

Profit Maximisation of Deforestation based on Reinforcement Learning

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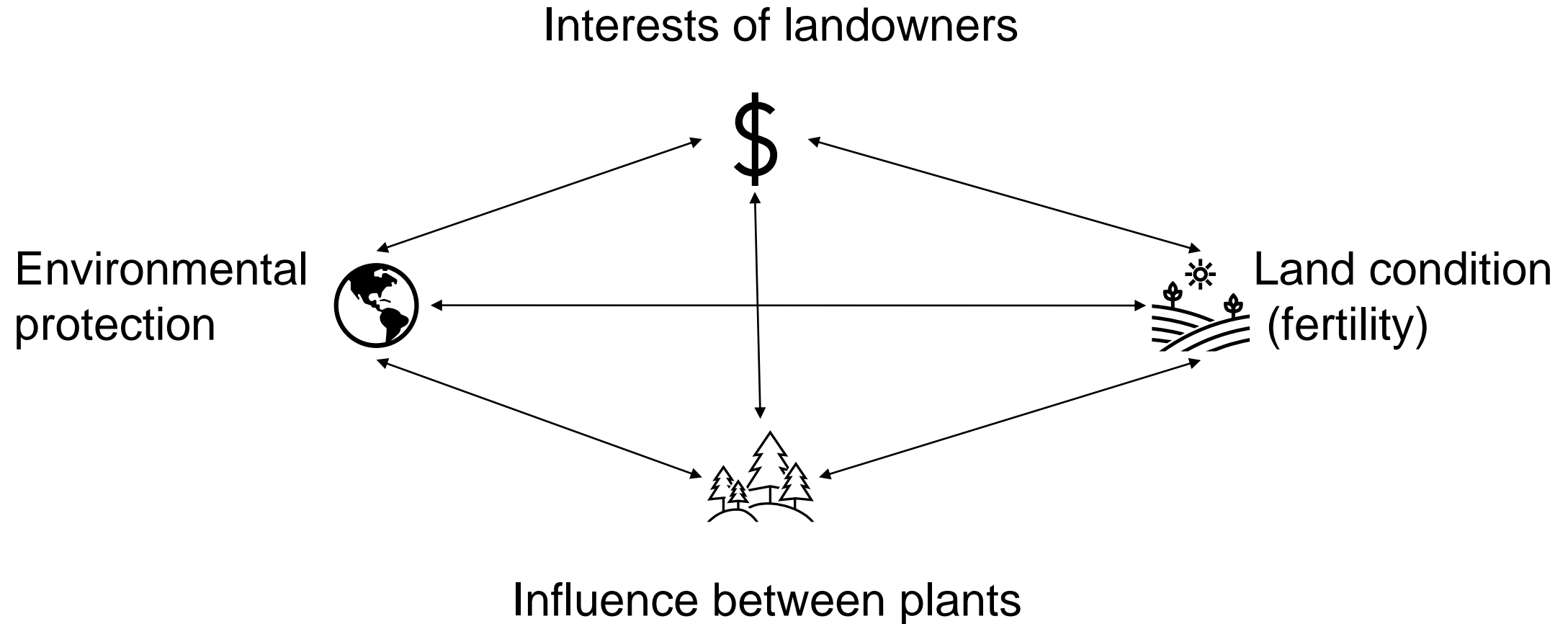
Problem caused by Deforestation



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)=

$\text{reward_timber} * \text{WEIGHT_TIMBER} + \text{Reward_greenhouse_gas}$
 $* \text{WEIGHT_GREENHOUSE_GAS}$

