

# Profit Maximisation of Deforestation based on Reinforcement Learning

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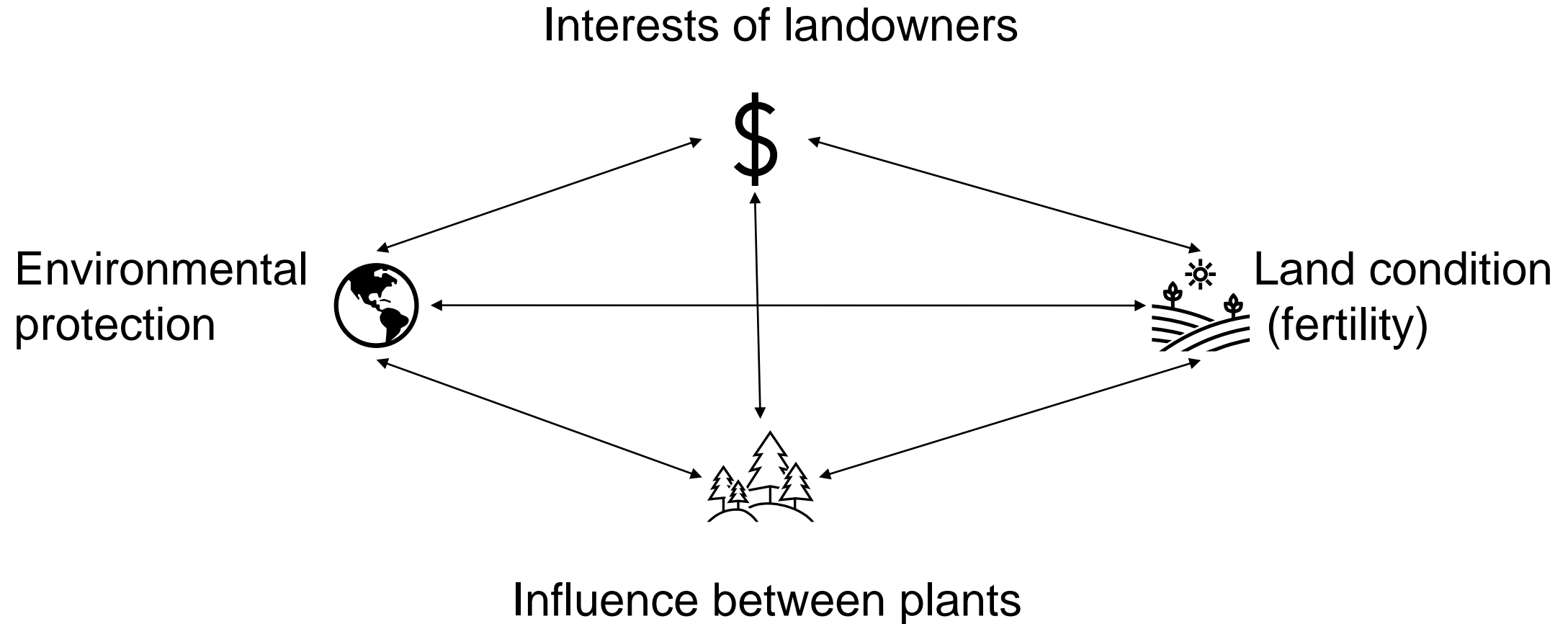
# Problem caused by Deforestation



every year more than 10,000 kilometers of forest are deforested  
0.5 billion metric tons of carbon per year

- Action\_space
  - Observation\_space
  - The complexity
- 
- Reward\_Timber
  - Reward\_GHG
  - Fertility





**reward(weighted)=**

$reward\_timber * WEIGHT\_TIMBER + Reward\_greenhouse\_gas$   
 $*WEIGHT\_GREENHOUSE\_GAS$

