Science

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INTRODUCTION TO SPECIAL ISSUE

Prediction and its limits

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Statistical syllogism and deductive syllogism in software packages

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In incremental innovation methods including open source software developments, abstraction and modularity of cognition are used for understanding in integrating open source software packages. Jasny and Stone (1) state that using software packages of the shelf, without understanding them fully, can lead to disaster. There are three kinds of software packages: open, closed, and mixed source. We have never understood the packages fully, because unknown black boxes are included in closed/mixed packages. Besides, since abstraction and modularity of cognition are used in the software developments, we have never understood the software packages fully. The most important point is not "fully understanding packages", but whether we understand the difference between statistical syllogism and deductive syllogism in software packages.

References:
1. Barbara R. Jasny, Richard Stone, Prediction and its limits, Science 03 Feb 2017, Vol. 355, Issue 6324, pp. 468-469
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Inductive and deductive reasoning must be merged for enhancing prediction and breaking its limits

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Machine learning approach belongs to one of statistics and uses statistical syllogisms. As long as the statistics is based on inductive reasoning and/or statistical syllogisms, the machine learning's conclusion is inherently uncertain. Inductive reasoning allows for the possibility that the conclusion is false, even if all of the premises are true. Definition of inductive reasoning here is more nuanced than simple progression from particular/individual instances to broader generalizations. Deductive reasoning is a logical process in which a conclusion is based on the concordance of multiple premises that are generally assumed to be true. In order for artificial intelligence to behave like human's inference, the conventional machine learning (inductive reasoning) and deductive reasoning must be merged or fused. Prolog (1) and Otter (2) are famous for deductive computer languages. In other words, in order to enhance prediction and break the limits, machine learning functions must be embedded in deductive computer languages.

1. **https://en.wikipedia.org/wiki/Deductive_language**
2. **http://www.mcs.anl.gov/research/projects/AR/otter/**
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