$\text{WEIGHT_TIMBER} = 0.5$

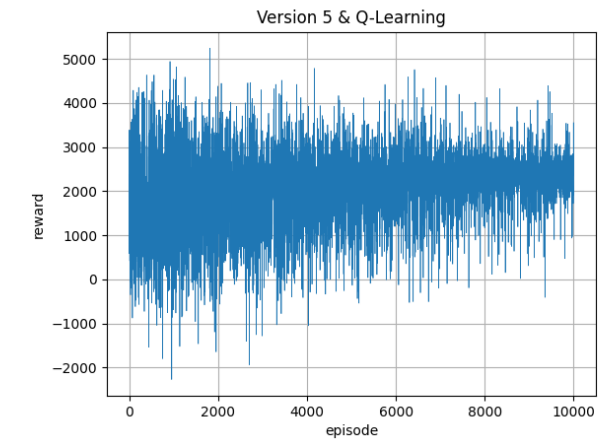
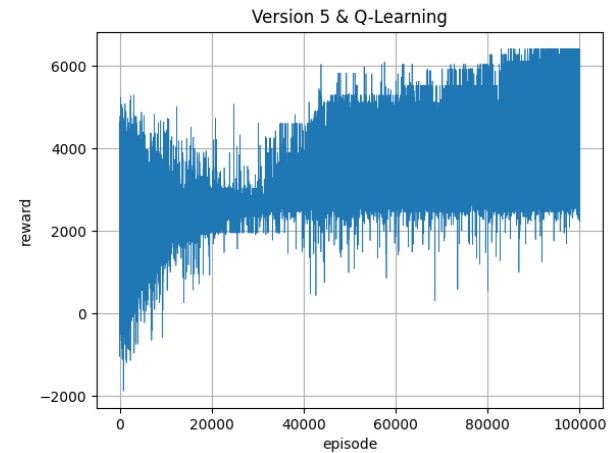
$\text{WEIGHT_GREENHOUSE_GAS} = 0.01$

$\text{value_of_tree_fn} = \text{lambda } x: 0 \text{ if } x == -1 \text{ else } \text{math.pi} * ((0.5 * x) ** 2)$

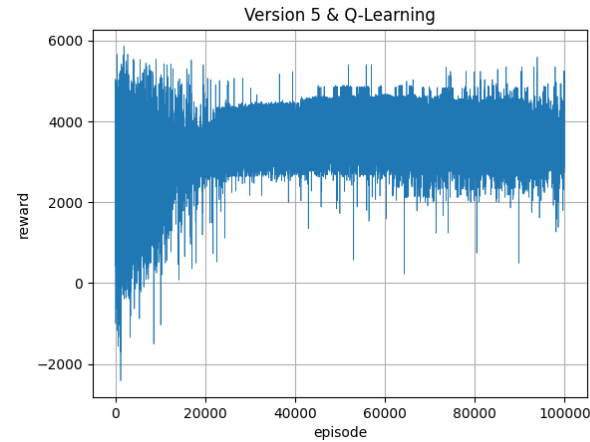
$\text{value_of_greenhouse_gas_uptake_fn} = \text{lambda } x: 0 \text{ if } x == -1 \text{ else } (x * 5)$

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

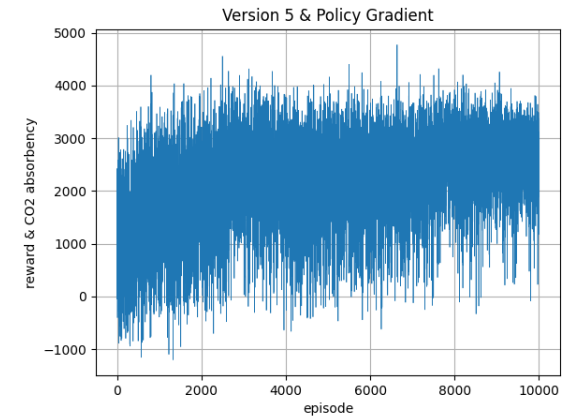
WEIGHT_TIMBER
WEIGHT_GREENHOUSE_GAS
MAX_FERTILITY
MINIMUM_REQ_GHG_10
MINIMUM_REQ_TIMBER_1
RANDOM_SEED



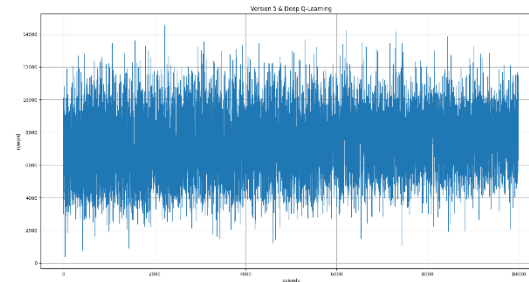
1. Random test
2. Q-Learning
3. DQN
4. Policy Gradient



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!

