Take me home

Land the space ship at target pad

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Problem Statement

Space ship starts at top center with random initial force applied. It needs to be landed between the flags (home) using three engines.

Data : open ai gym

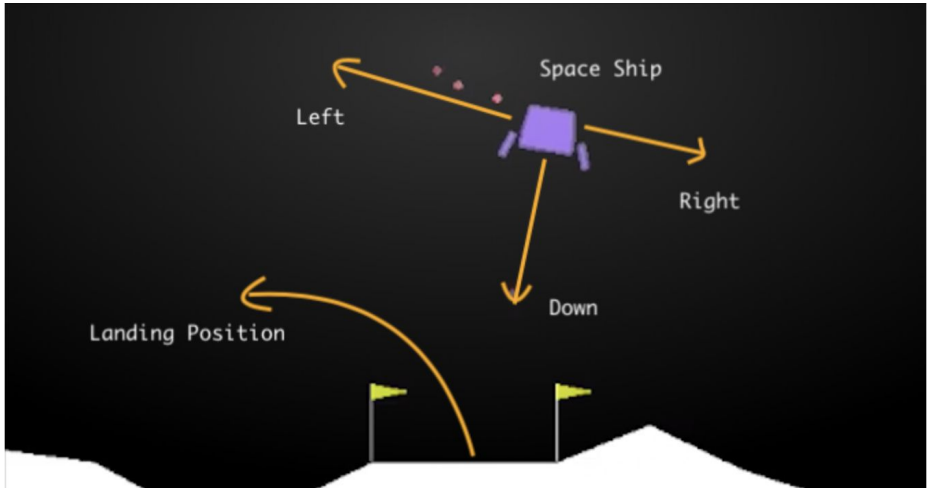


Figure source

Solution

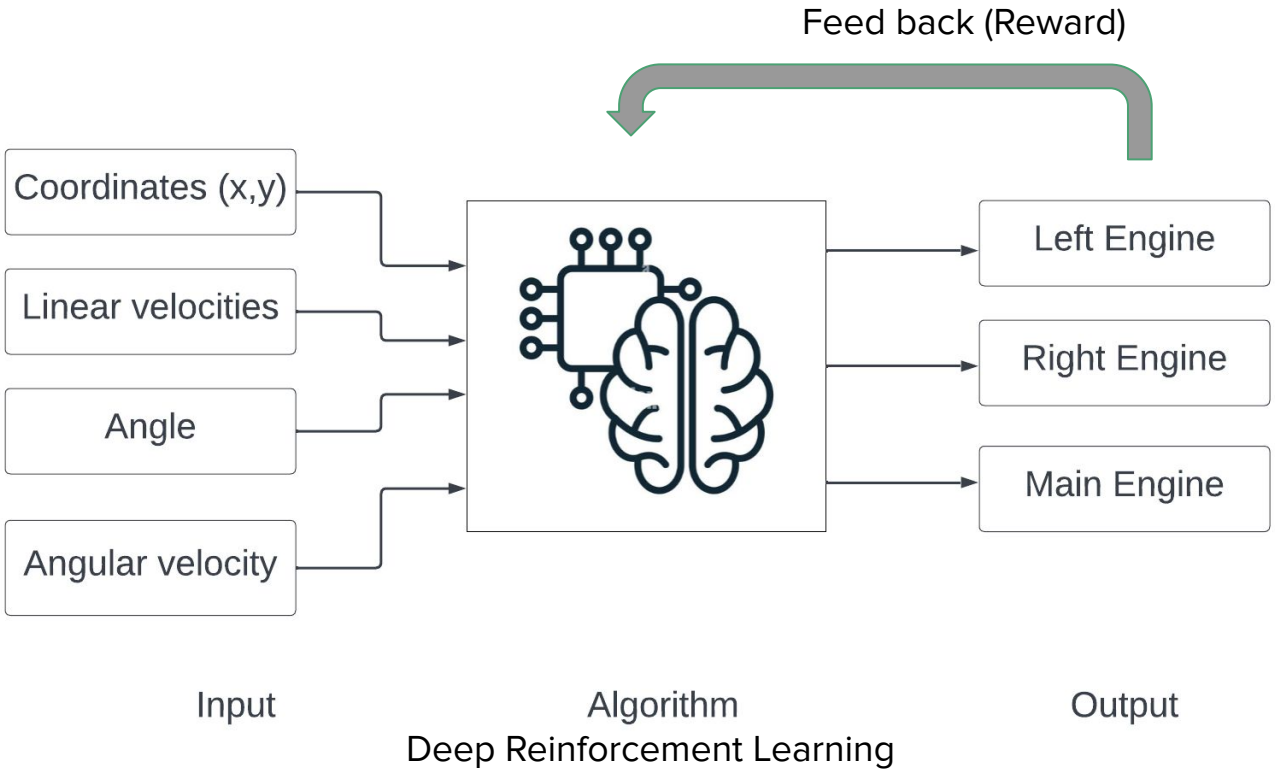


Figure source

