

# An Analysis of Artificial Intelligence in Machines with Turing Machine

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**Abstract**— The success of machine's intelligence which is nothing but a machine with brain is possible now a day. The intelligence could be addressed into machines as in humans. Artificial intelligence came into existence because of humankind; they have named themselves as Homo sapiens. Today's era is artificial intelligence era anything could be possible, machines have capabilities to think, intimate and sense like humans. Learning Artificial intelligence is nothing but learning about ourselves. Systems such as machines or software could able to monitor their emotions like happy, love, angry and hunger. In this paper we would analyze clear picture of capabilities of machine with intelligence. Turing test, which is still used as a key gauge of how close machines have come to human intelligence with the Imitation Game example. The Turing test has given the inspiration for the instigation and exponentially development of artificial intelligence. Turing test is done by Turing machine which is hypothetical device that modifies symbols on a tape according to protocols. In later section we will be explaining a scenario which proves the machines intelligence.

**Keywords**— Artificial intelligence, Turing Machine

## I. INTRODUCTION

Over the past few decades, Science and technology are changing rapidly. Computer technology's evolution has been approached by artificial intelligence with gratitude. AI has changed the human's perception towards Machines whose works are cerebral in nature because of manmade intelligence known as Artificial intelligence. AI is artificial brain assigned to the machines to perform cognitive operations. If cognitive states and processes can be expressed as algorithms, then they can be implemented as machine intellectual. Turing test gives the probability of successful outcome of non mechanical operations performed by machines in intellectual domains. Turing test is carried out in computational device as Turing machine.

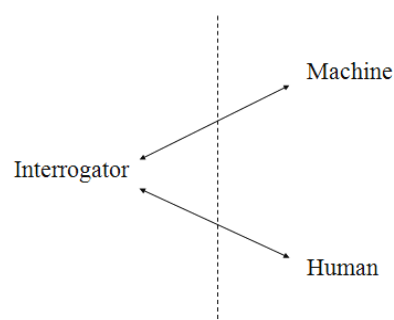
Turing machine can be used to compute logistic output with the help of intelligence algorithms. Reverse Turing test is also possible. Today's addictive games or machine with artificial intelligence like chess, reversi has been able to beat humans. This software is first tested by Turing test. Then made a conclusion of presence of AI which can challenge a man with natural intelligence. But what would be the conclusion of evolution as a blessing or doom day. ?

## II. TURING TEST AND REVERSE TURING TEST WITH INTELLIGENCE

The most critical area is now to think about really a machine could have intellectual brain as human does. To resolve this type of confusion Alan Turing, known as the father of theoretical computer science came up with a great idea of Turing test which is performed by Turing machine. If machine passes the TT then conclusion can be made that machine possess human-like intellectual and can performed non mechanical or sensible work. To get a better picture of TT Alan Turing, in a 1951 paper, proposed a test called "The Imitation Game".

*"I believe that in about fifty years' time it will be possible to programme computers, with a storage capacity of about  $10^9$ , to make them play the imitation game so well that an average interrogator will not have more than 70 per cent chance of making the right identification after 5 minutes of questioning"*

-Alan Turing (1950)



In his paper he mentioned the success rate as 30%. Imitation game is nothing but Turing Test by Turing machine.

In this paper we have explained modified Imitation Game. The main idea behind this example is machine intellectual is indistinguishable from human intellectual. Suppose in one room computer is there as a contestant and in other room judge (he or she) is there. They are connected and semantic networks can be established between them. A directed graph is used to represent a semantic network. Now, then computer task is to respond the human without any discrepancy with human. Human should not able to identify whether he is communicating with a machine or a human. If this happens

then TT is passed by machine with an intellectual brain which has mental capabilities to think and sense things.

