
Five Levels of Intelligence

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Abstract

Artificial intelligence (AI) has gained unprecedented universal attention in recent years. However, the difficulty of defining and measuring intelligence and comparing the artificial form with the biological form has been surrounded with uncertainty. In this paper, we proposed five levels of intelligence in order to explain the deep qualitative differences between biological intelligence and artificial intelligence.

1 Introduction

In 1950, Alan Turing proposed a test called “The Imitation Game”, better known as “Turing Test”, to settle the issue of machine learning intelligence (1). In 1990, Hugh Loebner initiated the Loebner Prize, with a grand prize of 100,000 dollars and a gold medal, to the creators of the first computer program capable of passing an extended Turing Test involving textual, visual, and auditory components. While small prizes were given out to the most “human-like” computer programs, no program has ever won the grand prize. Opponents of Turing’s behavioral criterion of intelligence argue that it is either not sufficient or perhaps even relevant at all. What is important, they argue, is that the computer demonstrate cognitive ability regardless of behavior. Moreover, it seems the main motive behind the imitation game was to pose challenges for the development of better machines and more sophisticated software (2). The main issue is that there has not been any universally acceptable test to settle the issue of machine intelligence so far. Here, we propose the first such a universal assessment, called “Five Levels of Intelligence”.

1.1 Entity and Act

An entity is a thing which is perceived or known or inferred to have a distinct being (living or non-living), such as a cup, a car, a thermostat, a computer, an artificial intelligence (AI) program, a bacterium, or a person. An act is a task or piece of work undertaken by an entity.

2 Level 1 of Intelligence - Actor

An actor is an entity with one or more acts. An act can be very simple or very complex.

- A cup is for holding some amount of water
- A car is for driving
- A computer is for computing
- An AI program is for predicting diseases

The level of intelligence of an AI program (e.g., Deep Neural Network) is the same as that of a cup, because both must be made by another entity. The main difference between a cup and an AI program

is their level of complexity, which is entirely dependent upon the level of intelligence of the entity that made them, not the cup or the AI program itself.

3 Level 2 of Intelligence - Director

A director is an actor that directs its acts.

- A thermostat can direct its act (on/off a switch) by sensing temperature
- A self-driving car can direct its act of driving
- An airplane on auto-pilot mode can direct its act of flying or landing

A director needs another entity to make things that are necessary to direct an act. The main difference between a thermostat and a self-driving car is the level of complexity, which is entirely dependent upon the level of intelligence of the entity that made them.

4 Level 3 of Intelligence - Producer

A producer is a director that produces what is needed to direct and perform acts.

- A bacterium is a producer of what is needed to direct and perform its act of eating.
- A person is a producer of what is needed to direct and perform its act of flying.

There are no man-made entities (e.g., machines) at this level.

5 Level 4 of Intelligence - Inventor

An inventor is a producer that produces a new thing using existing things to direct and perform its acts. Obviously, there are no man-made entities at this level.

- A bacterium can invent a new chemical to block an antibiotic to progress its act of living.
- A person invents a microscope to improve his act of seeing.

The level of intelligence of a bacterium and a person is the same. The main difference is the quantity and complexity of their acts.

6 Level 5 of Intelligence - Creator

A creator is an inventor that brings entities to existence (a.k.a. God). There is no scientific method to accept or reject the existence of such an entity.

References

- [1] Turing A. M. *Computing Machinery and Intelligence*. Mind 59, pp. 443–460, 1950.
- [2] Noam Chomsky. *A private email conversation with Noam Chomsky*. 2019.