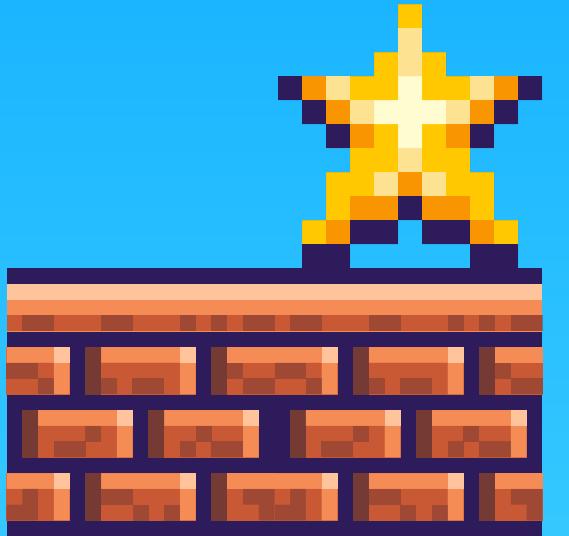


SUPER MARIO BROS

PROGETTO IA



INDICE

Ci sono 6 diversi tipi di gioco!

Problema

Workflow

Implementazione

Analisi dei
Dati

Problemi
Riscontrati

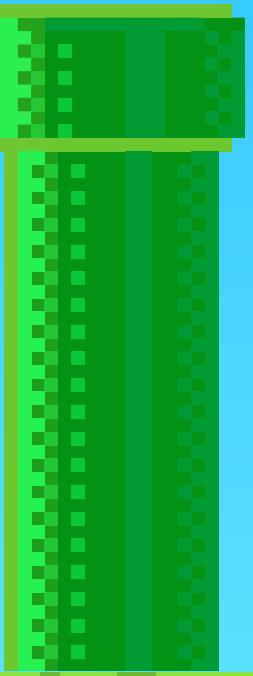
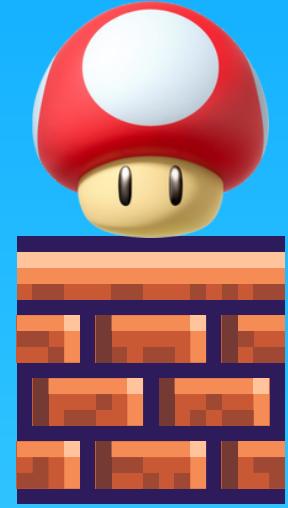
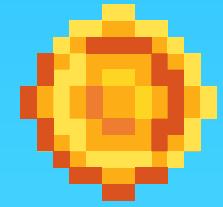
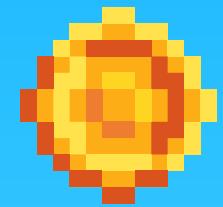
Disponibilità
dei Dati



