Some Logical Aspects of the Concept of Artificial Intelligence

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Abstract: The paper proposes a logical definition of the concept of artificial intelligence (AI), based on sufficiency predicates, by moving from genus to species. The nature of the intra-contingent need for AI, respectively the logical characteristics of AI, is shown. The digital/analogical relationship is discussed and, on this basis, issues in the AI "zone" such as: conscious/subconscious, free will, self-learning are examined. Finally, the issue of human protection against AI is assessed, respectively that of AI protection against humans and AI itself.

Keywords: predicate; automaton; logically living; consciousness; self-learning; free will.

The Introduction

Artificial intelligence (AI) is an automaton, i.e., an artifactual entity, which is capable of lasting in time and carrying out, during this duration, operations assimilable to a logical life (as opposed to biological life). To give a logical definition to IA we will have to find its sufficiency predicates. We will discuss two concepts related to AI: (a) the automaton; (b) the living in the logical sense (or the logically living).

Basic concepts
Automaton (A)
Of the three possible entities in the Universe – things, properties, relations – (Dinga, 2024), the automaton is a thing. As a thing, it has, of course, a series of properties, i.e., it generates a series of relations. We will refer to these, in the following, as its sufficiency predicates, i.e., the minimum number of attributes/characteristics that, through cumulative verification, qualifies the entity in question as an automaton:

(i) (A_1) is *artifact*: this means that it is a construct, either physical or ideal (logical, mathematical), and not a product of nature;

(ii) (A_2) is (or contains) a *self-controllable operational program* (*Nota bene*: even if, of course, being an artifact, the program has an external origin – we will refer to the so-called self-learning phenomenon below);

(iii) (A_3) is *capable of self-replication*: this capability is included in the program (*Nota bene*: this distinct sufficiency predicate is needed because its presence in the immediately preceding sufficiency predicate is not implied).

So, strictly logically, the automaton (A) is generated (comes into existence) by the logical conjunction of its sufficiency predicates:

$$A = (A_1) \wedge (A_2) \wedge (A_3) = \wedge_{i=1}^{3} A_i$$