SNS COLLEGE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION

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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

MACHINE LEARNING FOR CIVIL ENGINEERS

II YEAR / IV SEMESTER

Unit 4 : Reinforced Learning

Topic 1 : Introduction to Reinforced Learning

Introduction

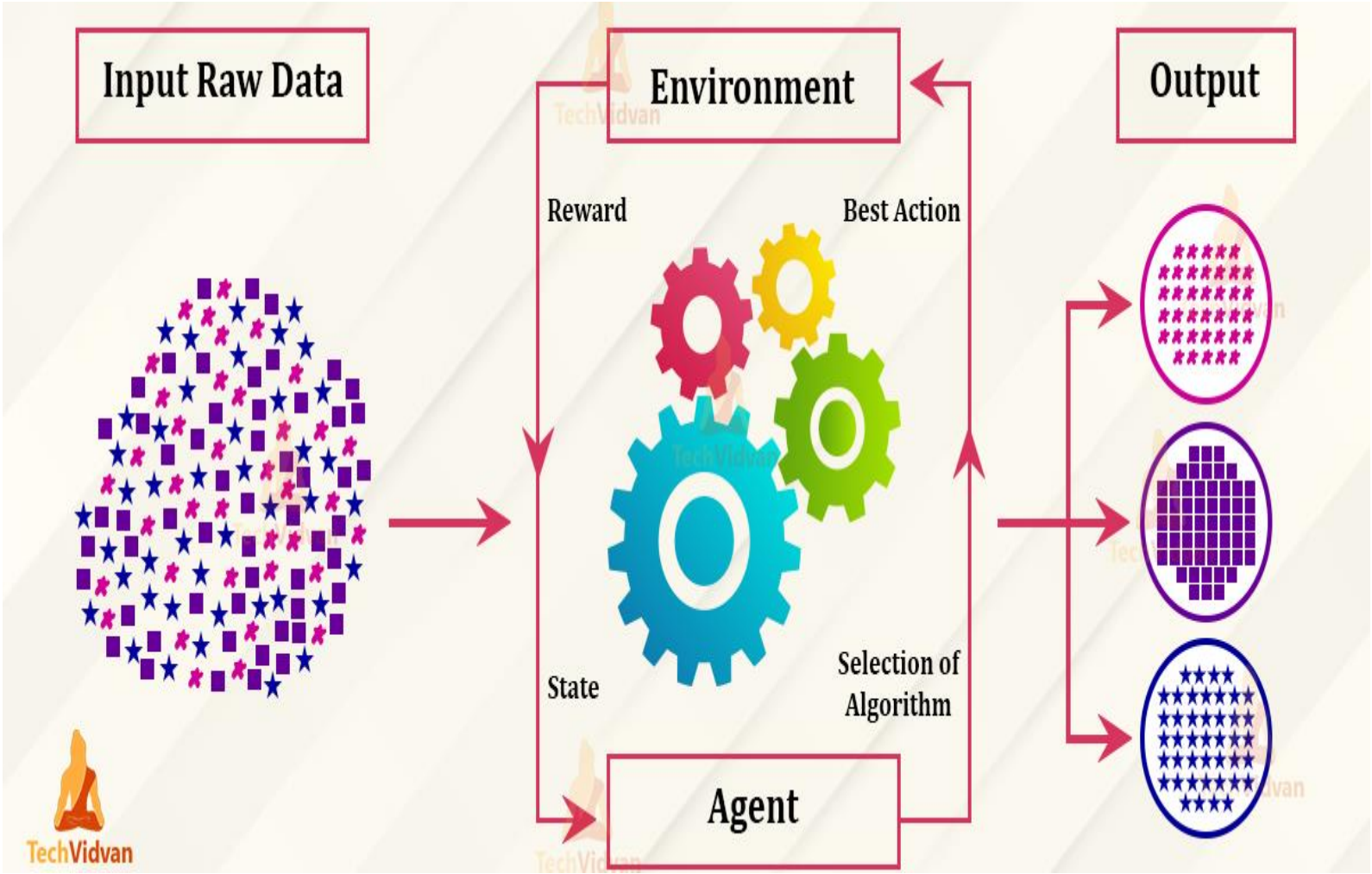
- Close to human learning.
- Algorithm learns a policy of how to act in a given environment.
- Every action has some impact in the environment, and the environment provides rewards that guides the learning algorithm