PROBLEMA

Sviluppo di un agente
intelligente per il gioco
Super Mario Bros

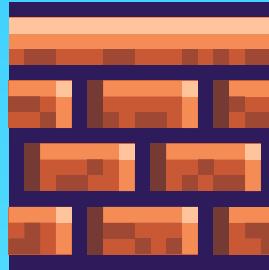
Q-learning vs SARSA



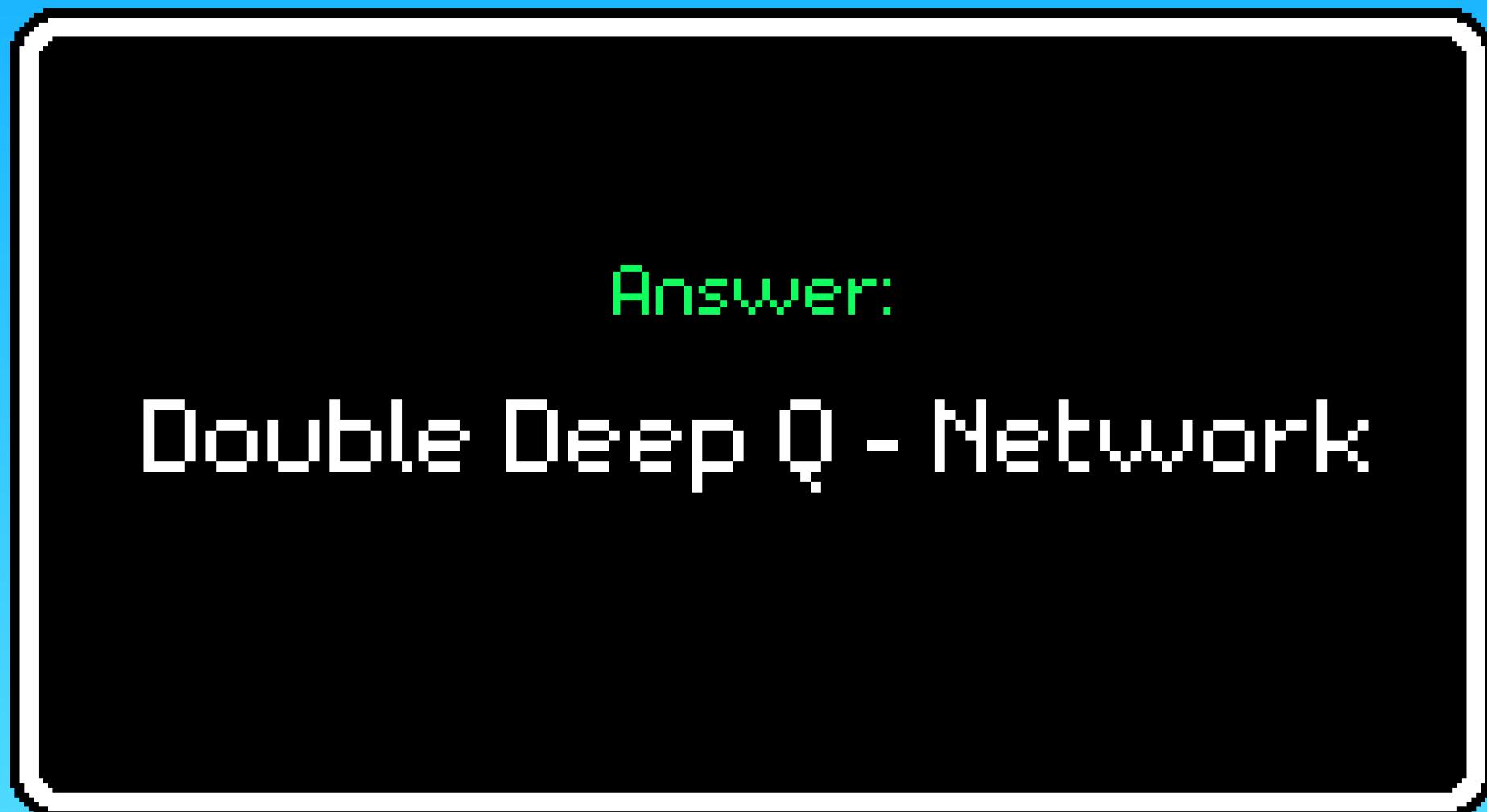
PROBLEMA

Benchmarking di alcuni algoritmi di RL

- Q - Learning classico
- Double Q - Learning
- Deep Q - Network
- Double Deep Q - Network



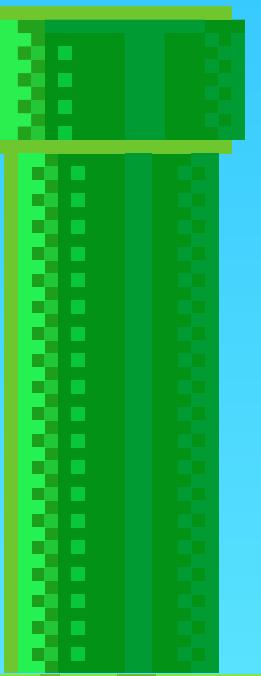
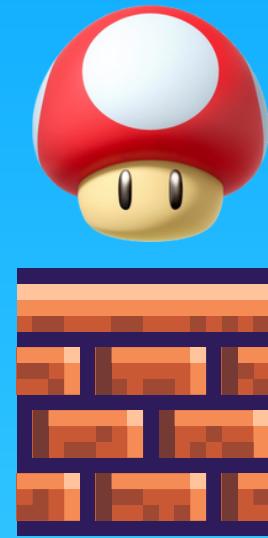
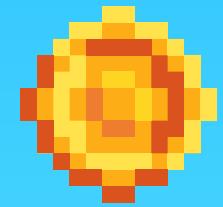
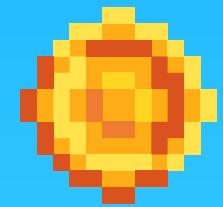
PROBLEMA



WORKFLOW

Completere il primo
livello del gioco

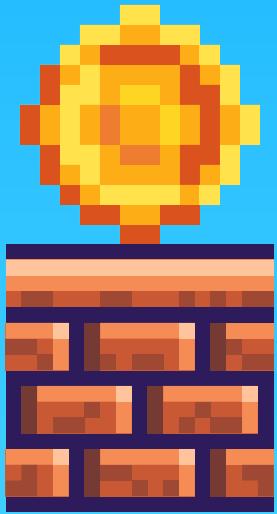
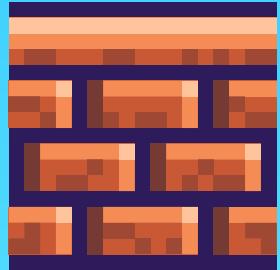
Ricompense e Penalità



WORKFLOW

Gym-super-mario-bros

- RIGHT_ONLY
- SIMPLE_MOVEMENT
- COMPLEX_MOVEMENT



WORKFLOW



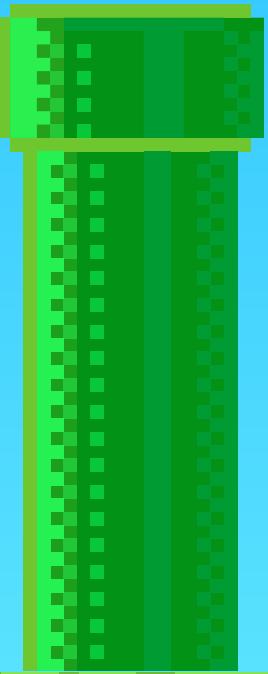
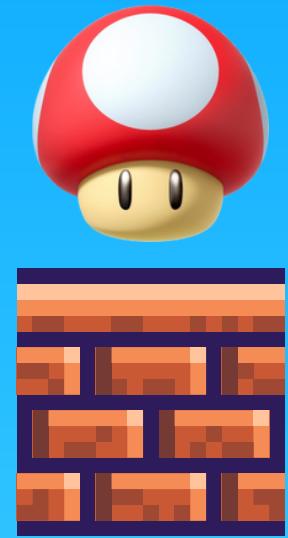
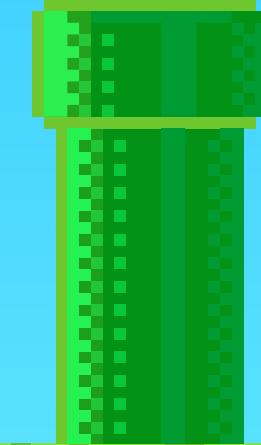
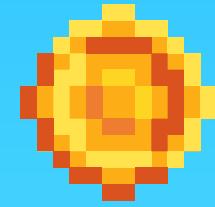
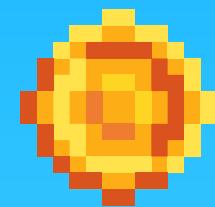
Ricompense	
• time:	- 0.1
• death:	- 100
• extra-life:	+ 100
• mushroom:	+ 20
• flower:	+ 25
• mushroom-hit:	- 10
• flower-hit:	- 15
• coin:	+ 15
• score:	+ 15
• victory:	+ 1000



