REINFORCEMENT LEARNING ALGORITHMS IN THE COMPUTER GAME FLAPPY BIRD

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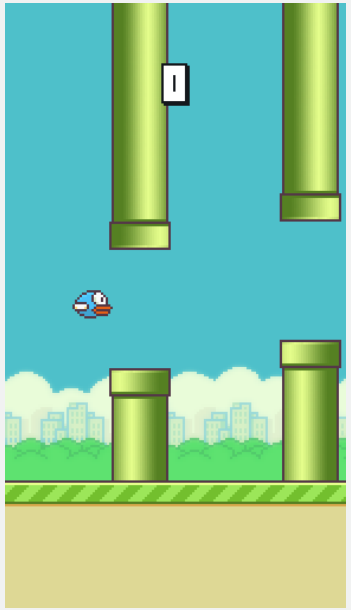

An example of the game configuration of the game Flappy Bird.

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Motivation

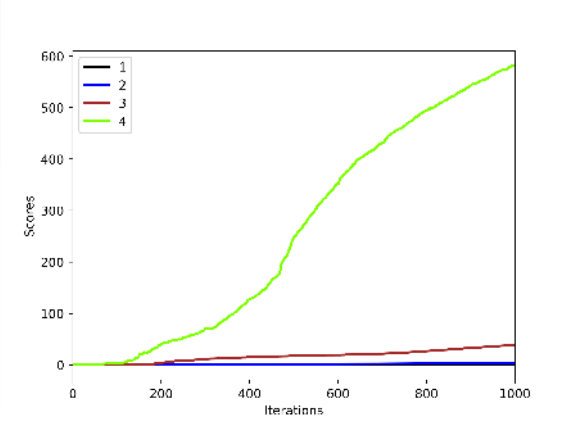
Nowadays, machine learning and **artificial intelligence** have become very attractive because of its ability to provide an almost optimal solution to problems where searching for the optimal solution would take too long (or is even not possible).

In the thesis, results of testing different **reinforcement learning** algorithms and their setups are done on the well-known computer game **Flappy Bird**.

Results

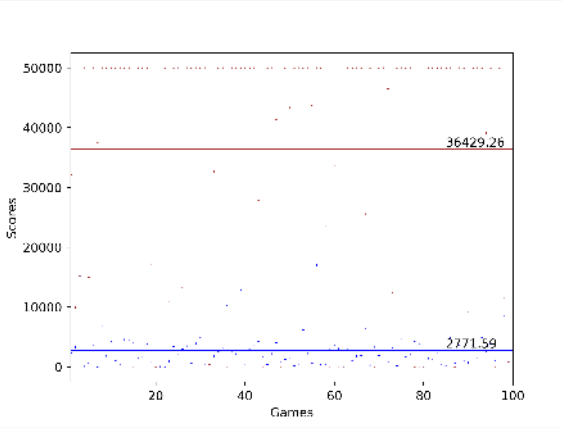
***k*-future rewards policy** is meant to maximize not only the actual state values for all the actions (default in Q-learning) but sum up Q-values of all possibilities in depth *k* and pick the best action with the greatest summed value.

The results for *k* with the values of 1, 2, 3 and 4 are shown in the following figure.



One can see how taking into account more future states decrease learning time.

In the next figure, one can see a **comparison** of the average scores of a **Q-learning** instance comparing to a **Deep Q-Learning** instance played on the same 100 games. Individual games are presented as brown dots for Deep Q-learning and as blue dots for Q-learning.



Conclusion

Applications of the algorithms with the designed improvements are very wide. Implementing such algorithms could help in **robot navigating**, **business management**, **computer vision**, **language processing**, etc.

References

1. Mnih et al. *Playing atari with deep reinforcement learning*. 2013
2. Li. *Deep reinforcement learning: An overview. 2017*