

Neural ODE Processes

Alexander Norcliffe*, Cristian Bodnar*, Ben Day*, Jacob Moss*, Pietro Liò

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me →

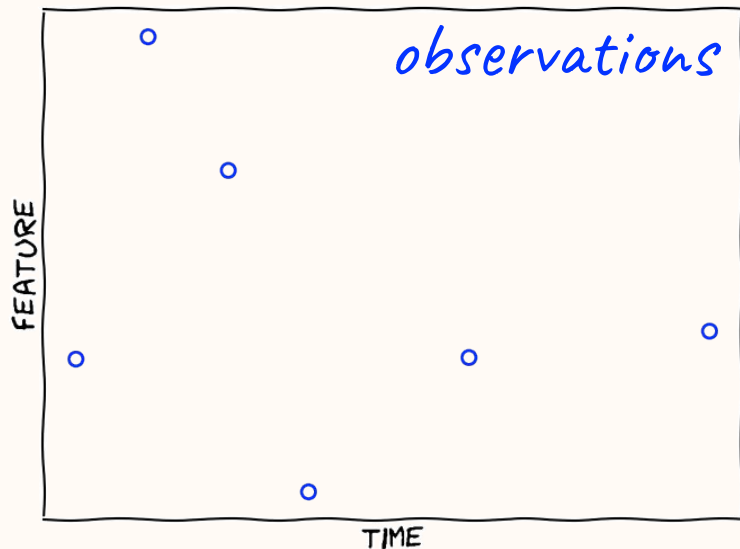
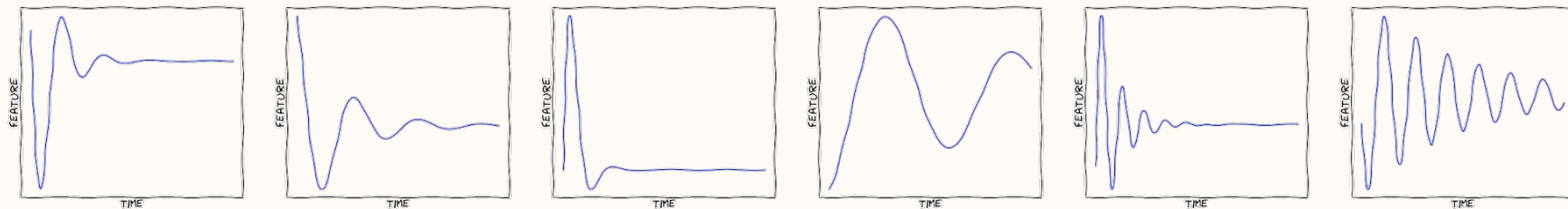


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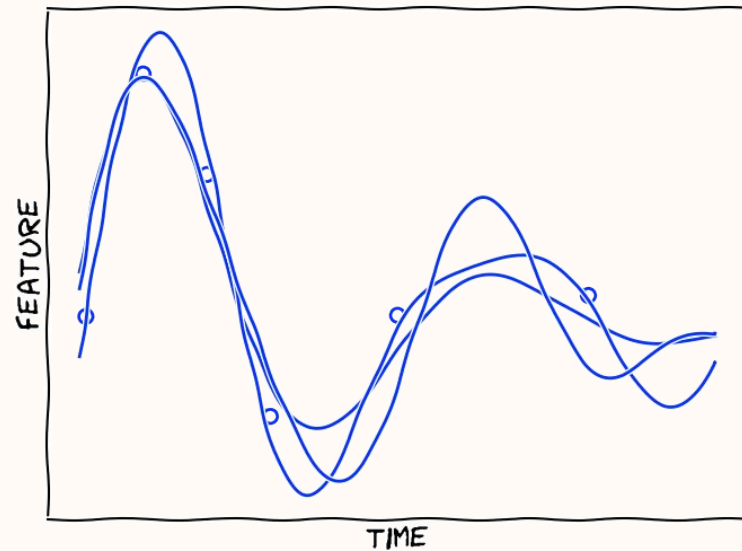
Department of
Computer Science
and Technology