PROBLEMI RISCONTRATI

Prestazioni del
Q - Learning

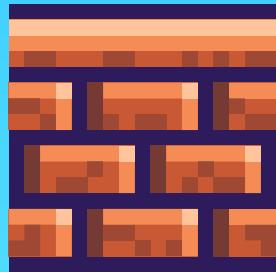
Tempo di esecuzione



PROBLEMI RISCONTRATI

Prestazioni del
Q - Learning

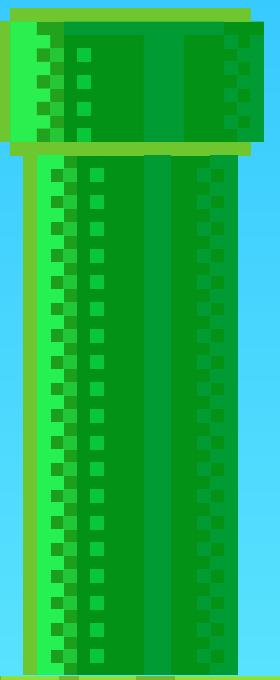
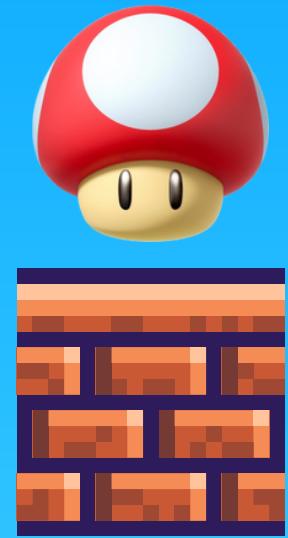
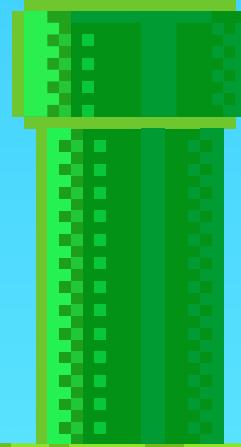
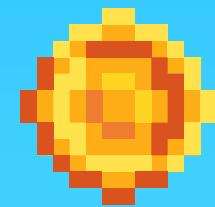
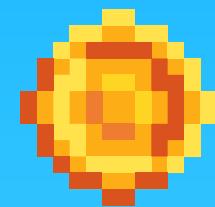
Lento apprendimento



