or language, baby memories the both components together simultaneously in his/her brain, though they are input from different paths. This impression is on a concrete subject or thing with their attributes, sometimes the impression is on an action with dynamic attributes. We say all these presentative impressions as a **scheme**, they are the basic components of memories.

To express a scheme in computer we need a unit, in which store a presentative impression which may be a subject image plus a noun sound, or an action moving picture plus a verb sound. Of course, for real biological individual this unit (the scheme) not only includes visual and hearing information, but also includes tactile, gustatory and olfactory information. However, to implement machinery cognition we limit our attention into the computer vision and computer hearing. Once we build up this kind of unit in computer we should build up the relations between units and to form knowledge.

## 2.2 From scheme to knowledge

Scheme is essentially some primitive knowledge due to it has incomplete structure of knowledge comparison with human knowledge structure, even if for a human child. Scheme is only a fragment of knowledge discussed in this paper and it is not the final result of cognition. In this paper we try to discuss the knowledge with certain structure and similar to human's knowledge, or the evolutionary configuration of knowledge. In fact, we could observe the process of mother teaching baby language and you could find that "mother" use natural language to make a link of schemes stored in baby's brain. Natural language is the link between scheme and human baby knowledge. At beginning the human baby could know mother's face, the taste of mother's milk, some toys and mother's sound, and then they try to understand some very simple repetitive words. The baby gradually learned them and could repeat them. Thus baby got some schemes and obtained primitive knowledge about the surrounded world. Later they could understand some simple sentence; they start to get complete knowledge.

So, we say that the natural language is the

key from scheme to presentative knowledge.

## 2.3 Structure of presentative knowledge

From the above we could try to explain the structure of presentative knowledge. First, the schemes are divided into several groups according to the noun, verb, adjective, and adverb and so on. The relations are defined according to grammar. The relations are grouped as several layers, such that "fragment", "very simple", "simple", "usual", "complex", "very complex", etc. any relation in those groups will combine some schemes, this combination is very similar to the structure of a sentence but it is not a sentence. A combination corresponds a mapping between the semantic of combination and a real scene or subject. So, the knowledge expression is to define those rules grouped schemes as different layers.

Examples of the relations:

"fragment":

(Food--Noun scheme);  
(Eating--Action scheme);  
(Color—Adjective scheme).

"very simple":

(Eating) + (food).

"usual":

(Look) + ( at ) + (here).

The people in different countries speak various languages, and the grammar is different. The rules defined groups of relation layers is really different, however, if the mapping between the semantic and the scene or subject is the same we could say that it means the same knowledge.

If using several combination to construct a bigger combination, it is similar to a paragraph consists of several sentences in a article. At this time the mapping is a composite of mapping. Note, the structure of knowledge must can be extended in the same manner. So, the knowledge in a human brain is definitely not isolated, it is similar to an article or a tree, it has fractal property.

## 2.4 Knowledge warehouse

The result of machinery cognition is to combine with the schemes as the presentative knowledge. So, we expect a special storage form in computer, in which there are "units" to save schemes simultaneously formed by using

of machinery visual and sonic perceptron; in which there are defined rules to construct knowledge; also, the real knowledge--mapping to obtained.

This kind of knowledge warehouse must be parallel operation. The storage of scheme may be not very difficult, but the retrieve of scheme may be more difficult.

### III. Knowledge's emergence

Machinery perceptrons are not enough if we want to create an Artificial Brain. Naturally, it concern the question that what is knowledge stored in computer? How dose the knowledge is emerged from the information cognized by computer vision and computer hearing? The first question has been discussed previously. The second question concerns with a very difficult field that the creation of intelligence or knowledge emergence.

In fact, knowledge emergence is a process to operate knowledge. It contains two operations; one is the **detail down** process. This operation make the obtained knowledge has more detailed contents. On the other hand, baby can find the common attributes between some similar schemes himself or by mother's teaching, for example, baby learned "apple", "strawberry", "pear" and know all these are eatable and a new scheme "fruit" was established. This is also a process to operate knowledge; we say it as an **integrated up** process. This process maybe cause knowledge emergence. Both processes are to make the relation and mapping between schemes and subject (or scene) more complicated. Knowledge emergence will make all knowledge has the free-scale structure

A lot of cognitive and psychological study experiments for children's intelligence tell us how they cognize outside environment and obtain knowledge, these are very important. Here we want to emphasize mother's role. At beginning period of babyhood they just could see some objects surrounding them and could hear the voice from mother mainly. Mother's voice and gesture language make baby establish a mapping gradually. This mapping is the process to establish a structure to fit attributes of scheme Of course, not only vision and hearing. This mapping will store in baby's brain. When this mapping was established firmly, the baby had obtained knowledge.

### IV. Intelligence on artificial brain

To study machinery cognition is try to investigate the new ways creating artificial intelligence. Once artificial brain is mounted computer vision and hearing the machinery cognition will be basic component. We cannot expect artificial brain has the same intelligence like human being's, however, our research focus on the creation of intelligence using artificial brain. We could hope that to do some experiments on it. What kind intelligence could appear on artificial brain? We limit the definition here as the following:

**"Intelligence" is the abilities that to obtain knowledge, to use knowledge and to operate knowledge.**

Based on our analysis here we want to promote the study of knowledge based artificial brain. We propose the key techniques on the research as the following:

- a. Knowledge expression;
- b. Knowledge warehouse;
- c. Knowledge emergence and operation.

After these key techniques were implemented, we could play as "mother" to teach and train the artificial brain gradually. The human being's intelligence is evolutionary result with the evolutionary process of human being's natural language. So, artificial intelligence mounted on artificial brain should be evolutionary either.

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