AI in Physics: The Clever Hans Trap

Terry Bollinger
2023-04-19.18:07 EDT Wed
https://youtu.be/fWH8ZP1AHC8&lc=Ugy5QgS8RD1w3gCpzxx4AaABAg

A Comment on the Sabine Hossenfelder post:
AI rediscovers Einstein's Time Dilation and Kepler's 3rd Law (Apr 19, 2023)
https://youtu.be/fWH8ZP1AHC8?t=2m22s

2:22 "The system also correctly reproduced ... Einstein's law of relativistic time-dilation. Albert is shocked." One of the dangers of AI learning is how easily it falls into the Clever Hans trap of doing little more than repeating what its trainers *hope* the AI can derive. In this paper, the Clever Hans trap in Figure 6 lies in *how* researchers chose to present selected data. They chose the simplified case of point-like clocks — a relativity classic. Had they instead presented precise data for a relativistic train with a long length, it's not clear if this simple training algorithm would have figured out anything at all.

For this paper, the data showing the $-\beta\gamma/c$ time gradient on either side of a non-point object is missing. As with Clever Hans — the horse that did math by watching the expectant face of humans who knew the answer — an AI cannot find an equation in data unless those training it *know* the equation. While the age gradient equation $\alpha = -\beta\gamma/c$ applies to all Lorentz-contracted objects and is visible in figures showing the derivation of Lorenz contraction, it's not taught in textbooks or (to my knowledge) online courses like Brilliant. The result is an incomplete data set that leaves the AI as clueless as its trainers.

The bottom line is that AIs remain terrible at insight. Their illusion of intelligence stems from their speed and quick reuse of what they learn. That's valuable and economically impactful. However, even a globally distributed, hyper-fast Clever Hans like ChatGPT remains not much more than a highly perceptive but otherwise clueless dumb horse.

Terry Bollinger CC BY 4.0
2023-04-19.18:07 EDT Wed
PDF: https://sarxiv.org/apa.2023-04-19.1807.pdf