Reinforcement Learning

- Teacher: training data
- The teacher scores the performance of the training examples
- Use performance score to shuffle weights randomly
- Relatively slow learning due to randomness

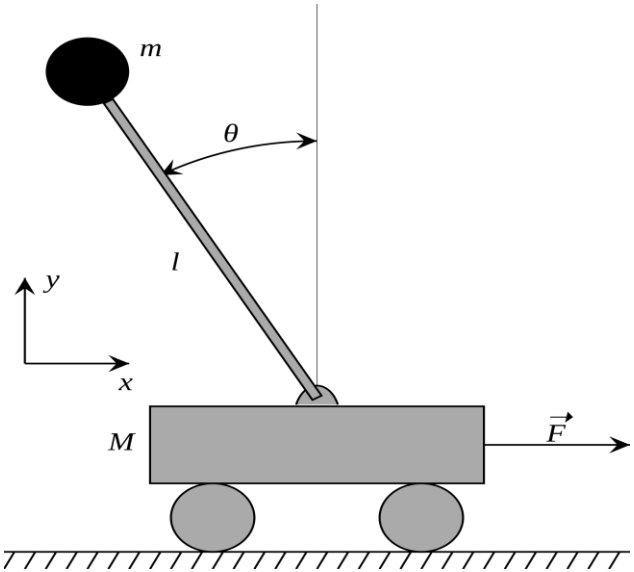
Reinforcement Learning

- Reinforcement learning is the problem faced by an agent that learns behavior through trial-and-error interactions with a dynamic environment.
- Reinforcement Learning is learning how to act in order to maximize a numerical reward.
- Reinforcement learning is not a type of neural network, nor is it an alternative to neural networks. Rather, it is an orthogonal approach for Learning Machine.
- Reinforcement learning emphasizes learning feedback that evaluates the learner's performance without providing standards of correctness in the of behavioral targets.
- Example: Bicycle learning


Input Raw Data
Environment
Output
Reward
Best Action
State
Selection of Algorithm
Agent
TechVidvan

RL - ILLUSTRATIONS

Cart Pole Problem



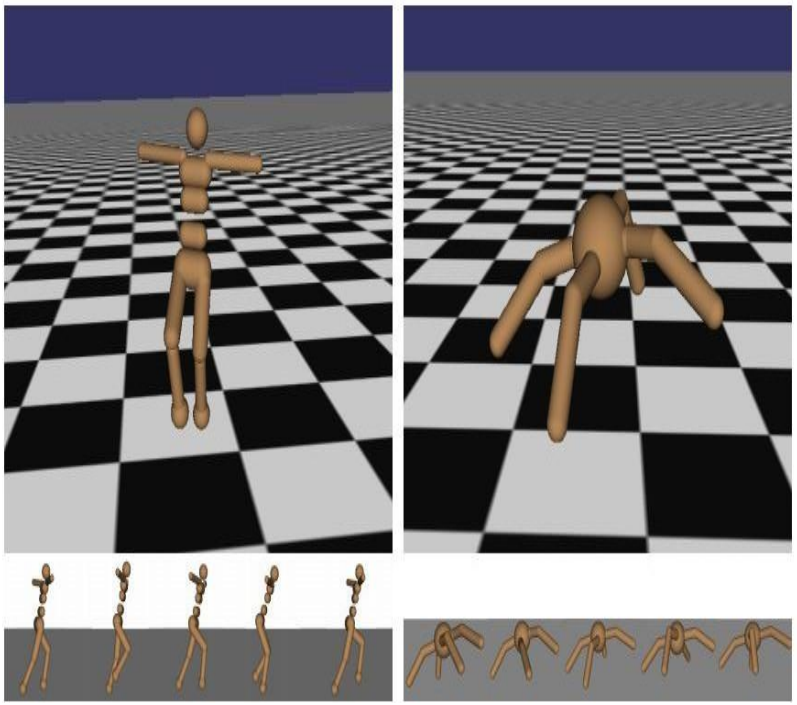
Objective: Balance a pole on top of a movable cart

