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Survey on Studies of Consciousness

- From the view point of information science -

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Computer technology is progressing at the level exceeding human intelligence in some aspects. At this stage, we know that these machines don't think and act like human with consciousness, and are operated by programs embedded to when we use them. On the other hand, a human consciousness is not yet clarified because of its complexity. However, in the past ten years, many philosophers, psychologists, and neuroscience people use a computer model, and test theories about consciousness, and are beginning to tackle about human consciousness. According to Gamez, such latest tendency brings about expectation that the theories may be connected with construction of a more intelligent machine. It comes to be known as research of machine consciousness, artificial consciousness or synthetic consciousness, and the research is studied from various angles.

In the paper of Gamez, research of machine consciousness (MC) is distinguished in the following four different classes: (MC1) Research of the machine equipped with the appearance behavior related with consciousness, (MC2) Research of the machine equipped with the recognition feature related with consciousness, (MC3) Research of the machine consciousness equipped with the architecture claimed to be the human basis or correlation phenomenon of consciousness, (MC4) Research of machine consciousness intentional in phenomenon. This classification started by the system

copying the aspect of behavior of humans (MC1), and has shifted to the system (MC4) which tries to make actual artificial consciousness. The interdisciplinary characteristics of machine consciousness takes an inspiration from philosophy, psychology, and neuroscience. Since it shares many of purposes of strong A.I. (Artificial Intelligence) or general artificial intelligence, it serves as a source of confusion. This paper claims that application of these category divisions clarifies relation between machine consciousness and other fields.

If we put the premise of using the computer, we will not think the machine has consciousness. It becomes more difficult to distinguish between humans and machines, when the machines' expression of voice or language, behavior, appearance, etc. approach humans and the premise (using computer) is hidden. It was expected in Turing's paper "Computing Machinery and Intelligence" (1950) that it did not have a chance of exceeding 70 percents that it can be correctly judged whether they are humans or a machine (which has about 9th power of 10 storage capacity by 2000 is programmed well.) even if an average questioner exchanges for 5 minutes with it (that is a machine can delude people with 30 percents or more). ELIZA and Internet chat bot MGONZ deceived people, talked, and did not make them notice that a opponent might be a program. The program called ALICE deceived one of examination committees in the Loebner Prize competition in 2001. Chatbot Eugene Goostman has left record of having deceived 29 percents in the committees held by Milton Keynes of Britain in June, 2012. This year hit in Alan Turing birth 100 years. Turing prediction hasn't been accomplished. However, his prediction is almost realized. The appearance of machine, equivalent to humans has also been no longer a dream. Although a Turing test may become one index which shows that a machine like a computer has been approaching humans, we cannot judge so far whether the machine really has consciousness.

Moreover, in the field of neuroscience, it is made into the miraculous thing for realization of thinking, an act, and self-consciousness to be physically possible at a set of a simple cell of a brain. According to Russell and Norving, if it is a mistake, the idea replaced with this will have only the mysticism which supposes that the consciousness is operating in the place beyond the range of the physical world. Although researchers of cognitive

science, brain science, etc. have tackled such a subject scientifically, it is not solved. The problem solved in these fields (cognitive science, brain science, etc.) is an easy problem. Chalmers asserted the existence of the hard problem from which the clue to solution is not obtained.

The research which tackles scientifically about human consciousness is increasing. It was rare in the past to take up the problem of consciousness from the view point of information science. The difficulty of defining consciousness is one reason. An unfathomable contribution is expected if a thing like consciousness can be built in a machine. However, the definition of consciousness differs among researchers. The positioning of this survey is to classify the studies the researchers tried to realize human consciousness by a machine. Is a thing like consciousness realizable by introducing what kind of thing in a machine? The answer for it will be obtained for constructing of machine consciousness like humans. This paper surveys from the viewpoint of information science studies on consciousness.