PROBLEMI RISCONTRATI

Prestazioni del
Q - Learning

Livello mai completato



PROBLEMI RISCONTRATI

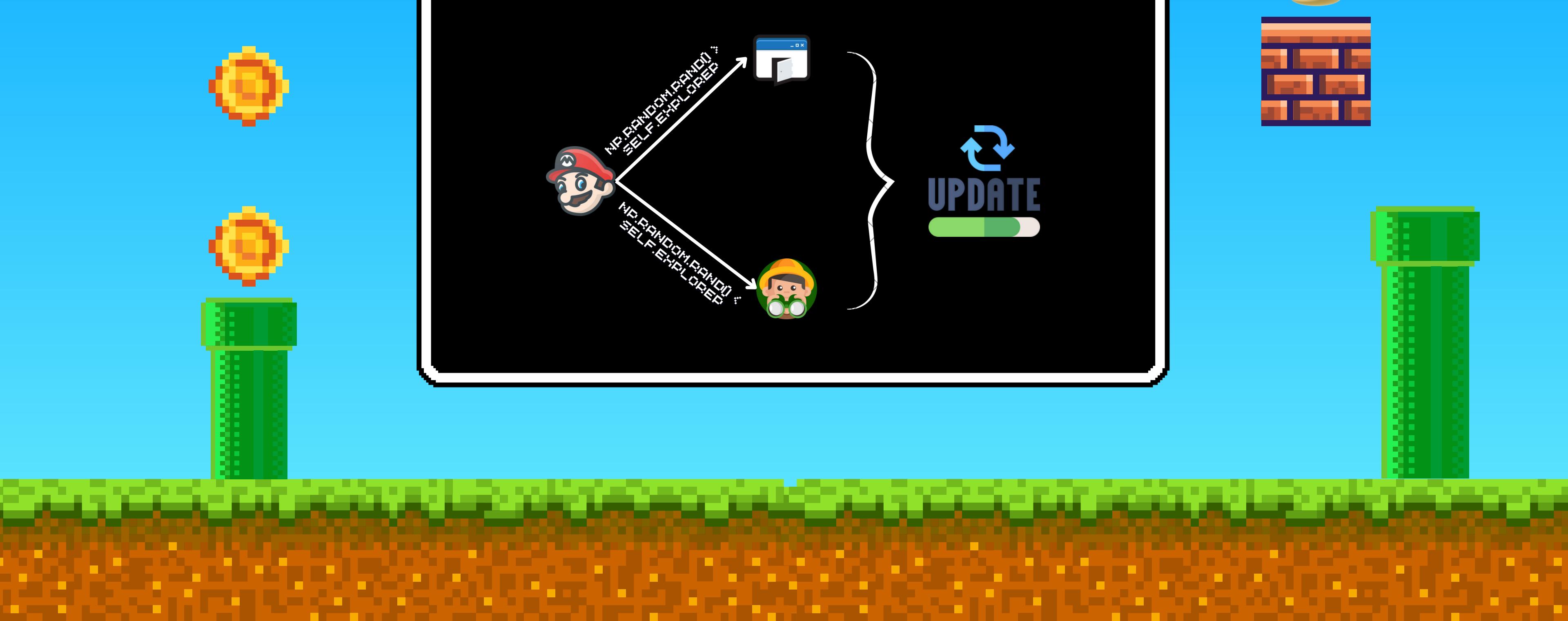
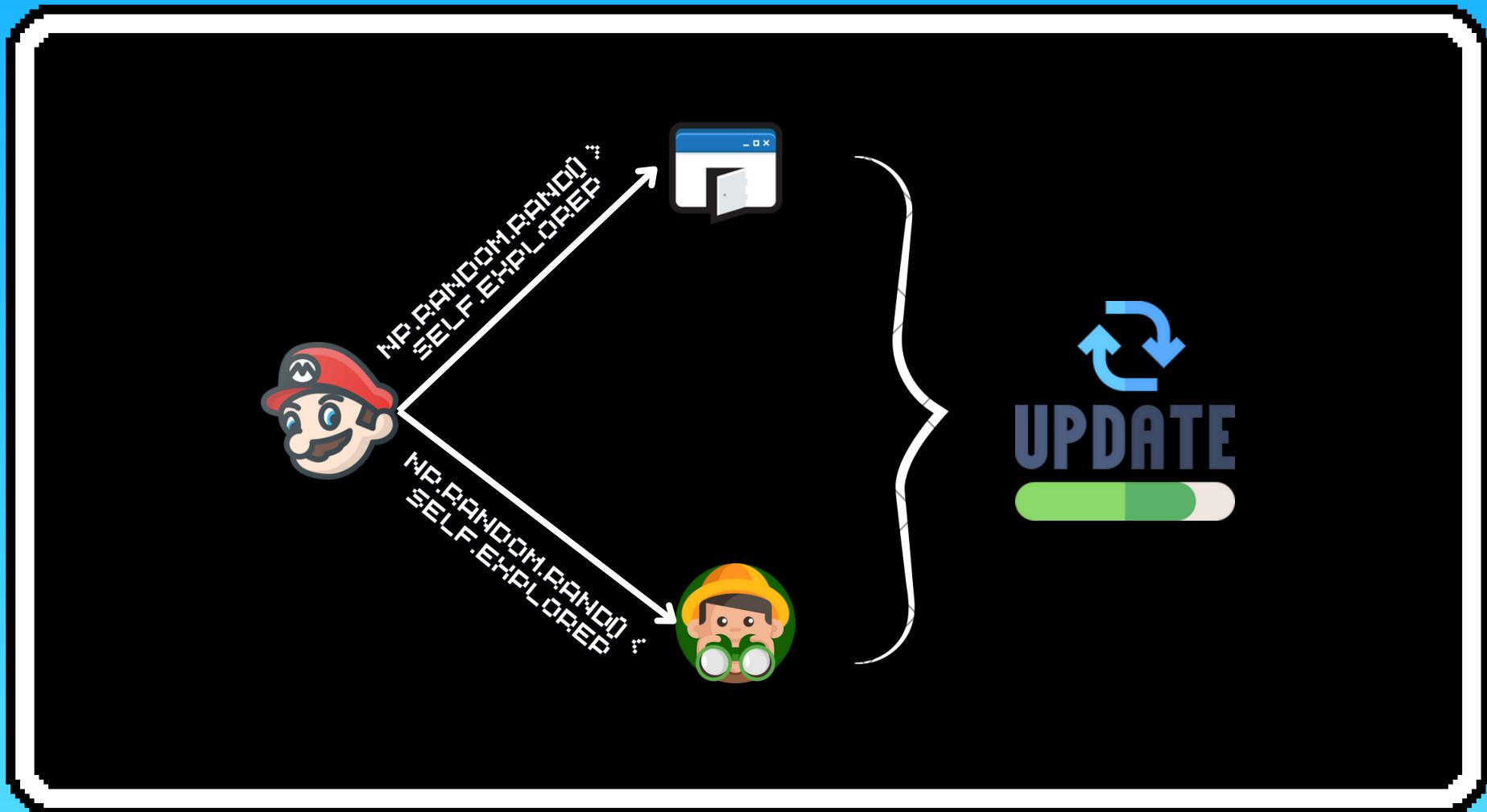
Soluzioni al nostro
problema:

Rete Neurale



IMPLEMENTAZIONE

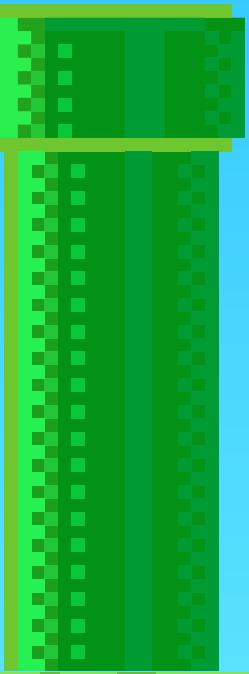
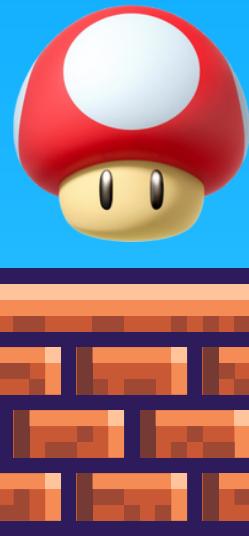
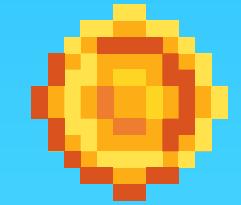
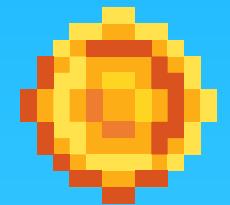
Q-LEARNING



IMPLEMENTAZIONE

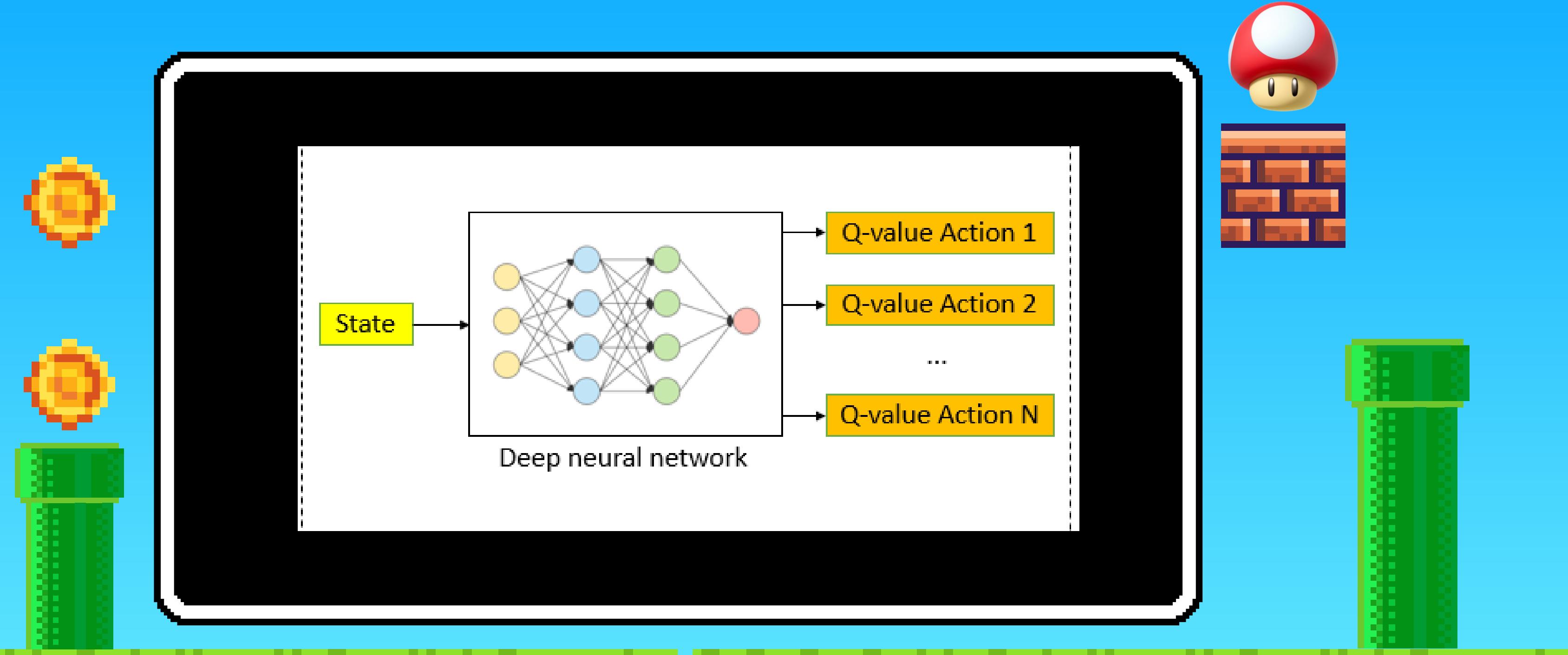
DOUBLE Q-LEARNING

VA A MITIGARE IL PROBLEMA DELLA SOVRASTIMA E SOTTOSTIMA RISPETTO AL Q-LEARNING TRADIZIONALE DATO CHE VA AD UTILIZZARE DUE TABELLE SEPARATE PER STIMARE I VALORI DI Q.