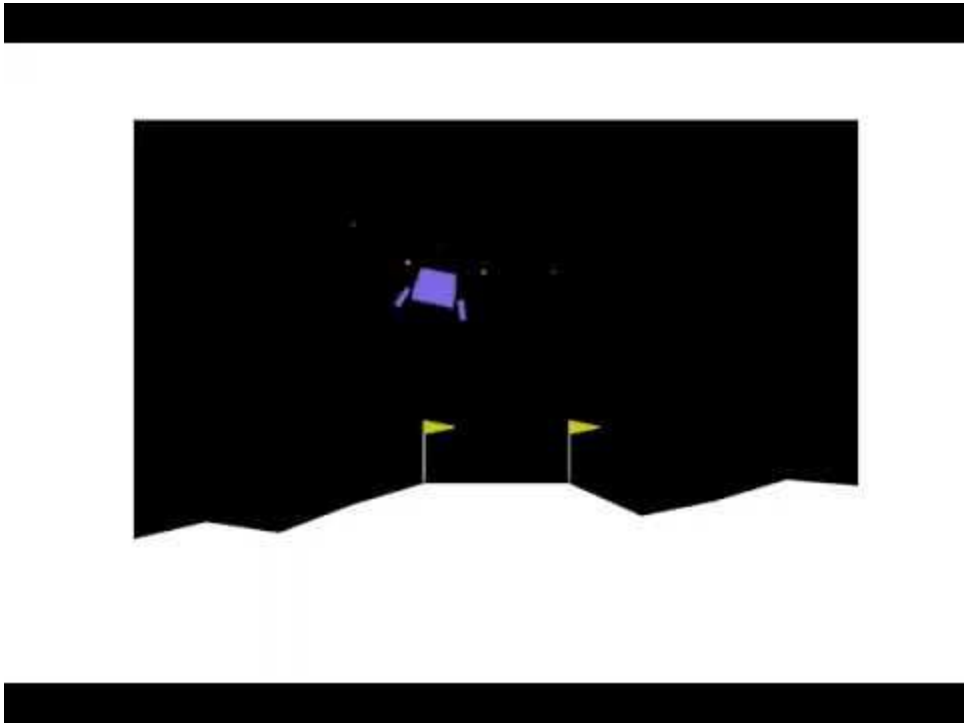
Deep Q learning Algorithm

Algorithm 1 Double Q-learning

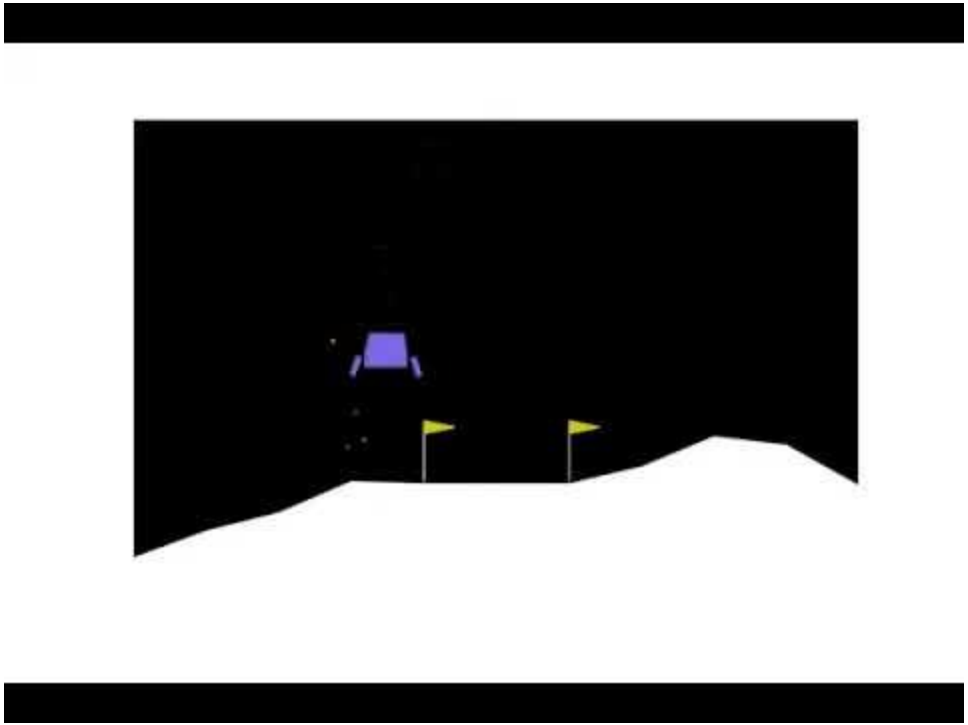
Initialize Q^A,Q^B,s
repeat
  Choose a, based on $Q^A(s,\cdot)$ and $Q^B(s,\cdot)$, observe r, s'
  Choose (e.g. random) either UPDATE(A) or UPDATE(B)
  if UPDATE(A) **then**
    Define $a^* = \arg\max_a Q^A(s',a)$
    $Q^A(s,a) \leftarrow Q^A(s,a) + \alpha(s,a)\left(r + \gamma Q^B(s',a^*) - Q^A(s,a)\right)$