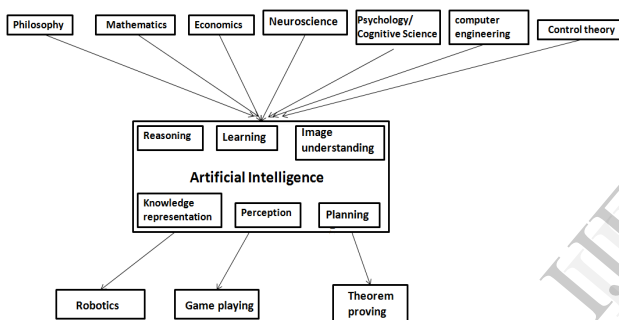
Interrogator  $\longleftrightarrow$  Machine

Reverse Turing test is also possible. Conventionally, TT is performed with human as a judge and computer or machine as a contestant who should act as human. But swapping of the characteristic between them is also possible which is called as Reverse Turing machine.

Machine  $\longleftrightarrow$  Interrogator

### III. STRONG ARTIFICIAL INTELLIGENCE

One of the challenges before Artificial Intelligence is to make machines feel the emotions and sense like hunger, decision, anger, pain, love etc. Major components of artificial intelligence are knowledge representation, reasoning, language/image understanding and learning



Let us consider another example to explain the strong intelligence in machine. We have a space robot whose main work is space exploration which has attracted the attention of many scientists and also human to get aware or knowledge about the space. Robot decides for itself what to explore next. Recently, the “opportunity “ mars rover is sent by NASA to mars planet to collect the information like to sent satellite images and maneuvering on the surface of Mars back to earth is only possible by artificial intelligence.

Engineers updated Opportunity to make their own decision like where to stop and start analyzing different kind of Rocks. And then send captured images to The Earth. Opportunity has been also updated with picking and choosing where to investigate. If robot would face any problem while exploring then immediately it will inform the scientist. Researchers at NASA have predicted the more improvement for updates which will lead a good trial experience regarding how future planetary probes and rover could do more of their own thinking in the future.

To perform such tasks robot has to sense and make decision based on the situation all this non-mechanical operation is performed by machine which is capable to think and judge.

### IV. PROBLEM WITH THE TURING TEST

A Turing machine is an entirely theoretical entity, which is like mathematical foundation for the development for almost all machines. Turing machines may be not suitable to prove the existence of intelligent system or may not be able to model human minds as Lucas (Lucas 1964, Lucas 1970), and Searle (Searle 1980).

#### A. Turing Machines as formal system

Turing machine is considered as a formal machine according to Lucas. He argued about the mechanism and idea of artificial intelligence in his famous paper Minds, Machines and Gödel (Lucas 1964). According to him Gödel theorem applies to all formal systems and hence to all levels of computing machines as well, whereas minds themselves are not constraint by Gödel theorem. Machine with intelligence can't just constraint by Gödel's theorem. All cyber metical machines should prove Gödel theorem as a formal machines. It follows that any machines which is consistent and capable of doing simple arithmetic, there is a formula which it is incapable of producing as being true –i.e., the formula is improvable-in-the-system – but which we can see to be true. It follows that no machine is equivalent to Human minds; minds are essentially different from machines. (Lucas 1964).

Gödel's theorem states that in a consistent system which is strong enough to produce simple arithmetic there are formulae which cannot be proved-in-the-system, but which we can see to be true (Lucas 1964, 43)

Lucas has mentioned two claims in his paper. The first and strong claim is that Mechanism is false, which emphasized that no form of computing machines or other machines can ever be act or work as a human's mind. The second and weaker claim is that it is impossible to implement a mind or to successfully model a human mind using a Turing machine. Lucas gave so many statements with Gödel theorem. Later on it seems he is not always clear about who can find Gödel sentences which can't be true within a formal system. . The question is not about minds over machines, but about one formal system against another. Formal system of arithmetic which contains prepositions that cannot be shown true with Gödel theorem within arithmetic. This shows the incompleteness of Gödel theorem which implies that, if Gödel were a formal machine, will contain some prepositions as well. The propositions in Gödel's incompleteness theorem are *about* arithmetical propositions and are not arithmetical propositions. This leads to a very interesting condition, when we compare two “copies” of a formal system against each other. Each copy would contain Gödel sentences, which can only be specified by the other copy.