Neural ODE Processes

training set

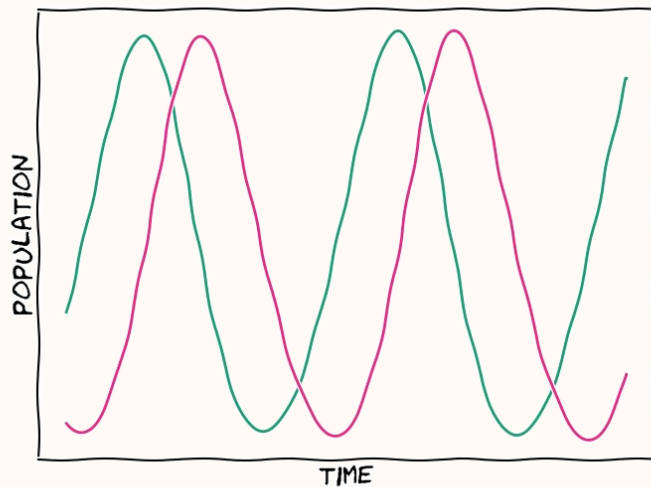
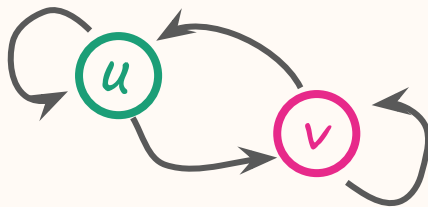
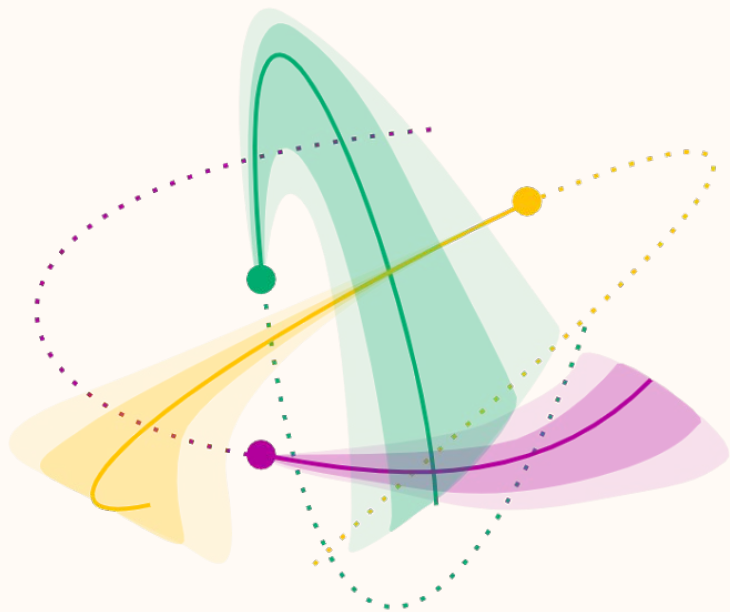


