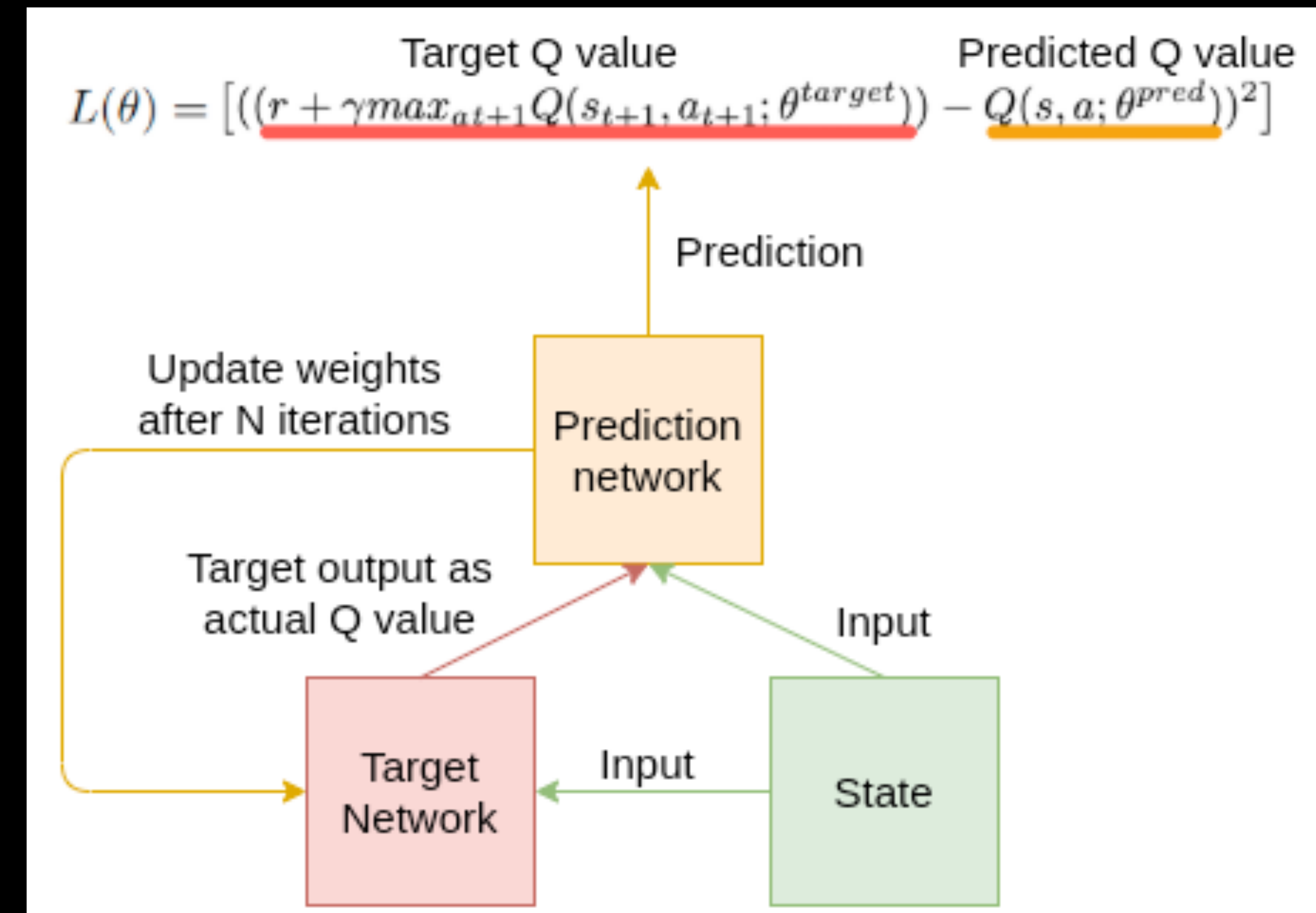# Deep Reinforcement Learning

Algorithm: Deep Q Learning

- DQN uses deep learning to approximate the Q-function in reinforcement learning

- DQN combines experience replay and fixed Q-targets to stabilize learning

- DQN can handle high-dimensional, nonlinear environments

$$L(\theta) = \left[((r + \gamma max_{at+1} Q(s_{t+1}, a_{t+1}; \theta^{target})) - Q(s,a; \theta^{pred}))^2 \right]$$

Target Q value

Predicted Q value

Prediction

Update weights after N iterations

Prediction network

Target output as actual Q value

Input

Target Network

Input

State

Deep Reinforcement Learning

This project

- **Model Free:**

  - A multiplayer game with limited view of the field implies unknown transition probabilities

  - Explored: DQN, A2C, PPO

  - **Will focus on <u>DQN</u> - the best model found (within the scope of this project)**