Learning **physical concepts** purely from data: We demonstrate how **generative models** can learn **manifolds** of **differential equations.**

Rodent: Relevance determination in ODE

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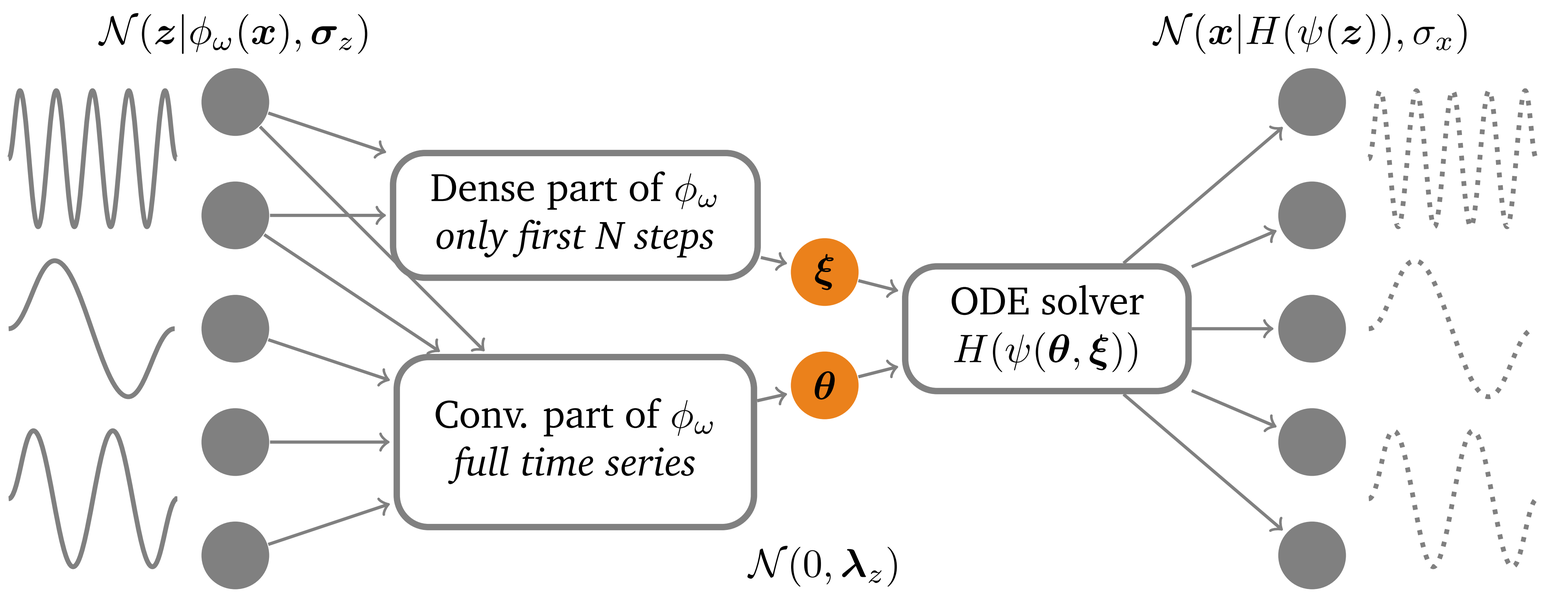
Learning differential equations