update
→
sample



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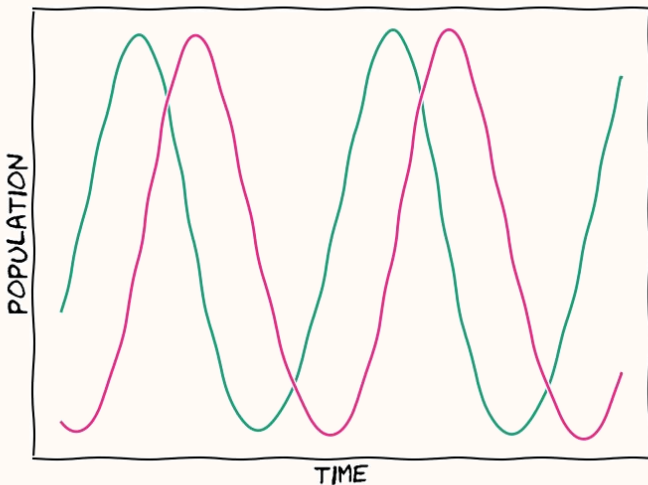
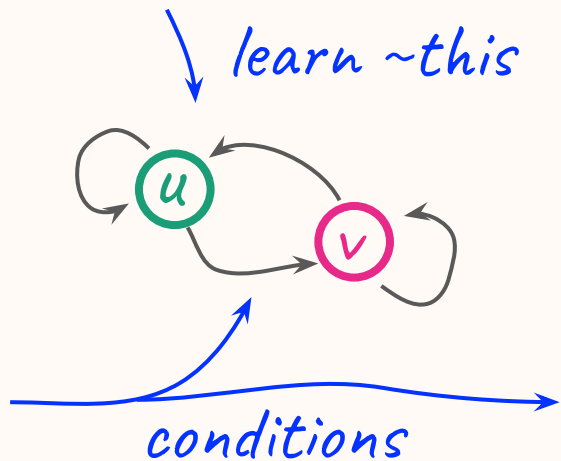
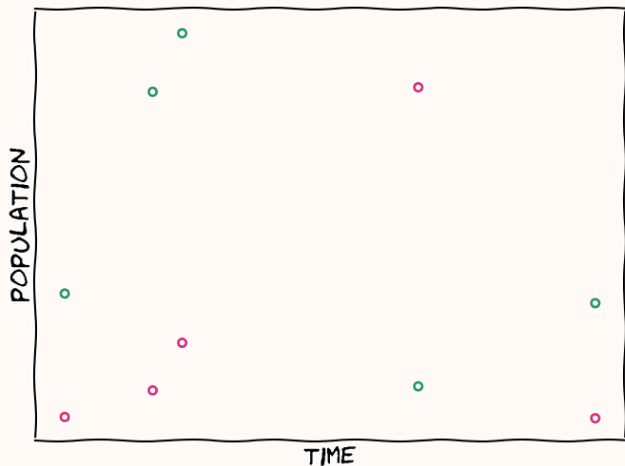
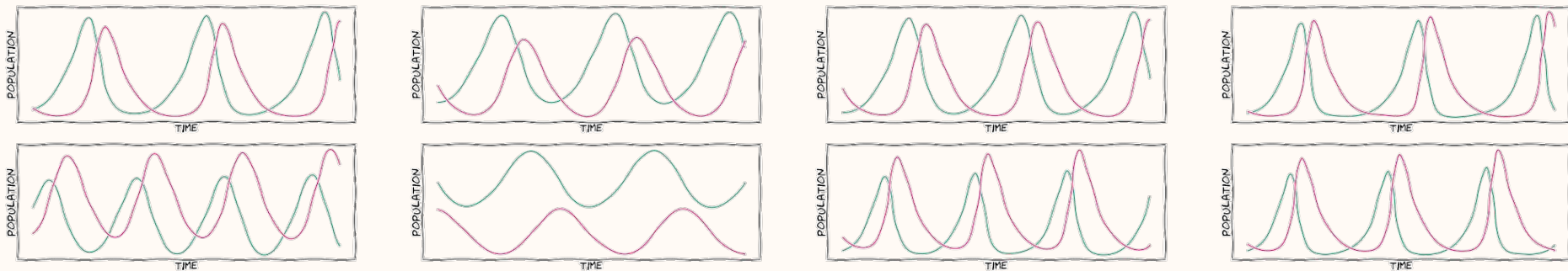
interacting particles



