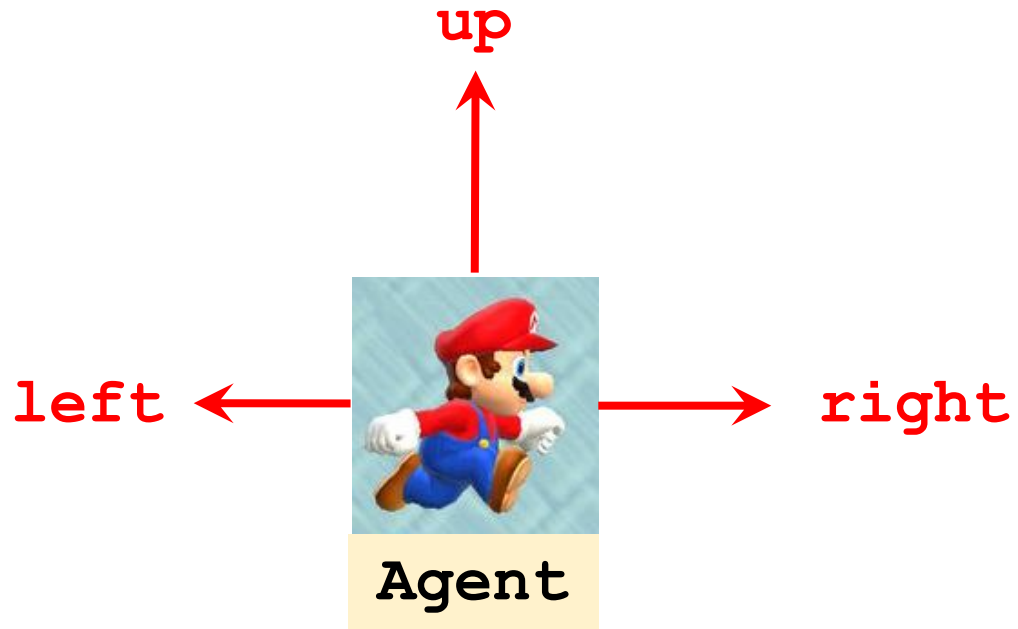


Discrete VS Continuous Control

Shusen Wang

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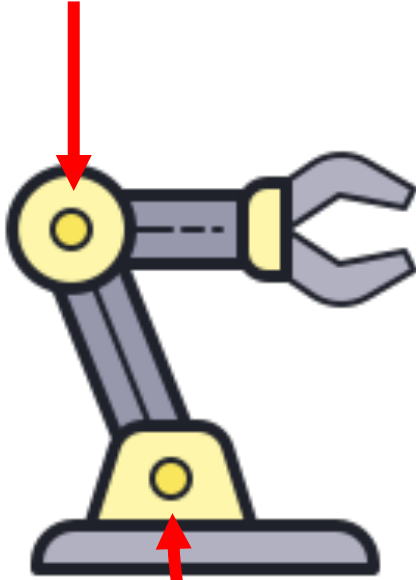
Discrete Action Space



- Action space $\mathcal{A} = \{\text{left}, \text{right}, \text{up}\}$.
- The action space \mathcal{A} is discrete.

Continuous Action Space

$$a_1 \in [0^\circ, 360^\circ]$$



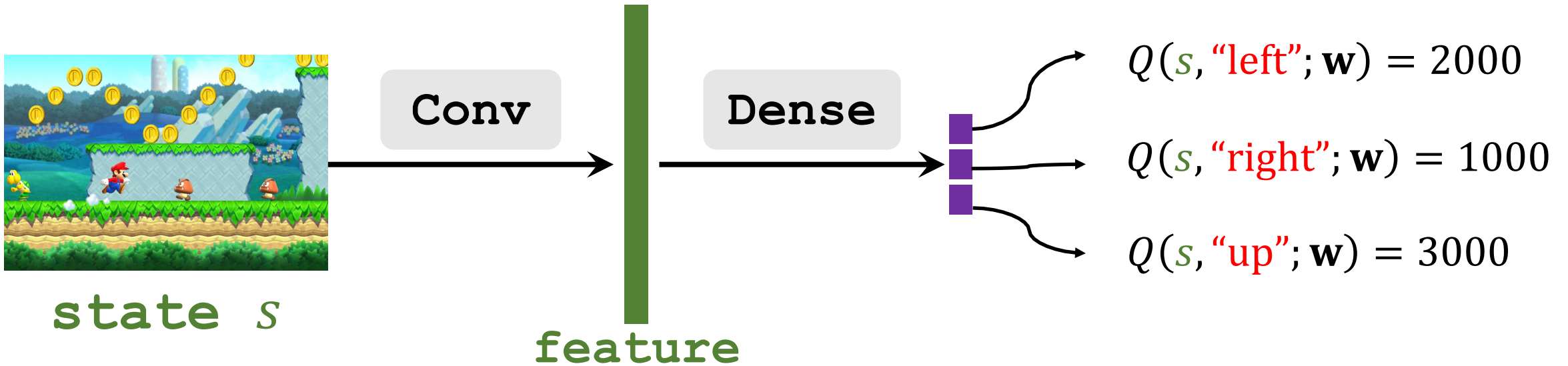
$$a_2 \in [0^\circ, 180^\circ]$$

- The action space \mathcal{A} is continuous:

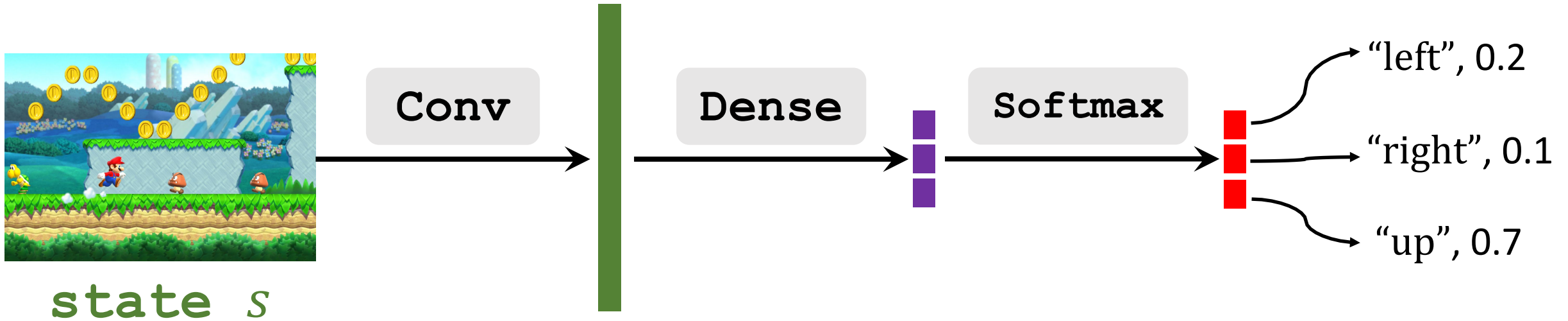
$$\mathcal{A} = [0^\circ, 360^\circ] \times [0^\circ, 180^\circ].$$

- Actions are 2-dim vectors.

DQN for Discrete Action Space



Policy Network for Discrete Action Space

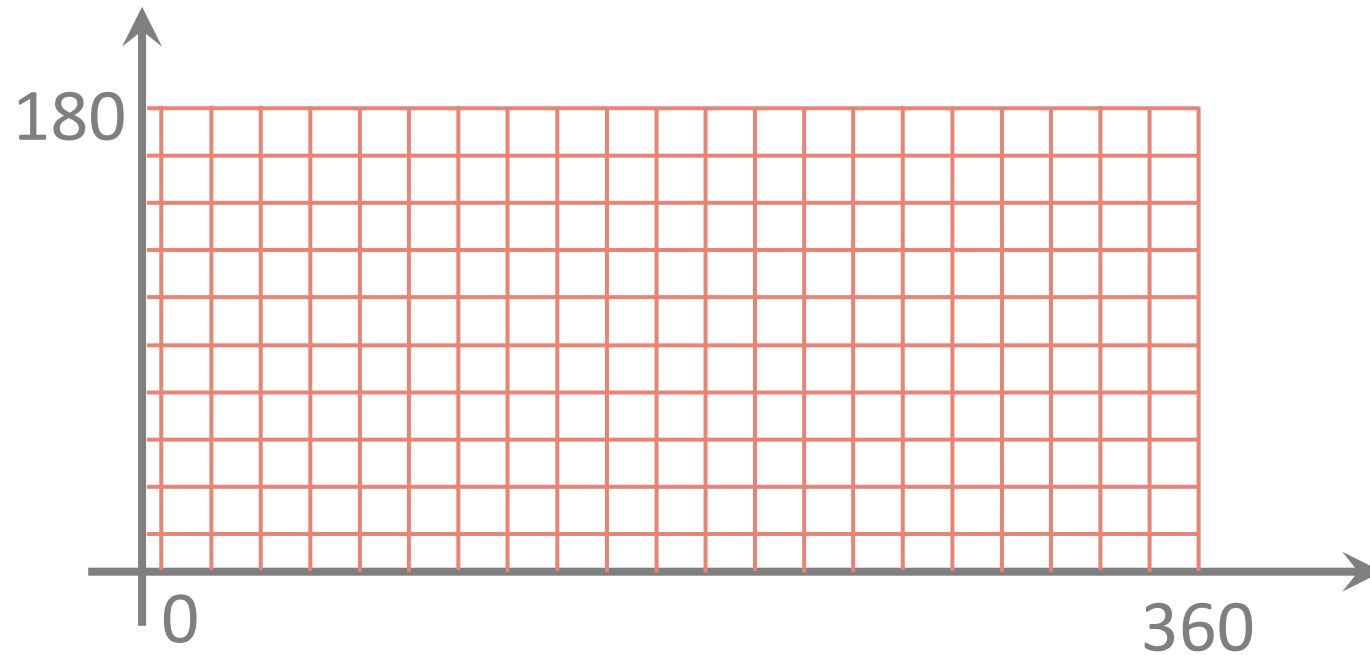


Discretization



Discretization

- Discretize the action space. (Draw a grid.)
- Now, the number of actions is the number of grid points.



Discretization

- Discretize the action space. (Draw a grid.)
- Now, the number of actions is the number of grid points.
- Problem: curse of dimensionality.
 - Let d be the degree of freedom.
 - The number of actions grows exponentially with d .

Better Approaches to Continuous Control

1. Deterministic policy network (the 2nd lecture).
2. Stochastic policy network (the 3rd lecture).

Thank you!

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