



Team Nr. 1
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Sadly our code still contains a critical error. Non the less, we learned a lot about the design and implementation of neural networks for reinforcement learning.

Colab broke connection due to GPU usage limits after 741 episodes of training. The network showed no improvements in the reward over that time, which is why we think that our code contains an error.

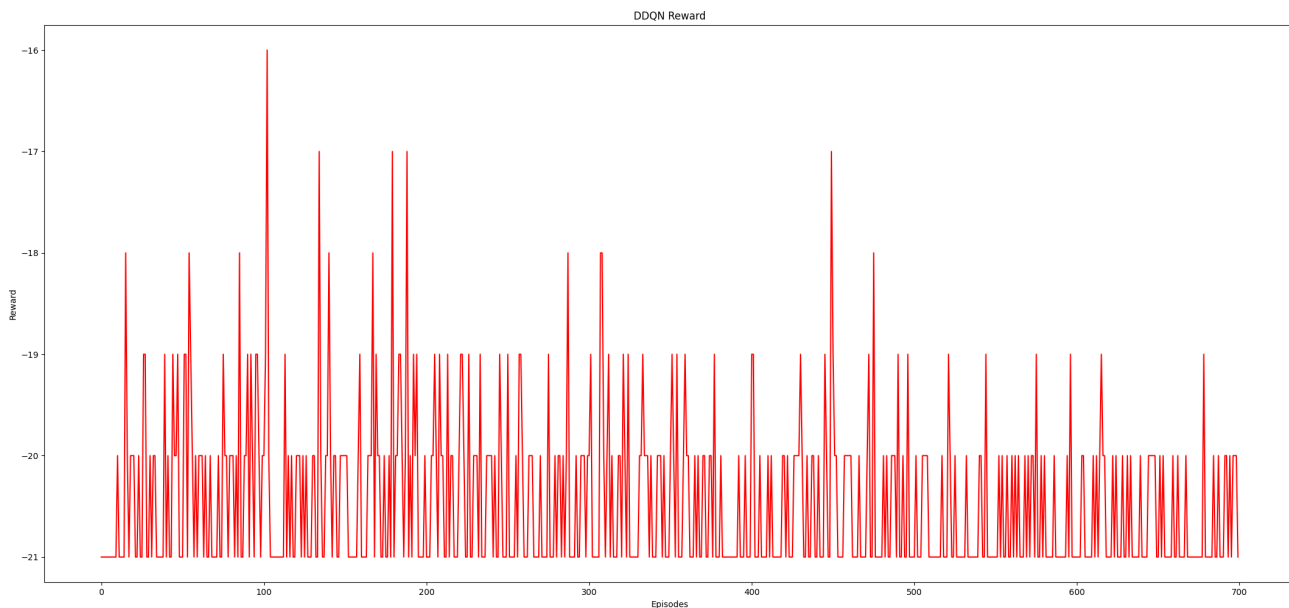


Figure 1 The DDQN episodic reward over the first 700 episodes. It is clear to see that no significant improvements have been made.



Activities Chromium Web Browser MI Jul 21

Atari_on_Colab.ipynb - C x +

colab.research.google.com/drive/1vByqQzdtTgXCzR77YhgXUCwVnwBYfsI#scrollTo=ouCVMjVDBqWP

Atari_on_Colab.ipynb

File Edit View Insert Runtime Tools Help All changes saved

Comment Share

Allocating Editing

Connecting to a runtime to enable file browsing.

Cannot connect to GPU backend

You cannot currently connect to a GPU due to usage limits in Colab. [Learn more](#)

If you are interested in priority access to GPUs and higher usage limits, you may want to check out [Colab Pro](#).