‘interacting’ animals

Neural ODE Processes

training set



Neural ODE Processes

ResNet

$$h_{t+1} = h_t + f(h_t, \theta_t)$$

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ResNet

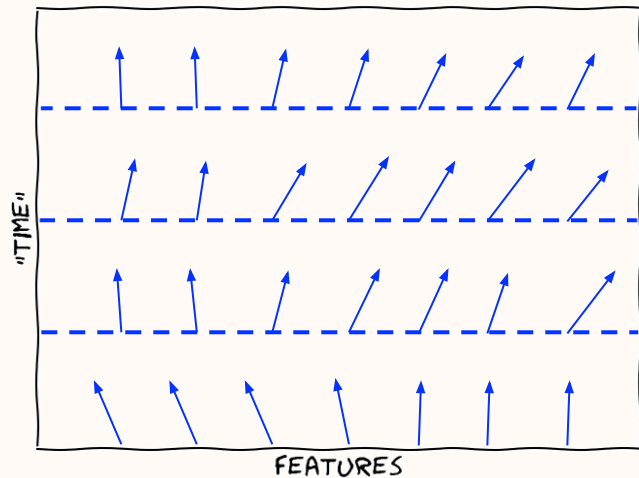
$$h_{t+1} = h_t + f(h_t, \theta_t)$$

Euler integration

perspective

$$h'(t) = f(h_t, \theta_t)$$

$$h_{t+\Delta t} = h_t + f(h_t, \theta_t)\Delta t$$



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ResNet

$$h_{t+1} = h_t + f(h_t, \theta_t)$$

Euler integration

perspective

$$h'(t) = f(h_t, \theta_t)$$

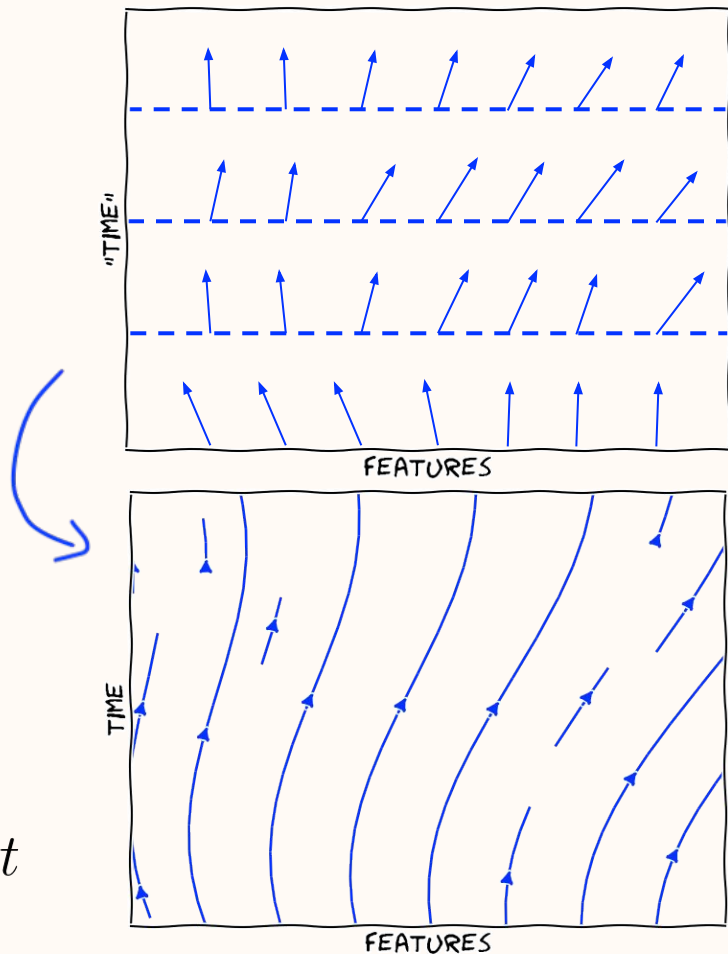
$$h_{t+\Delta t} = h_t + f(h_t, \theta_t) \Delta t$$