IMPLEMENTAZIONE

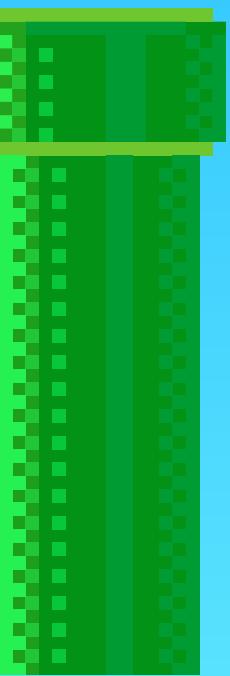
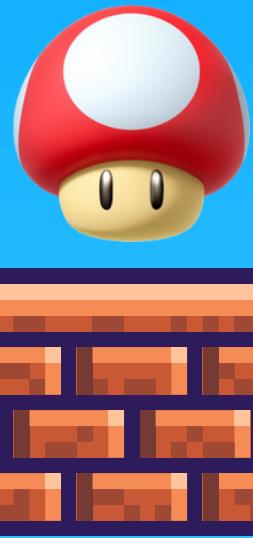
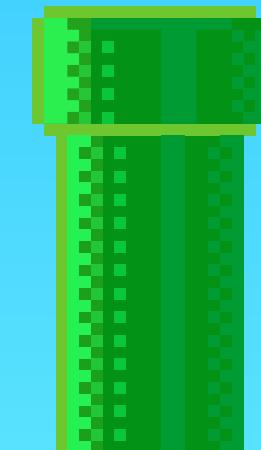
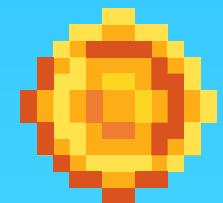
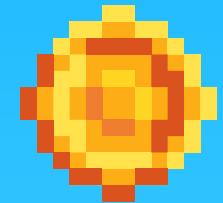
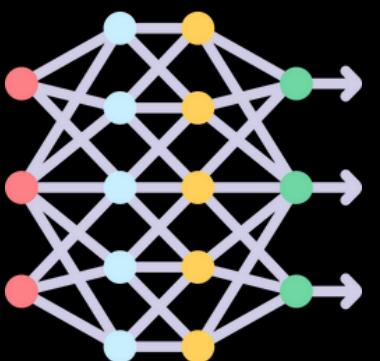
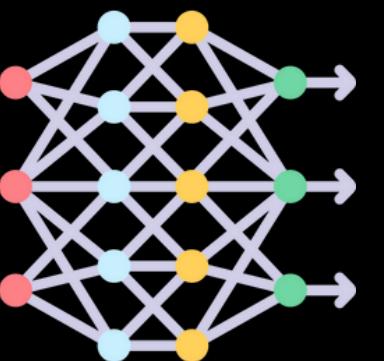
DEEP Q-NETWORK



IMPLEMENTAZIONE

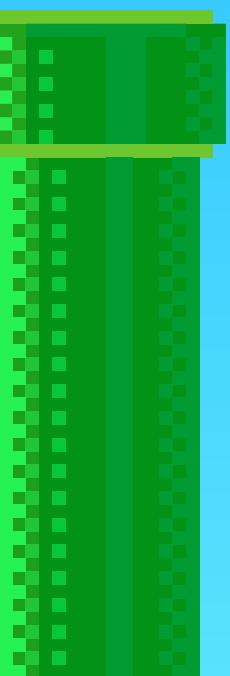
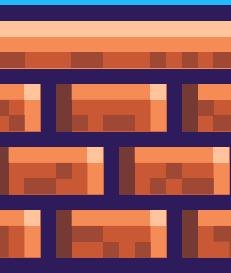
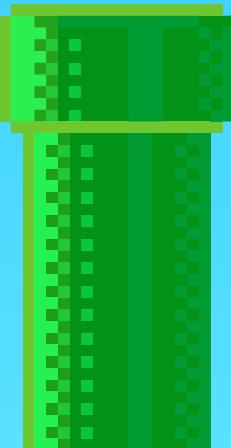
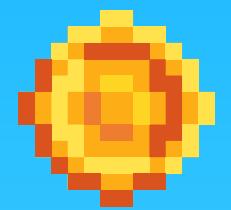
DOUBLE DEEP Q-NETWORK

una rete locale per selezionare l'azione corrente e una rete target per stimare il valore Q associato a tale azione. La rete target è utilizzata solo per stimare il valore Q , mentre la rete locale è utilizzata per selezionare l'azione. Ciò contribuisce a mitigare la sovrastima dei valori Q .



