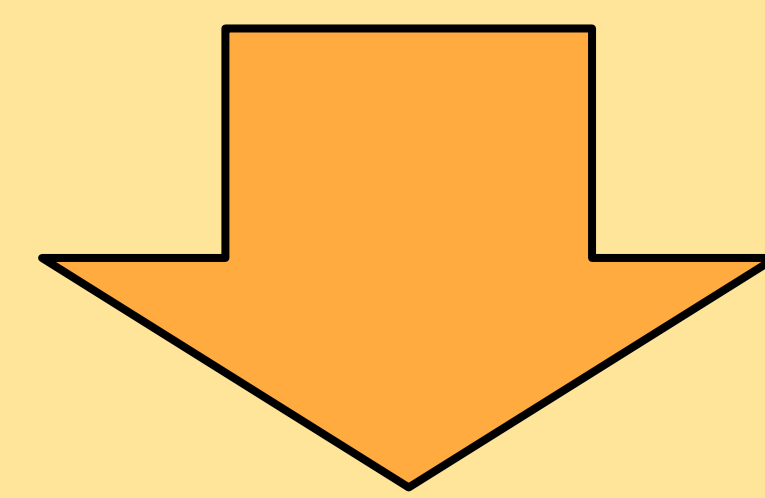




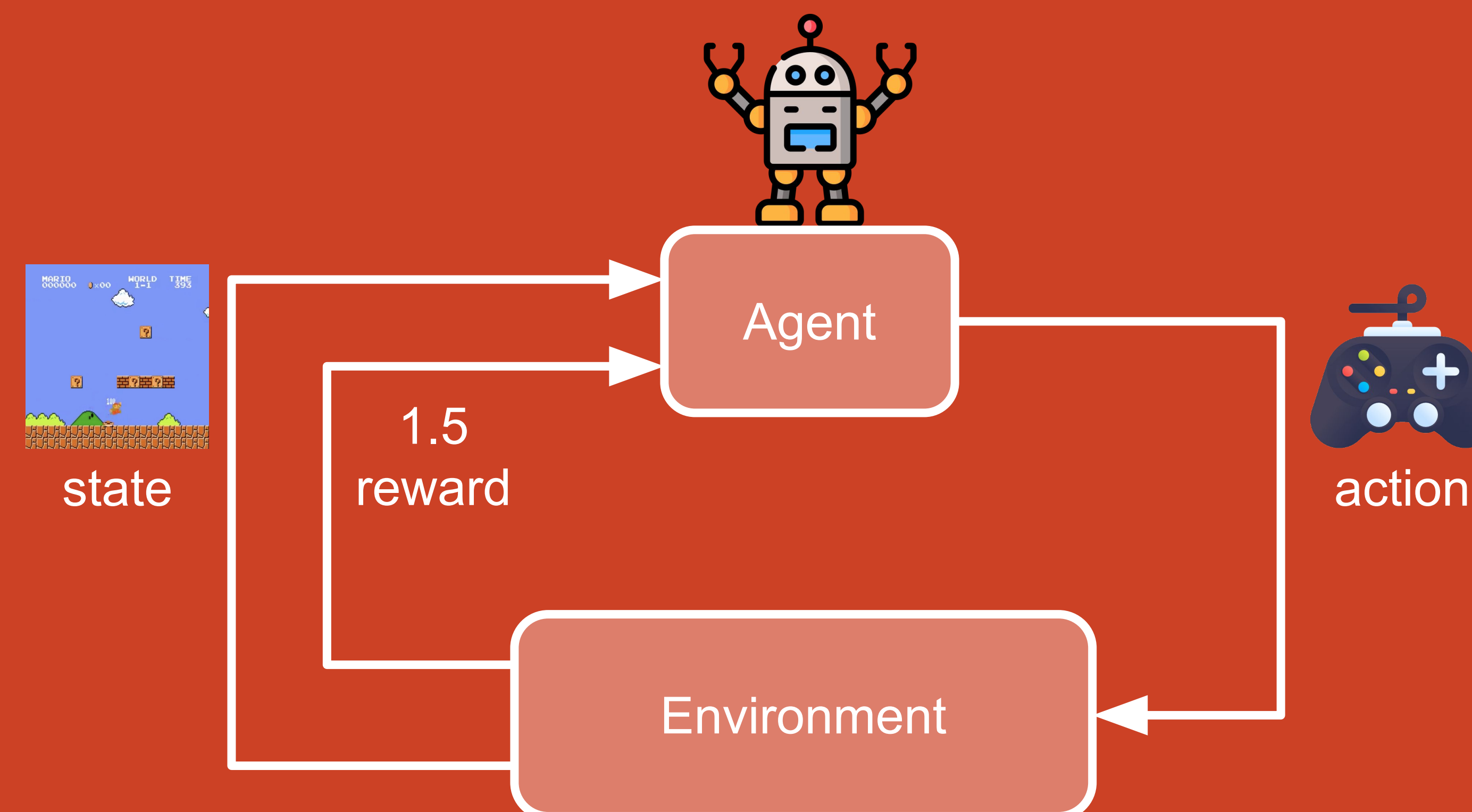
## Research Question

How can we beat Super Mario Bros without humans?