Explicit derivative

+ ODE solvers

$$\frac{dz}{dt} = f(z(t), t, \theta)$$

$$z(t_1) = z(t_0) + \int_{t_0}^{t_1} f(z(t), t, \theta) dt$$



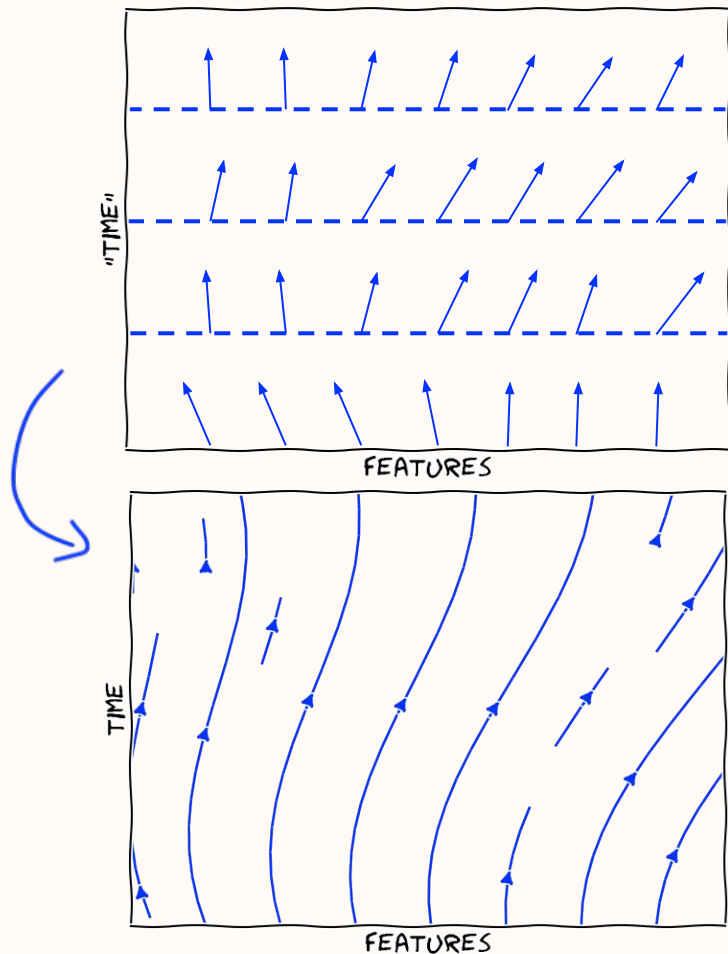
Neural ODE Processes

Good

- naturally handle time and irregular sampling

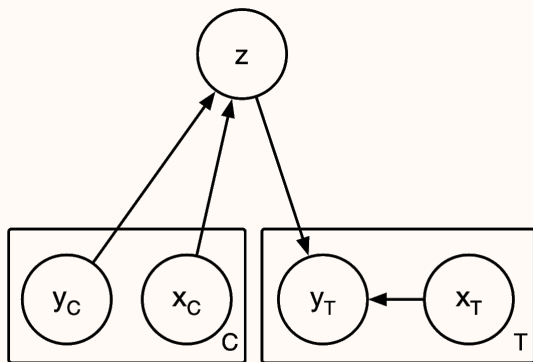
Missing

- adaptation, uncertainty



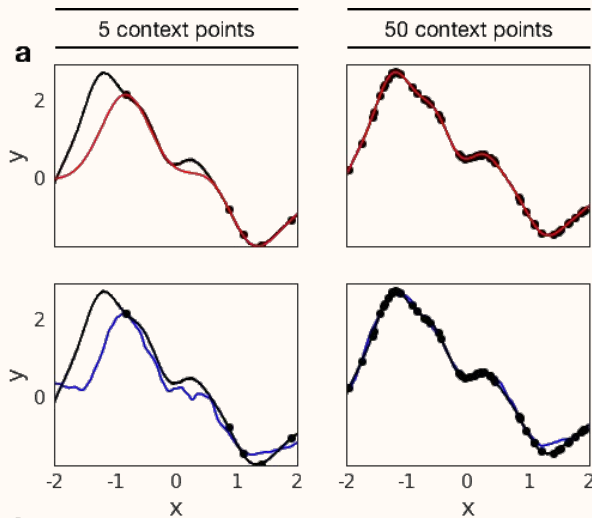
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latent variable