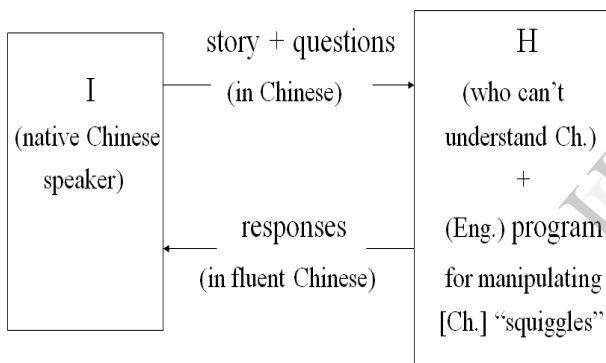
#### B. Turing machine with Turing test

Is Turing test good enough to test the AI of a machine? Do they actually understand simulated cognitive algorithms and processes? One of the main opponents to the Strong AI point of view is American philosopher John Searle. He strongly disputed the Turing Test. He proposed an experiment which

proves the flaws of Turing test known as The Chinese room Argument. It is possible to pass TT, yet not really think.

### *The Chinese room problem*

In Chinese room experiment setup, as mentioned on Wikipedia Searle visualize himself in a room, acting as a computer who executes a program and act as a Chinese speaker. People outside the room thinks that Chinese language Translator is inside the room. Searle does not know Chinese at all. For him Chinese language is like Greek and Latin. But then also he is able to create sensible replies in Chinese using set of instructions of the programs. Now the Question "is Searle really a Chinese Speaker?" arises. Searle Strongly argues that "Understanding "is missing so he cannot be called as a Chinese speaker. By using some methods or algorithms and then answering does not imply understanding of Chinese. He also argues that if any other system runs the same programs or algorithms then that system also understand Chinese. Searle's wider argument includes the claim that the thought experiment shows more generally that one cannot get semantics (meaning) from syntax (formal symbol manipulation), therefore Strongly AI is completely false.



Others arguments on Chinese room problem saying that man in the room does not understand Chinese but simulation and sensible answers may create something that understands Chinese. There are many layers from the man in the room starts working to the man in the room finish the Chinese translation or the claim that the man in the room does not understand Chinese to the conclusion that no understanding has been created. Any layers can hold the strategy of System Reply and Virtual Mind Reply. Replies hold that the output of the room reflects understanding of Chinese. This proves that his claim that there is no understanding of computationalism is false and hence denied.

The other arguments on Searle's claim that just running a natural language processing program as mentioned in a Chinese room problem is missing understanding of Chinese, whether by a human or machines. But the critics holds that a variation e.g. on the machines embedded with detailed operation of brain, neuron by neuron could understand it. For example a Robot with embedded system, interact with

physical world because it fetched with detailed operation of neuron by neuron.

### CONCLUSION

From the above two claims given by Lucas and Searle shows that there is no strong claim to prove that Strong AI is false. There are many supportive and non supportive arguments on Strong AI.

Many scientist proved machine's intellectual, But is it really so? Could machines actually think like human being? They work based on intellectual algorithms. So the biggest challenge is now to think about the possible ways for a given problem. All possible ways have been analyzed and then prepared an algorithm. By using this algorithms Machine works intellectually otherwise not. They cannot excel humans intellectual. What if we give any question which is not mentioned in algorithms? Will machine able to answers such questions. The answer is "no". Example: In chess game, developer first designed the algorithms for possible ways for each and every move based on human's input. When user will give play with computer or machine then based on simulated algorithm next moves would be decided for machine side. This doesn't mean, machine can actually think like human does. They don't actually think based on the possible ways they give output.

Machine cannot act as humans. But then also today's era is like artificial era. Despite of such critics on strong AI, use of AI now a day is increasing exponentially. Today we only heard about the machine with intellectual brain. The Future of AI is quite bright.

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