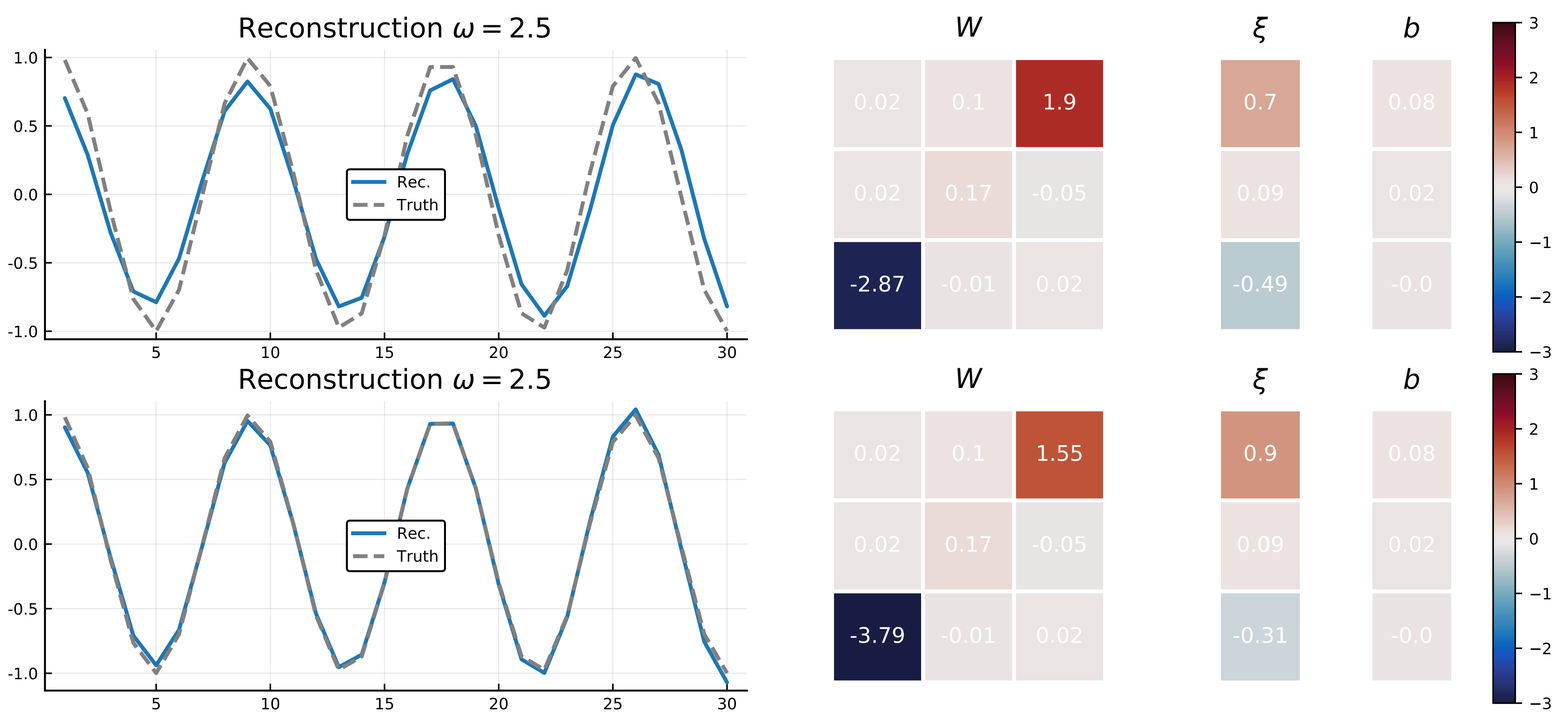
- We want to find the simplest ODE that describes a dynamical system
- Simple means: minimal order of ODE & minimum No. of non-zero parameters.
- Discover physically meaningful Eq. to help understand the underlying process.



Advantages of the relevant ODE identifier

- **Explainability.** Parameters of z are decoded through ODE solver, giving them physical meaning.
- **Sparsity.** The ARD prior on z encourages the simplest solution with fewest non-zero parameters.
- **Partial observations.** Rodent allows learning of an ODE without knowledge of all state trajectories.

Manifold learning & Reidentification



Rodent reconstructions (left column) and latent codes (right column) of a harmonic signal in the upper plots. Reidentified reconstruction and encodings in the bottom. The heatmaps on the right show the corresponding encodings for the weights W, biases b, and initial conditions ξ. The Rodent reduced the latent space to the four truly relevant parameters.

Check out the full paper at `http://tiny.cc/f6x6gz`
or scan the QR code on the left!
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