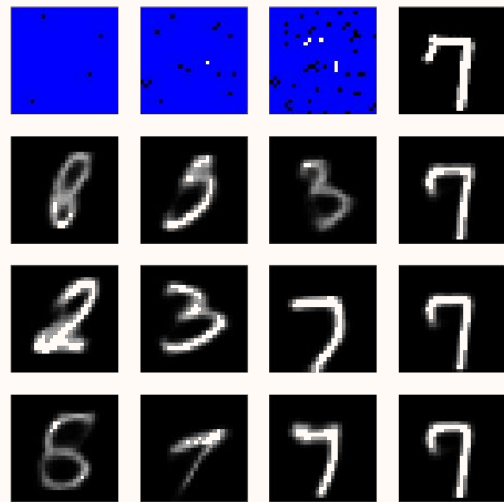
context

targets



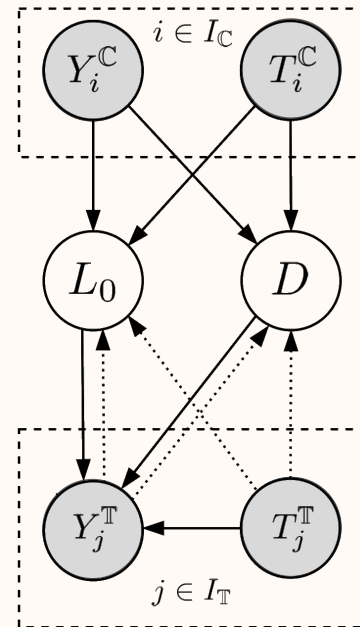
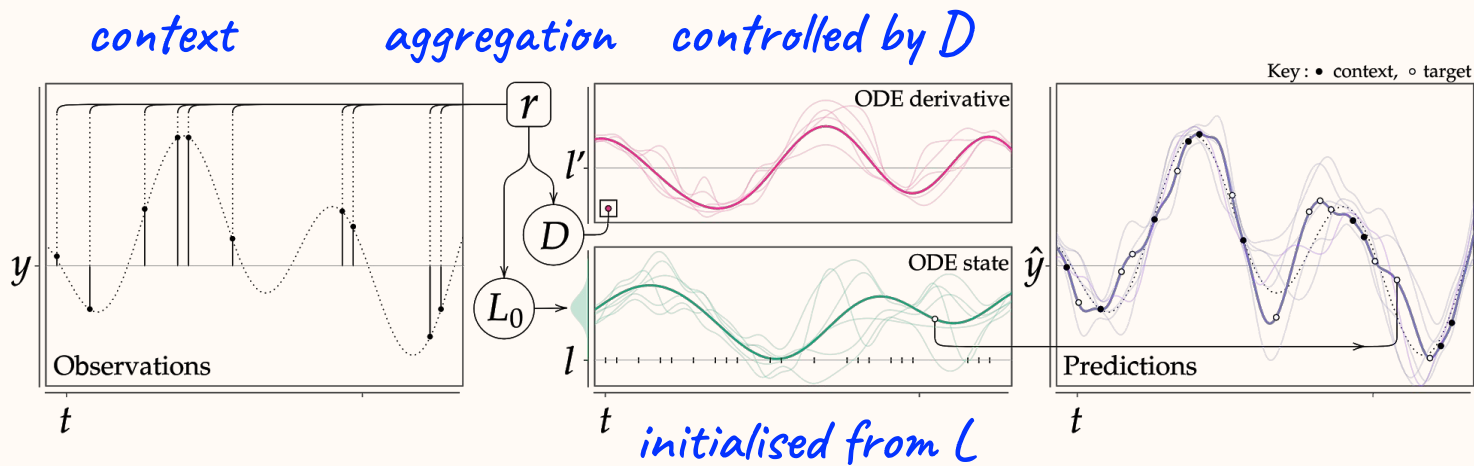
adaptable

