Ultrafinitism and epistemic limitations

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We use finite automata/transducers to model slow Turing Machines (sTMs) hobbled by epistemic limitations as to cpu, bandwidth, and memory. Our primary case is System I reasoning, natural language understanding in particular, rather than the extended deductive chains typical of System II reasoning. We obtain explicit lower (10^{20}) and upper (10^{40}) bounds on the size of the mathematical universe, considerably smaller than the classic $10^{10^{10}}$ Parikh bound. In line with Gewirth's ethical rationalism we argue that in a world populated by finite automata these cannot be denied fundamental rights. The automata are discussed in https://arxiv.org/pdf/2503.22000 and for the implications for AI safety see https://arxiv.org/pdf/2303.00752

Gewirth, Alan (1978). *Reason and morality*. University of Chicago Press.
Parikh, Rohit (1971). "Existence and feasibility in arithmetic". In: *Journal of Symbolic Logic* 36.3, pp. 494–508.