



Deep Learning

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The background is a dark teal color with a faint, out-of-focus image of a document. On the document, there is a line graph with several data points connected by lines. A pen is visible in the upper right corner of the document. The text '3. Deep Reinforcement Learning' is overlaid on the left side of the image in a large, white, sans-serif font.

3. Deep Reinforcement Learning

Atari (PongNoFrameskip-v4)

▶ Environment

- ▶ Input to the NN 2 consecutive frames of the game so as to capture the movement of the ball
- ▶ Images resized to lower dimensions scaled from 0 to 1.

▶ Replay Buffer

- ▶ used to store the current states, actions, rewards, next states and whether or not a terminal state (done) was reached.
- ▶ Total memory = 20,000 (when set to 50,000 I ran out of memory).
- ▶ Sampled with a batch size of 32.

▶ Model Architecture

- ▶ 3 convolutional layers
 - ▶ 32, 64 and 64 filters respectively
 - ▶ ReLU activations
 - ▶ Kernel sizes: 8, 4 and 4 respectively
 - ▶ Strides: 2, 3 and 1 respectively
- ▶ 2 fully-connected layers
 - ▶ ReLU and Linear activations respectively

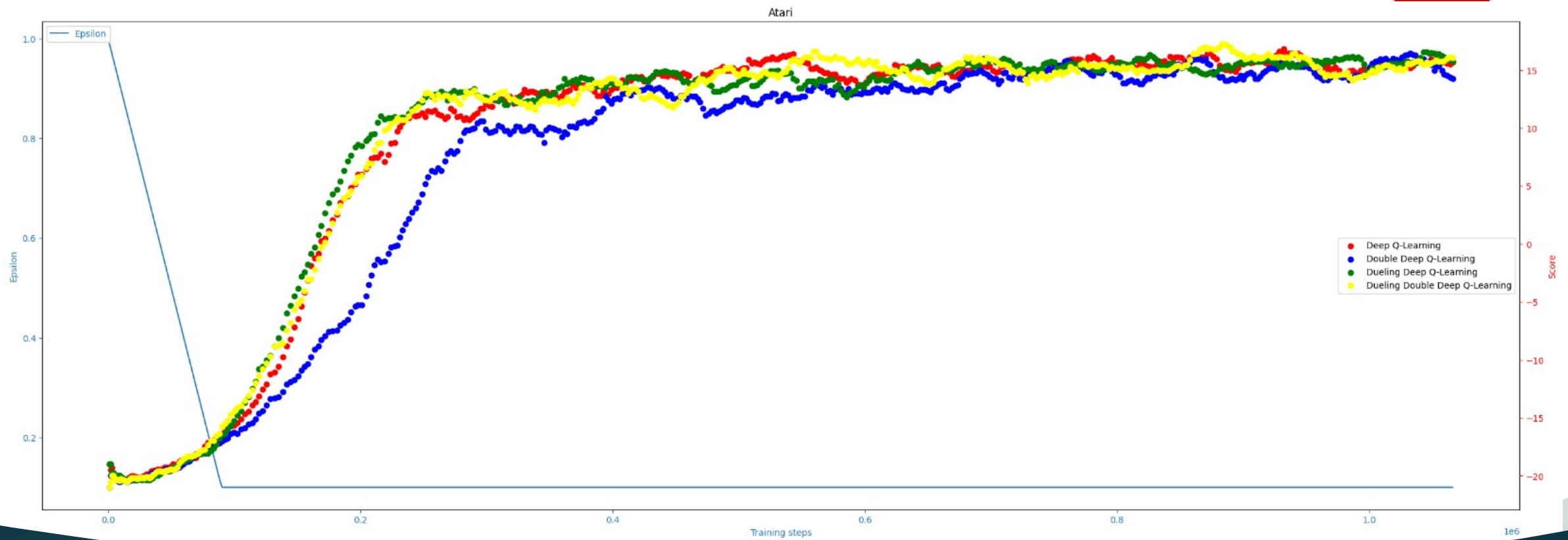


▶ 2 networks with the previous architecture were used

- ▶ One that was trained
- ▶ The other was updated every 1000 iterations by using the current weights of the first.

Atari (PongNoFrameskip-v4)

- ▶ **Methods** 4 methods were implemented from scratch
 - ▶ Deep Q-Learning
 - ▶ Double Deep Q-Learning
 - ▶ Dueling Deep Q-Learning
 - ▶ Dueling Double Q-Learning
- ▶ **Hyperparameters**
 - ▶ Number of games = 500
 - ▶ Learning rate =
 - ▶ (epsilon)
 - ▶ was initialized to 1
 - ▶ decreased by in each iteration until .
 - ▶ After that, it was kept constant



Atari (PongNoFrameskip-v4)



Thank you!