$WEIGHT\_TIMBER=0.5$

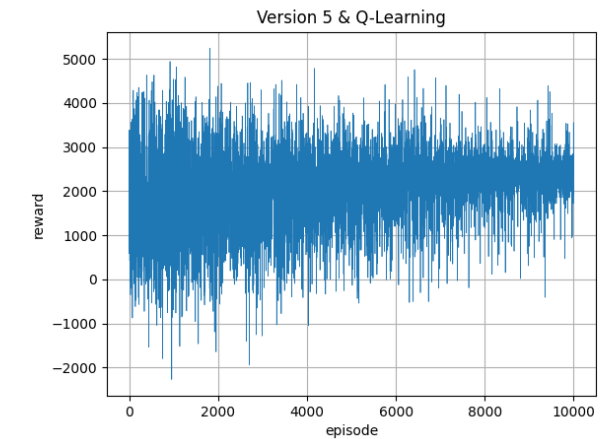
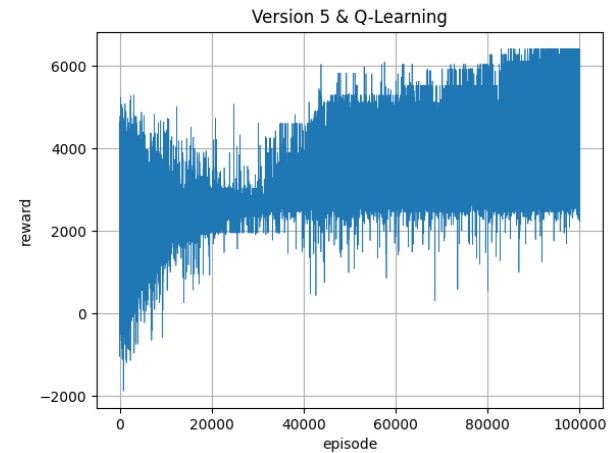
$WEIGHT\_GREENHOUSE\_GAS=0.01$

$value\_of\_tree\_fn = \lambda x: 0 \text{ if } x == -1 \text{ else } \pi * ((0.5 * x) ** 2)$

$value\_of\_greenhouse\_gas\_uptake\_fn = \lambda x: 0 \text{ if } x == -1 \text{ else } (x * 5)$

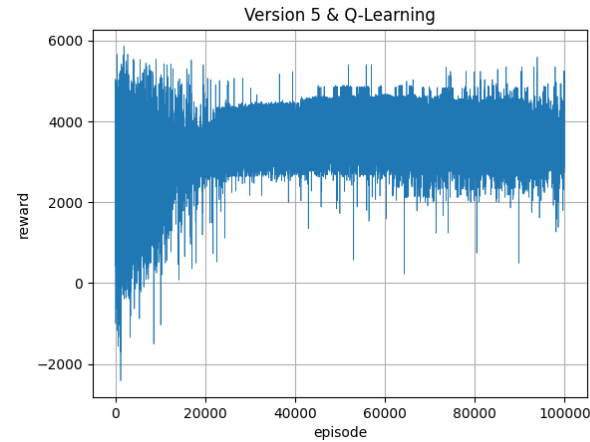
age	timber	greenhouse gas	weighted Timber	weighted Greenhouse gas	sum reward
1	0.785	5	0.785	0.5	1.285
2	3.14	10	3.14	1	4.14
3	7.065	15	7.065	1.5	8.565
4	12.56	20	12.56	2	14.56
5	19.625	25	19.625	2.5	22.125
6	28.26	30	28.26	3	31.26
7	38.465	35	38.465	3.5	41.965

WEIGHT\_TIMBER  
WEIGHT\_GREENHOUSE\_GAS  
MAX\_FERTILITY  
MINIMUM\_REQ\_GHG\_10  
MINIMUM\_REQ\_TIMBER\_1  
RANDOM\_SEED

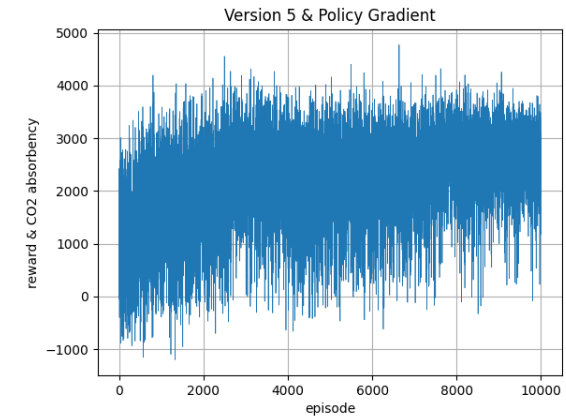




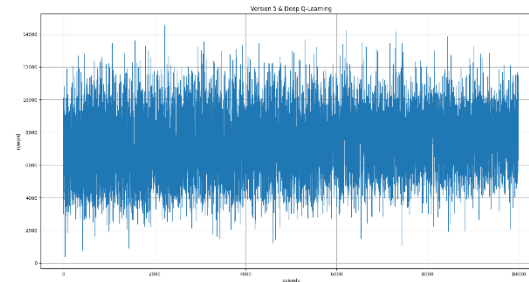
1. Random test
2. Q-Learning
3. DQN
4. Policy Gradient



Q-learning



Policy Gradient



DQN

1. Coding: version 1, version 1.2 and version 2
2. Docstring
3. Parameters Adjusting
4. Documentation(part):
  - Experimental Reproducibility and Generalization
  - Reporting



# Thank you for attention!

