Training a deep neural network

Input x | Neural network parametrized by $\boldsymbol{\theta}$ | Output y

Gradient-based training requires $\dfrac{\partial l(\boldsymbol{y}, \boldsymbol{\theta})}{\partial \boldsymbol{\theta}}$

$l(\boldsymbol{y}, \boldsymbol{\theta})$: loss function

Differentiable physics

Input x | Physical system parametrized by $\boldsymbol{\theta}$ | Output y

Gradient-based optimization requires $\dfrac{\partial g(\boldsymbol{y}, \boldsymbol{\theta})}{\partial \boldsymbol{\theta}}$

$g(\boldsymbol{y}, \boldsymbol{\theta})$: objective function

Differentiable programming