**Our approach:** using *deep reinforcement learning* to train a model to beat the game

## Reinforcement Learning



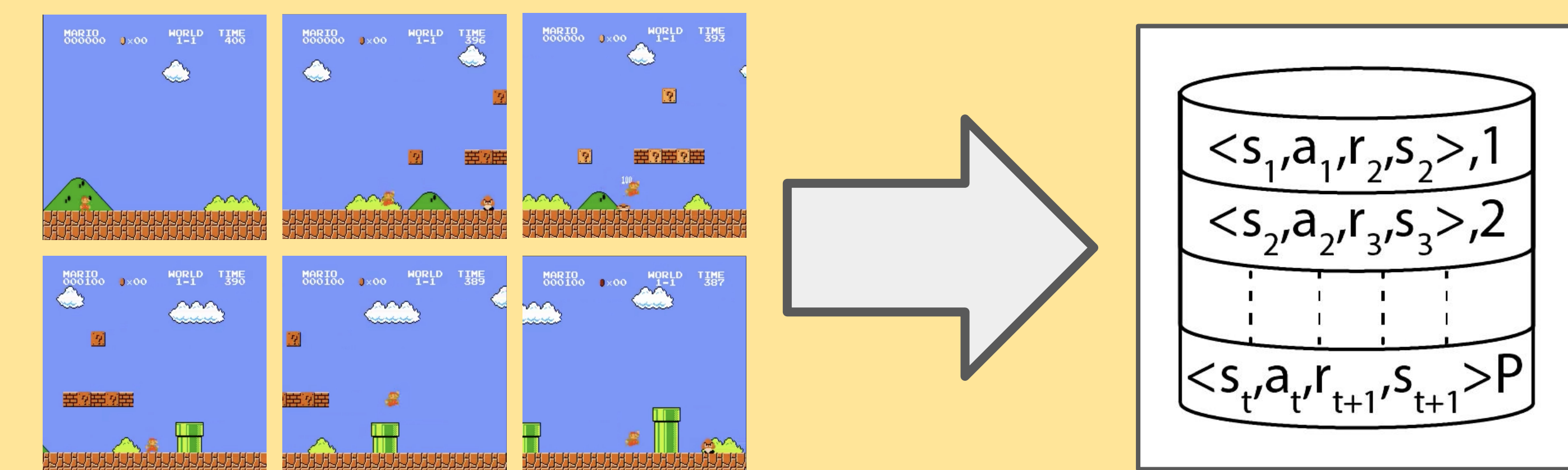
**Reward:**  $r = v + c + d$   
*v* = how far right Mario has moved  
*c* = time left  
*d* = death penalty



State = RGB Image/Frame  
 Action = Controller Inputs

## Methodology

**Step 1:** Create an experience replay dataset

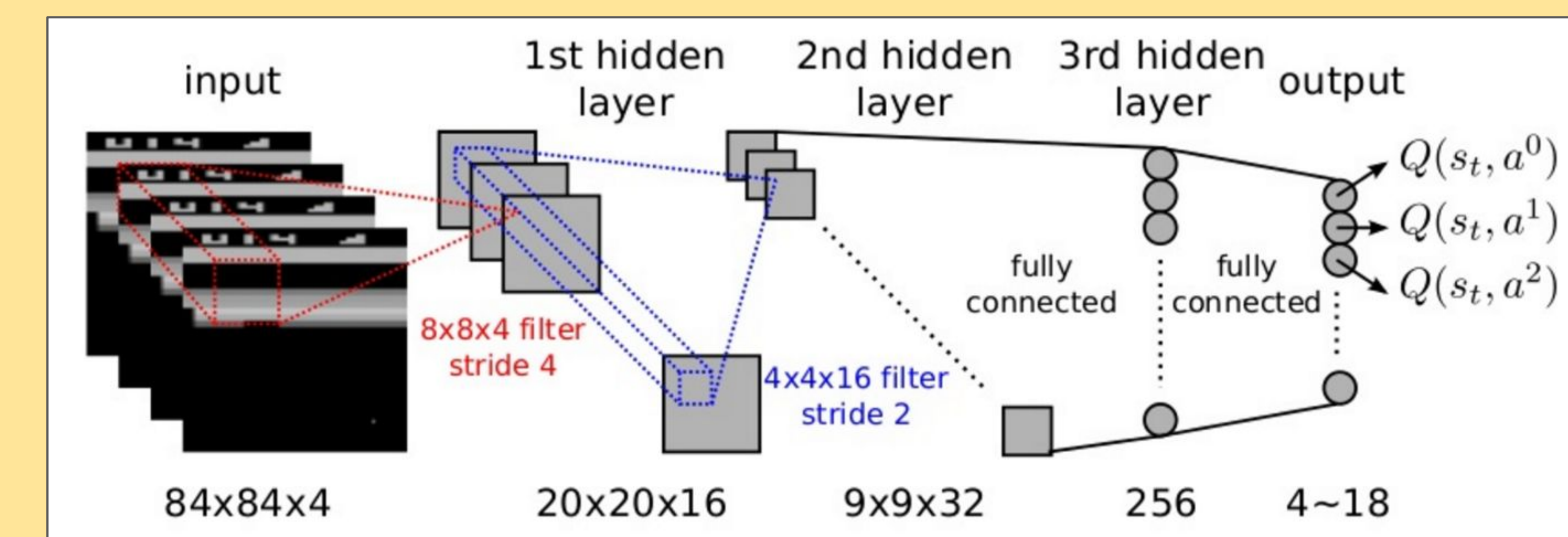


**Simulate game over many iterations**

The experience replay dataset:

- Speeds up learning by allowing training in parallel.
- Improves learning rate by prioritizing experiences that significantly improves the agent.

**Step 2:** Use the dataset to train a deep reinforcement learning model



The model learns the future reward associated with different actions, given the current state.

