AGI from the perspectives of Categorical Logic and Algebraic Geometry

King-Yin Yan[0009−0007−8238−2442]

general.intelligence@gmail.com

Abstract. To "situate" AGI in the context of current mathematics, so that mathematics-minded professionals can more easily see whether current mathematical ideas can be fruitfully applied to AGI.

Keywords: AGI · categorical logic · homotopy type theory · Curry-Howard isomorphism · algebraic geometry.

1 Goal of this paper

The bottleneck of AGI development is the speed of learning algorithms. The cost of training GPT-4 was rumored to be $100M (by Sam Altman). To speed up learning, one needs to introduce inductive biases, according to the No Free Lunch theorem. One principled way to introduce inductive bias is by imposing the structure of logic. One reasons that, if humans have discovered the structure of logic in this world, an intelligent program may re-discover the same structure. So our question is: what is the mathematical structure of logic?

Traditionally this line of research is called algebraic logic, starting from Leibniz and Boole, up to more recent times Tarski's cylindrical algebra and Paul Halmos' work.

2 Our conclusion so far

2.1 A Subsection Sample

Please note that the first paragraph of a section or subsection is not indented. The first paragraph that follows a table, figure, equation etc. does not need an indent, either.

Subsequent paragraphs, however, are indented.

Sample Heading (Third Level) Only two levels of headings should be numbered. Lower level headings remain unnumbered; they are formatted as run-in headings.

Table 1. Table captions should be placed above the tables.

Heading level	Example	Font size and style
Title (centered)	**Lecture Notes**	14 point, bold
1st-level heading	**1 Introduction**	12 point, bold
2nd-level heading	**2.1 Printing Area**	10 point, bold
3rd-level heading	**Run-in Heading in Bold.** Text follows	10 point, bold
4th-level heading	*Lowest Level Heading.* Text follows	10 point, italic

Sample Heading (Fourth Level) The contribution should contain no more than four levels of headings. Table 1 gives a summary of all heading levels.
Displayed equations are centered and set on a separate line.

$$x + y = z \tag{1}$$

Please try to avoid rasterized images for line-art diagrams and schemas. Whenever possible, use vector graphics instead (see Fig. 1).

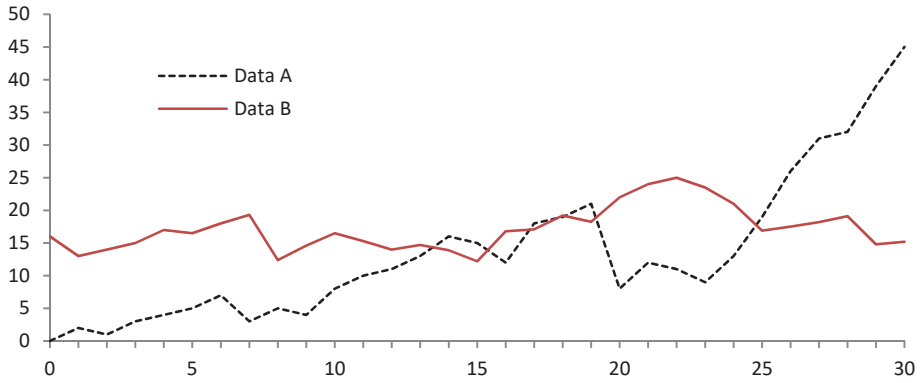

Fig. 1. A figure caption is always placed below the illustration. Please note that short captions are centered, while long ones are justified by the macro package automatically.

Theorem 1. *This is a sample theorem. The run-in heading is set in bold, while the following text appears in italics. Definitions, lemmas, propositions, and corollaries are styled the same way.*

Proof. Proofs, examples, and remarks have the initial word in italics, while the following text appears in normal font.

For citations of references, we prefer the use of square brackets and consecutive numbers. Citations using labels or the author/year convention are also acceptable. The following bibliography provides a sample reference list with entries for journal articles [1], an LNCS chapter [2], a book [3], proceedings without editors [4], and a homepage [5]. Multiple citations are grouped [1–3], [1, 3–5].

Acknowledgements Please place your acknowledgments at the end of the paper, preceded by an unnumbered run-in heading (i.e. 3rd-level heading).

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