  else if UPDATE(B) **then**
    Define $b^* = \arg\max_a Q^B(s',a)$
    $Q^B(s,a) \leftarrow Q^B(s,a) + \alpha(s,a)(r + \gamma Q^A(s',b^*) - Q^B(s,a))$
  end if
  $s \leftarrow s'$
until end

Pseudo-code Source: "Double Q-learning" (Hasselt, 2010)

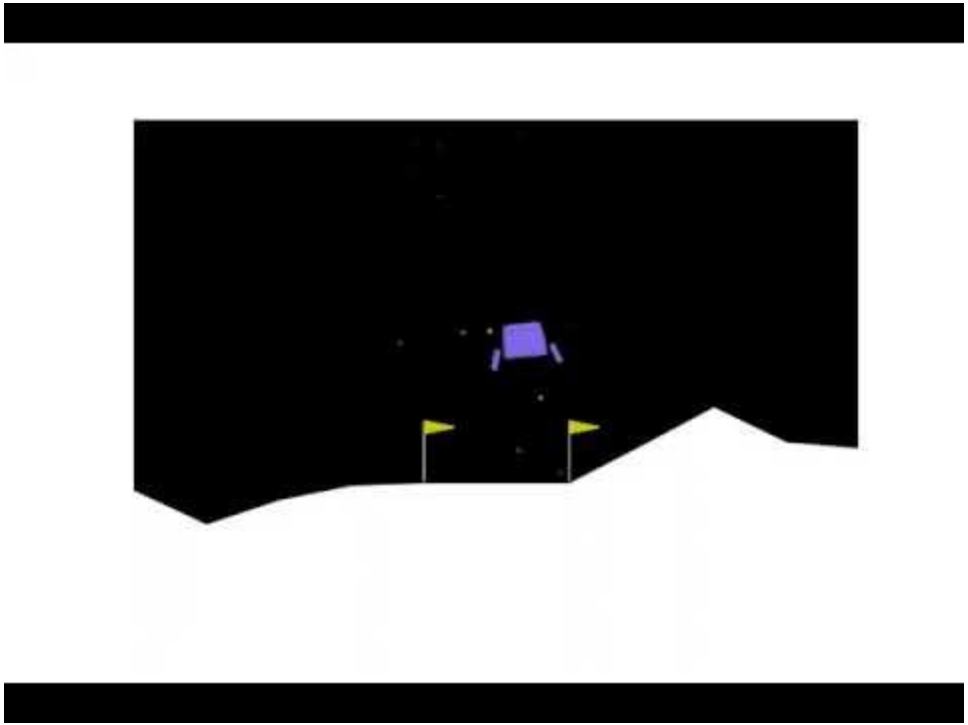
Naive Agent



Moderately trained Agent



Fully Trained Agent



Comparison of Training Progression :