Goal of this course

Train an agent to perform useful tasks

\[ \pi_\theta(a|s) \quad \hat{\Delta}_{t+1} = f_\theta(s_t, a_t) \quad Q_\theta(s, a) \]
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Train the model

\[ Q_{\theta}(s, a) \]

\[ \pi_{\theta}(a|s) \]

\[ \Delta_{t+1} = f_{\theta}(s_t, a_t) \]
How do train a model?

\[ \theta^* = \arg \min_{\theta} \sum_{(x,y) \in D} L(f_{\theta}(x), y) \]

PyTorch does all of these!
What is PyTorch?

Python library for:
• Defining neural networks
• Automating computing gradients
• And more! (datasets, optimizers, GPUs, etc.)
How does PyTorch work?

You define:

\[
\begin{align*}
    h_1 &= \sigma(W_1 x) \\
    h_2 &= \sigma(W_2 h_1) \\
    y &= \sigma(W_3 h_2)
\end{align*}
\]

PyTorch computes:

\[
\begin{align*}
    \frac{\partial y}{\partial W_1} &= \frac{\partial y}{\partial h_2} \frac{\partial h_2}{\partial h_1} \frac{\partial h_1}{\partial W_1} \\
    \frac{\partial y}{\partial W_2} &= \frac{\partial y}{\partial h_2} \frac{\partial h_2}{\partial W_1} \\
    \frac{\partial y}{\partial W_3} &= \frac{\partial y}{\partial h_2} \frac{\partial h_2}{\partial W_3}
\end{align*}
\]
PyTorch Tutorial (Colab)

https://colab.research.google.com/drive/1XQu1mUbGtvkQY-D7_YCOZlRzSnjp4u9f?usp=sharing