Paper to reproduce results:

*Playing Atari with Deep Reinforcement Learning*: <https://arxiv.org/pdf/1312.5602.pdf>

Tools/Libraries:

* Python (for data preprocessing and post processing)
* Tensorflow 2.0 + Keras (for the overall model definition + training pipeline + model deployment)
* OpenAI Gym (for I/O with Pong)

Other sources of help I’m receiving from:

*Deep reinforcement learning: Pong from pixels*: <http://karpathy.github.io/2016/05/31/rl/>

*Reinforcement Q-Learning from scratch in python with OpenAI Gym:* <https://www.learndatasci.com/tutorials/reinforcement-q-learning-scratch-python-openai-gym/>

The original paper implemented a deep reinforcement learning model that mastered seven popular ATARI games, *Beam, Rider, Breakout, Enduro,* ***Pong****, Q\*bert, Seaquest, Space invaders*. For the sake of demonstrating the performance of reinforcement learning and simplicity, I will be reproducing their work only on the game ***Pong***.

The model is a deep reinforcement learning model that learns to play ***Pong*** by taking inputs at pixel level. The overall model consists of two primary modules:

1. The policy network which interprets the state of the game at pixel level. The policy network will be defined as blocks of fully connected neural nets (FCNN), taking inputs from raw pixel level and outputs the actions corresponding to the current frame.
2. The reward function which determines the outcome of the given action and calculates the policy gradient used for training the network. The result of game can be obtained through interactions with OpenAI Gym’s ATARI 2600 Pong.

The project will be written in the combination of Tensorflow/Keras on Python. All data preprocessing and post processing will be done in Python. OpenAI gym will be responsible for the interactions of our agent with the game.