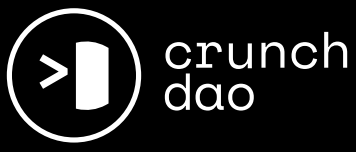

Data Science Problems and Hidden Discrete Dynamical Systems

DESCI LONDON HACKATHON

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Data Science Problems and Hidden Discrete Dynamical Systems

abstract

DeSci London Hackathon is a hackathon event taking place on the 12th and 13th of January 2023. This hack is aimed at anyone interested in DeSci. The event will have two tracks – code and no-code. All submissions will be open source.

Step 1: Machine Learning: Supervised Learning

We have noisy observations associated with a deterministic dynamical system and we are interested in best fitting, in some sense, these high-dimensional observations with a target scalar observation, related to the same system.

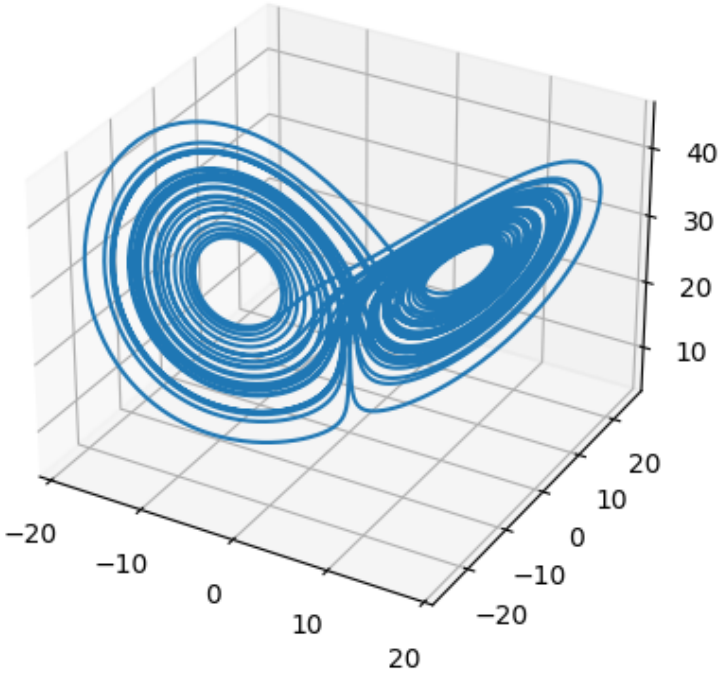

Figure 1: Hello Lorenz!

See (Vahid Nateghi 2022) and (Champion et al. 2019) for additional context.

Step 2: Convex Optimization

The estimated targets are part of a pipeline sending them to a convex optimizer which returns a fitness different from your fitness. You cannot modify the convex optimizer.

See (Diamond and Boyd 2016) for additional context.

Step 3 Convex Optimizer-in-the-loop backpropagation

You can use backpropagation to train your model against the post-optimizer fitness.

See (Agrawal et al. 2019) for additional context.

Bonus Problem

Award for this problem: 1M dollars. Good luck.

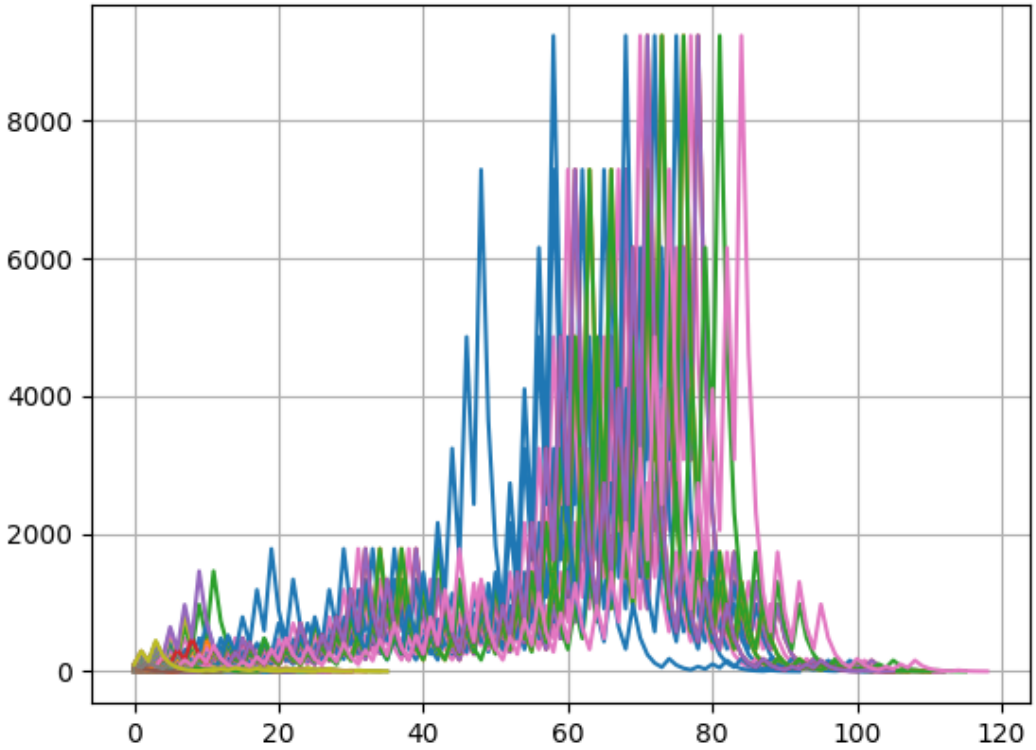

Figure 2: Prove the Collatz conjecture.

See (Tao 2019) for additional context.

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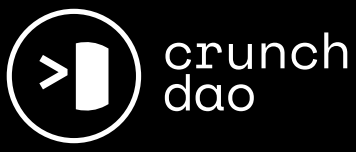
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