scale to high dim settings

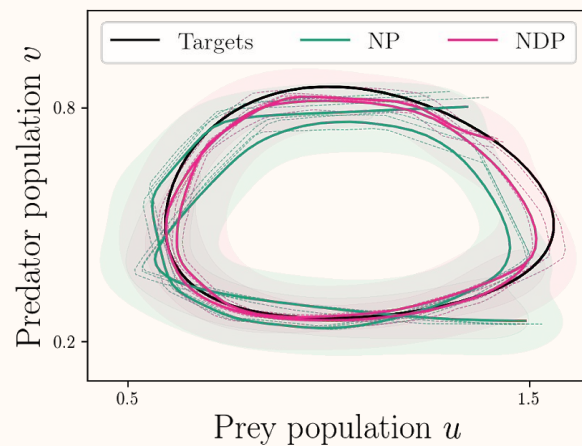
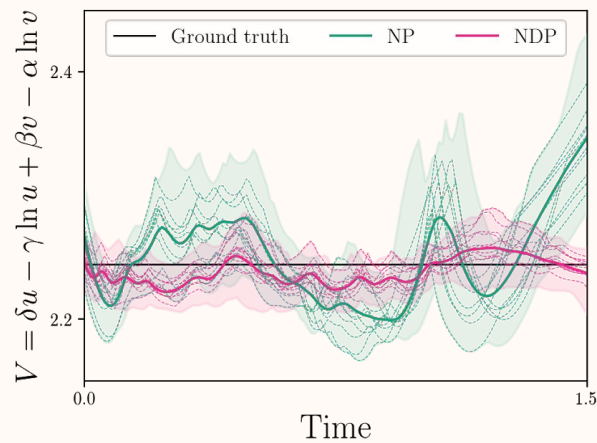
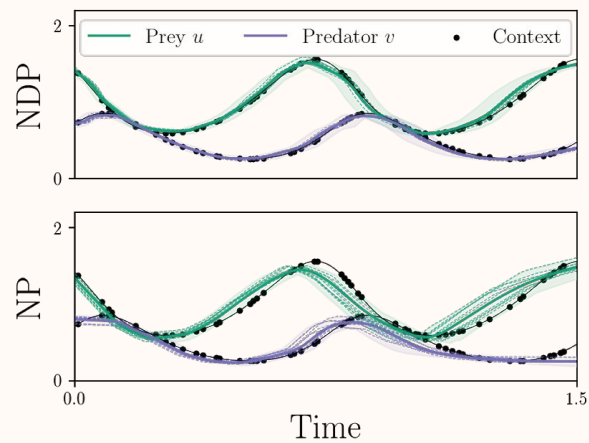


Figures from Conditional Neural Processes, Garnelo et al. 2018,
and Neural Processes, Garnelo et al. 2018

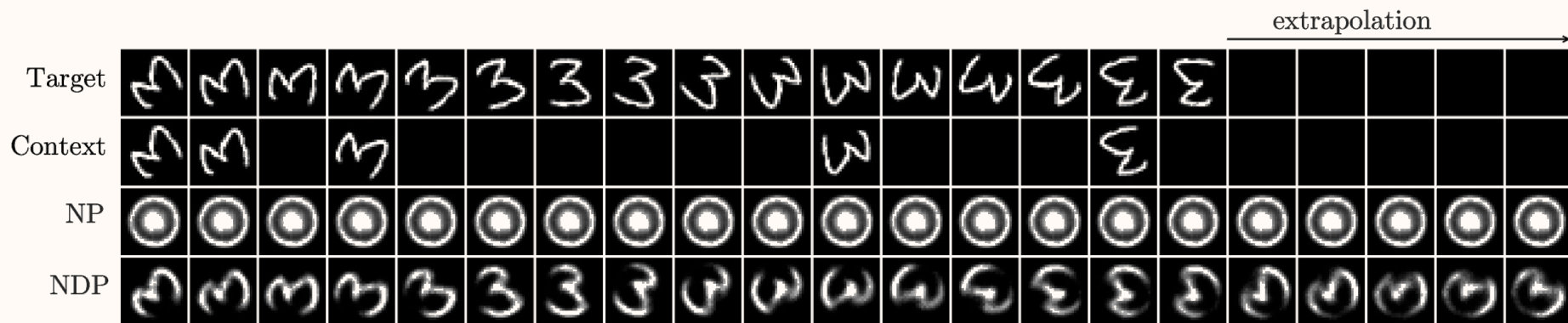
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Experiments



Experiments



Thanks for your time!

Poster Session 7 May 5, 2021, 1 a.m. – 3 a.m.

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