AI Mathematics

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AI vs Human

- Physically, AI can be much more energy-consuming than humans, who have evolved for billions of years;
- Economically, AI easily beats humans;
- Conclusion, AI is meant to replace humans in terms of economic cost.

AIGC Takeaway

- Input being natural language, output can be anything;
- dramatically lower the threshold to do creative things
- empower people's creativity
- can this be done for math?

AIGC Mathematics

- Applications:
  - Education: College Grading, AI tutor, ...
  - Paper Review
  - Discovery of new mathematical fact.

- Status Quo: LLM can generate natural language math proofs to some limited extent, cannot verify correctness, hallucination.
  One can use LLM to generate formal math proofs to totally avoid hallucination, however the success rate is not high and it's slow. There's a challenge of data.

- Reasonable Goal to be Achieved in a Few Years:
  - Solve all trivial mathematics. (In a sense, trivial mathematics can be defined to be those solved quickly by AI)
  - Imitate existing nontrivial proofs.
  - Search for certain proven theorems and facts.

The Pain of Formal Verification

- Steep learning curve.
- Library. Need to remember the name of the implementation of every tiny facts. Changing all the time.
- Small community. Small market. Engineering effort of tooling is poor. Few people mastering.
- Formal Verification for Mathematics needs people familiar with both fields, very rare

Proof Irrelevance

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