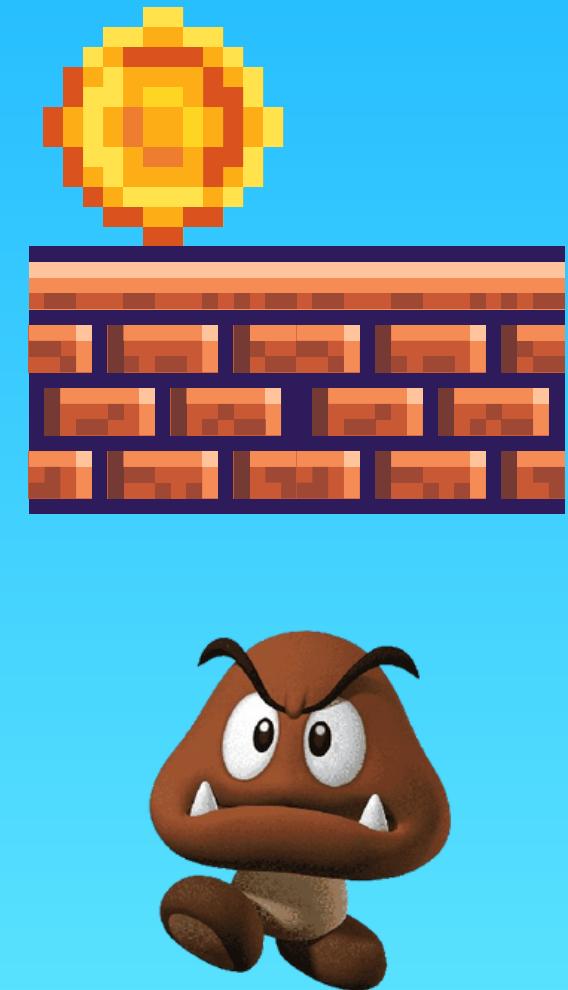
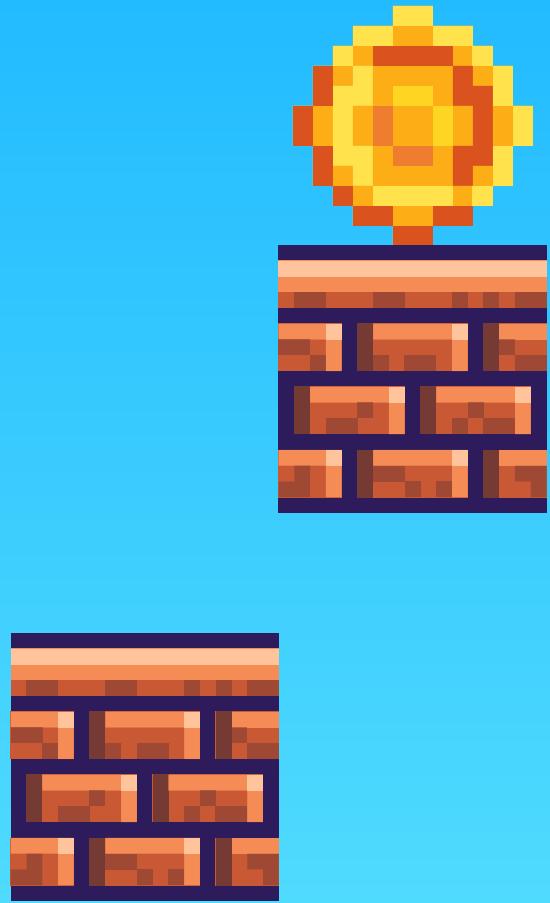
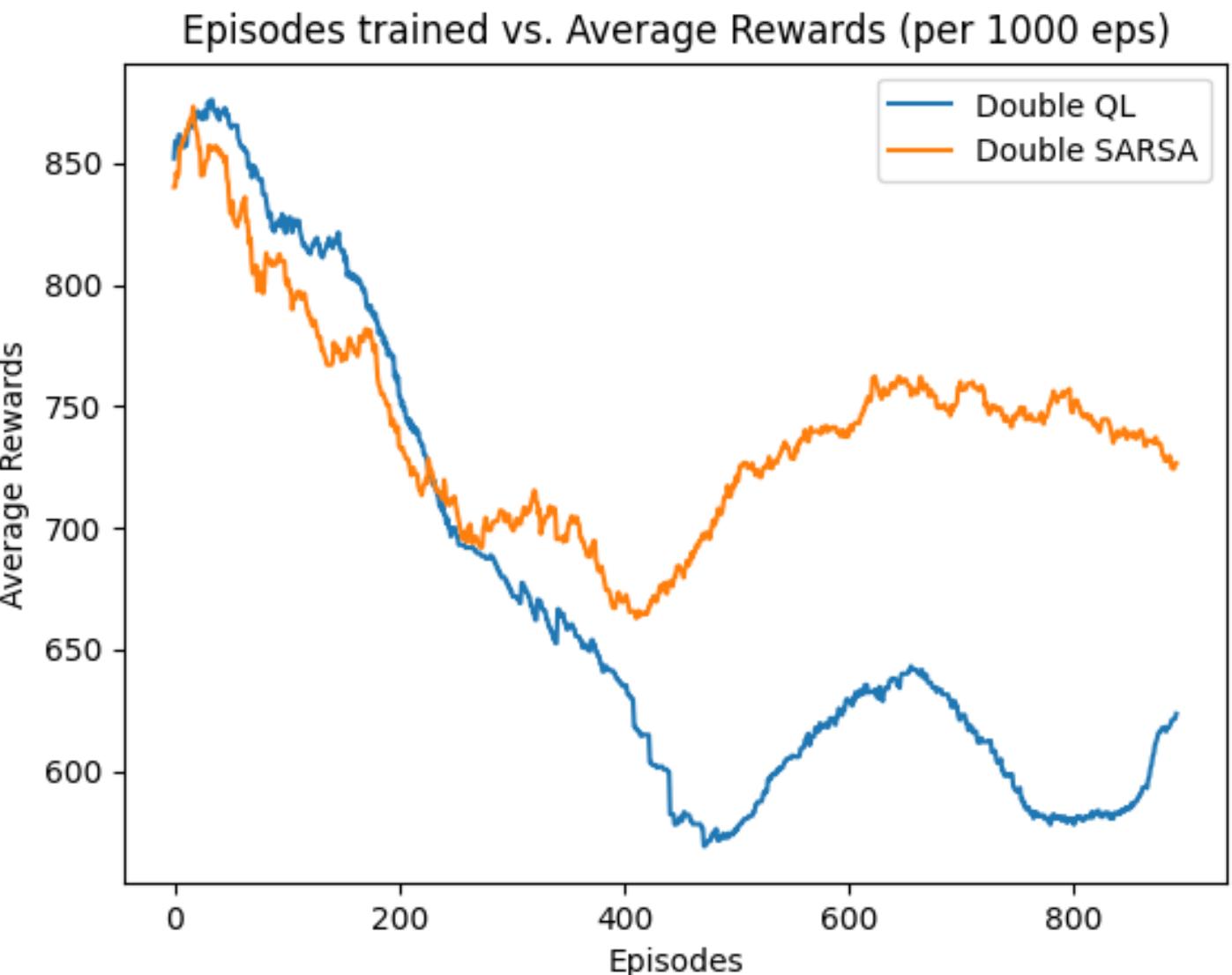
ANALISI DEI DATI