State: angle, angular speed, position, horizontal velocity

Action: horizontal force applied on the cart

Reward: 1 at each time step if the pole is upright

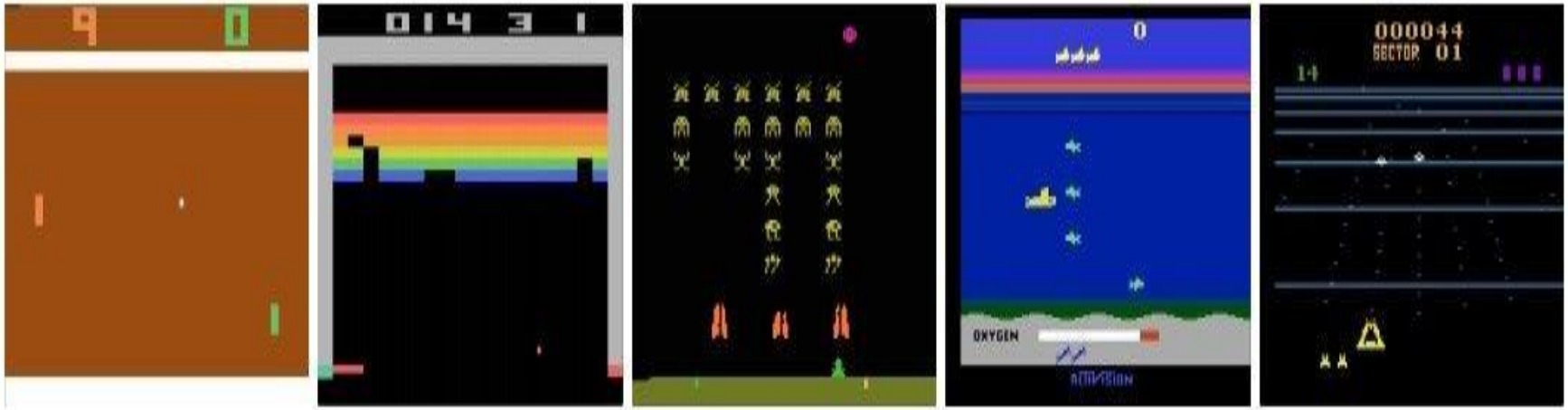
Robot Locomotion



Objective: Make the robot move forward

State: Angle and position of the joints Action: Torques applied on joints Reward: 1 at each time step upright + forward movement

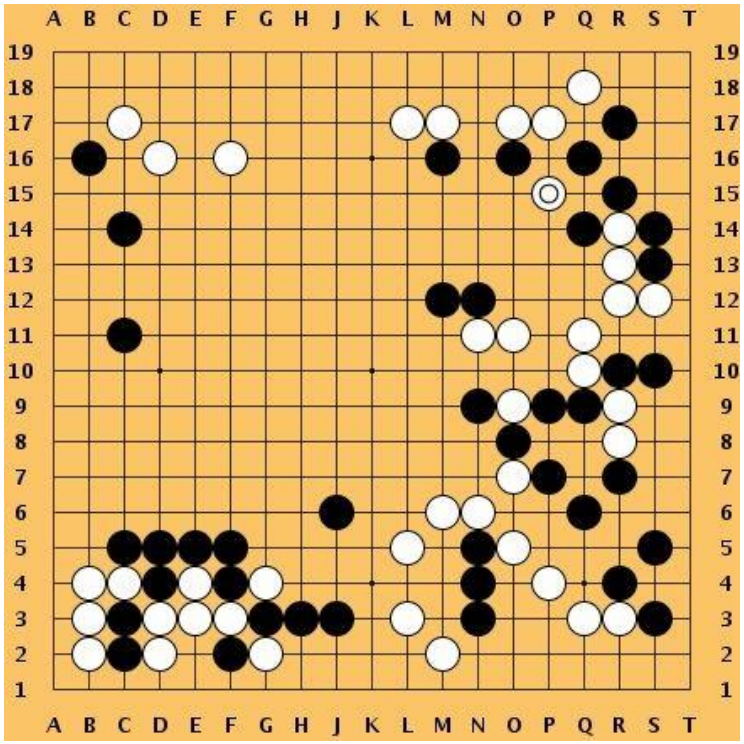
Atari Games



Objective: Complete the game with the highest score

State: Raw pixel inputs of the game state
Action: Game controls e.g. Left, Right, Up, Down
Reward: Score increase/decrease at each time step

Go



Objective: Win the game!

State: Position of all pieces
Action: Where to put the next piece down
Reward: 1 if win at the end of the game, 0 otherwise

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Thank You!!