Close Connect without GPU

```
Q loss: 0.000762369932606816
Episode : 711, episodic length : 758, return: -21.0, exp_count : 627155, averaged return over past 100 episodes : -20.65
Q loss: 0.76045087352395e-05
Episode : 712, episodic length : 982, return: -18.0, exp_count : 628138, averaged return over past 100 episodes : -20.63
Episode : 713, episodic length : 849, return: -21.0, exp_count : 628988, averaged return over past 100 episodes : -20.63
Q loss: 0.000526082469150424
Episode : 714, episodic length : 1801, return: -19.0, exp_count : 629998, averaged return over past 100 episodes : -20.62
Q loss: 0.00011913420160820288
Episode : 715, episodic length : 817, return: -21.0, exp_count : 630808, averaged return over past 100 episodes : -20.64
Q loss: 0.41675594449043274
Episode : 716, episodic length : 946, return: -20.0, exp_count : 631755, averaged return over past 100 episodes : -20.64
Q loss: 0.0026993914507329464
Episode : 717, episodic length : 971, return: -19.0, exp_count : 632727, averaged return over past 100 episodes : -20.63
Q loss: 0.00282539171266719
Episode : 718, episodic length : 819, return: -21.0, exp_count : 633547, averaged return over past 100 episodes : -20.63
Q loss: 0.0005067527526989579
Episode : 719, episodic length : 816, return: -21.0, exp_count : 634364, averaged return over past 100 episodes : -20.63
Q loss: 9.580646326139569e-05
Episode : 720, episodic length : 861, return: -20.0, exp_count : 635226, averaged return over past 100 episodes : -20.62
Q loss: 5.584465907304548e-05
Episode : 721, episodic length : 838, return: -20.0, exp_count : 636065, averaged return over past 100 episodes : -20.61
Episode : 722, episodic length : 802, return: -21.0, exp_count : 636868, averaged return over past 100 episodes : -20.62
Q loss: 0.010225153580307996
Episode : 723, episodic length : 759, return: -21.0, exp_count : 637628, averaged return over past 100 episodes : -20.62
Q loss: 0.0009156167507171631
Episode : 724, episodic length : 949, return: -20.0, exp_count : 638578, averaged return over past 100 episodes : -20.62
Q loss: 0.002080251380175352
Episode : 725, episodic length : 800, return: -20.0, exp_count : 639485, averaged return over past 100 episodes : -20.62
Q loss: 0.0002
Episode : 726, episodic length : 800, return: -20.0, exp_count : 640392, averaged return over past 100 episodes : -20.62
Episode : 727, episodic length : 800, return: -20.0, exp_count : 641299, averaged return over past 100 episodes : -20.62
Q loss: 0.0002
Episode : 728, episodic length : 800, return: -20.0, exp_count : 642206, averaged return over past 100 episodes : -20.62
Q loss: 0.0002
Episode : 729, episodic length : 800, return: -20.0, exp_count : 643113, averaged return over past 100 episodes : -20.62
Q loss: 0.0549
Episode : 730, episodic length : 800, return: -20.0, exp_count : 644020, averaged return over past 100 episodes : -20.62
Q loss: 0.0002
Episode : 731, episodic length : 800, return: -20.0, exp_count : 644927, averaged return over past 100 episodes : -20.62
Episode : 732, episodic length : 757, return: -21.0, exp_count : 644985, averaged return over past 100 episodes : -20.62
Q loss: 0.011278446702837944
Episode : 733, episodic length : 817, return: -21.0, exp_count : 645803, averaged return over past 100 episodes : -20.63
Q loss: 0.00029820523923262954
Episode : 734, episodic length : 864, return: -20.0, exp_count : 646668, averaged return over past 100 episodes : -20.62
Q loss: 0.73122044140473e-05
Episode : 735, episodic length : 782, return: -21.0, exp_count : 647451, averaged return over past 100 episodes : -20.62
Q loss: 0.0001281595832196482
Episode : 736, episodic length : 988, return: -21.0, exp_count : 648360, averaged return over past 100 episodes : -20.62
Q loss: 0.0003988404350820929
Episode : 737, episodic length : 942, return: -21.0, exp_count : 649303, averaged return over past 100 episodes : -20.62
Q loss: 0.0007426177617162466
Episode : 738, episodic length : 876, return: -21.0, exp_count : 650180, averaged return over past 100 episodes : -20.62
Episode : 739, episodic length : 817, return: -21.0, exp_count : 650998, averaged return over past 100 episodes : -20.63
Q loss: 0.00041710655204951763
Episode : 740, episodic length : 890, return: -20.0, exp_count : 651889, averaged return over past 100 episodes : -20.62
Q loss: 0.2606852650642395
Episode : 741, episodic length : 992, return: -20.0, exp_count : 652882, averaged return over past 100 episodes : -20.61
```

2h 49m 0s completed at 6:55 PM

Figure 2 Colab disconnected after 741 Episodes due to GPU usage limits.