Playing Atari with Deep Reinforcement Learning

Mnih et. al.

Carefully read the paper. We will discuss the questions below.

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Questions for Discussion:

1) What was novel about this paper?

**It performed on raw pixels , that is directly from the visual inputs and not from a low dimensional represenation**

2) Why do you think the authors picked Atari games as the subject matter?

**- relatively small and simple action space on**

**Easy to baseline against human performanace**

3) In RL, there are typically sequences of highly correlated states.

Why does this pose a problem? How is this handled in the approach?

* **Can cause overfitting and lead to poor generalization.**
* **Neural network chases a moving target because data distribution is changing.**
* **Small errors can compound during updates, leading to instability and not convergence**

**They used experience reply, which randomly samples previous transitions and therby smooths the training distribution over many past behaviors.**

4) What is a Q-network?

**A q-network is a neural network that is used as function approximator. It includes a loss function.**

5) The target y is a function of immediate reward and the future expected value. How is it different from supervised learning?

**In supervised learning, that target is a fixed label throughout training. In DQN, target y is not fixed, it is changing.**

6) How is stochastic gradient descent used?

**It updates the weights , Theta, in the neural network to reduce the TD error**