

Can Invention in Mathematics and Computer Science be Automated?

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Abstract:

We first present some general ideas about

- the practical role of logical formality for creativity in mathematics (including computer science)
- the "creativity spiral" in mathematics by which, in open-ended rounds, areas which need individual creativity for handling individual problem instances, after deeper mathematical research, can be "trivialized" in the sense that one single algorithm handles all problem instances in this area.

In this way, mathematics (including computer science) can be conceived as the permanent effort to trivialize itself on higher and higher levels. Thus, mathematics is the prototype of automation in the center of the current age of automation in all areas of science, technology, economy, and society.

We then present our recent formal method, called "lazy thinking", by which it was possible to synthesize automatically algorithms for some non-trivial problems.