Physics of Data. Part XVII

Physics of Data. Part XVII | Alfonso R. Reyes

Artificial Intelligence needs more physicists, not more data scientists, or machine learning engineers, or statisticians!

If it sounds like a heresy, it really is.

It is becoming clearer with time that established ground is being broken as more papers on SciML and PINNs are being published. Physicists and mathematical physicists are making astonishing discoveries, clarifying misunderstandings on the application of ML on dynamical systems, and expanding the frontiers of AI way beyond Generative AI.

AI is so much, much more than Gen AI. But the majority of us has so fallen for LLMs that it will take years until the hype dissipates and we are start paying attention to the physics.

This article on chaos in dynamical systems will probably be one of the great milestones on retaking scientific AI. This is the link to the article https://lnkd.in/gGKr_it3, and this other is the link to the post: https://lnkd.in/gDFy9-45

I wouldn't blame you if don't immediately grasp the content; It is not written for the general public. It assumes we already know about chaos theory, numerical stability, Lyapunov exponents, Differential Equations, and the numeric limits of our computers and GPUs.

My interpretation is this:

There is no Data Science or Machine Learning algorithm -insert here AI, since everyone is calling it as a catchall term for ML -, that will be able to make accurate predictions of dynamicalsystems.

When I say dynamical systems I mean systems that operate in the field, and feed real time data to production databases and datasets. The first reason is that dynamical systems are by nature nonlinear, they do not behave in predictable ways as we expect in systems at rest.

Data science and machine learning have had a brilliant history of successes; but that was before people tried to use AI/ML to make predictions on live data from systems in motion. The success of the past is due to one reason: data was at rest; no moving pieces.

Until someone decided to use those same algorithms with dynamical data!

Well, guess, how that turned out? Projects that never close. Infinite schedules. Predictions that never match the real world. Or empty promises that the next AI wave will fix the problem.

Classical data science and classical machine learning will never work with dynamical systems. Why? Because dynamic data tends to be nonlinear and chaotic, and without some physical constraints, it will never deliver reasonable results because it knows no bounds.

In the next post I will publishing running code of a nonlinear chaotic system where you will be able to enter infinitesimals in the input and see how huge is the effect on the output. You will have a taste of chaotic dynamical systems.

Alfonso R. Reyes • You
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1mo • Edited •

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