

Re: Article in Scientific American

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- *From:* Chris Smith <cdsmith@xxxxxxx>
 - *Date:* Mon, 25 Dec 2006 20:44:12 -0700
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T.H. Ray <thray123@xxxxxxx> wrote:

I am not quite sold. Montgomery-Smith's context was that of computers checking computers.

I am not aware of such a context. The context was a discussion of whether a computer program should be considered to constitute a proof, in the sense that the program is run and if it prints "true", then that is considered sufficient evidence that the theorem is true without requiring additional proof.

Yes, but the probability of the computer program being correct does increase if it is run on different computers with different compilers, operating systems, etc.<<

That sure sounds like not not provable to me.

Can you clarify what you mean by that? If the computer gives a proof, then the statement is provable. However, if the computer simply prints out "true", then how does that "not not prove" the theorem?

The rest of your post is unintelligible to me. I don't mean that as a casual dismissal; I did try to read and understand it; it just appears to be a lot of generally true statements (with the exception of the phrase "or among computer proofs", which seems to beg the question) that don't pertain to this discussion.

Again, the question was whether the existence of a computer program that outputs "true" should be considered a proof. I argued that it should not. My reason is that unlike in the case of a proof, the bulk of the program code is not read by other mathematicians as a primary means of understanding why the statement is true. Aside from being a significant difference in practical utility in itself, this means that errors in the program are likely to be found only if they give verifiably incorrect

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output. That is equivalent to the theorem being disprovable. We've lost the potential that someone just realizes a gap in the reasoning even though the theorem is still true; or that the theorem is not disprovable but also not provable, so the program "proves" it in error, but no one will ever notice that fact.

Hence, relying on observed fact, that a computer program prints some output, as a proof amounts to subjecting the theorem to a less strong standard of truth, over sufficiently large spans of time.

[I'll again point out that if you write a computer program that produces a proof, then I have no problem with that proof, so far as it really does prove the proposition. Furthermore, if you (a) write a computer program, then (b) prove that it prints "true" only if the theorem is true, then (c) prove that it prints "true"; then I have no problem with the proof. It's only when step (c) is verified by empirical observation rather than proven that the "proof" is questionable, in my view... though in either case, there's probably a more straight-forward way to write the proof.]

—
Chris Smith