Q-Learning vs Sarsa



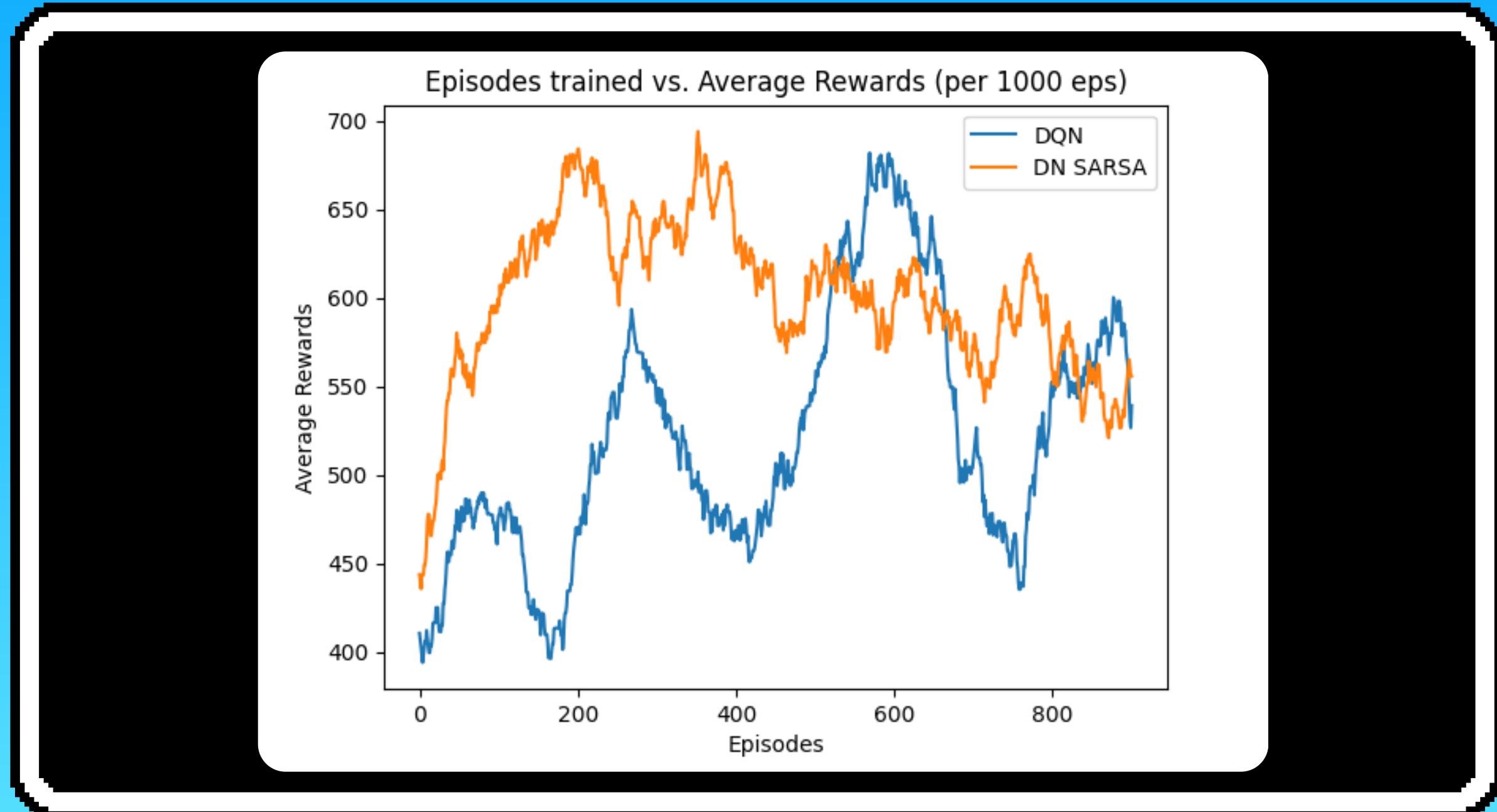
ANALISI DEI DATI

Double Q-Learning vs Double Sarsa



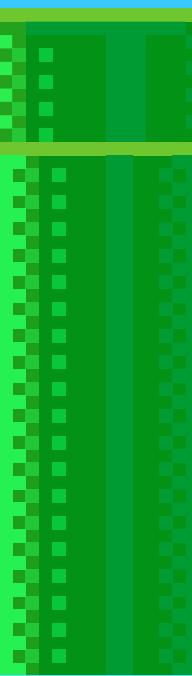
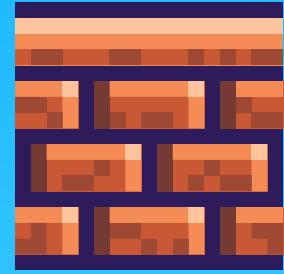
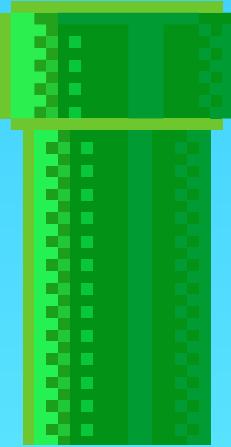
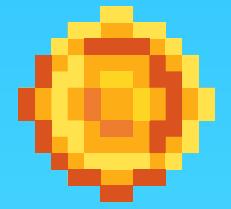
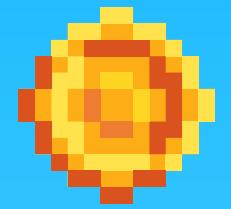
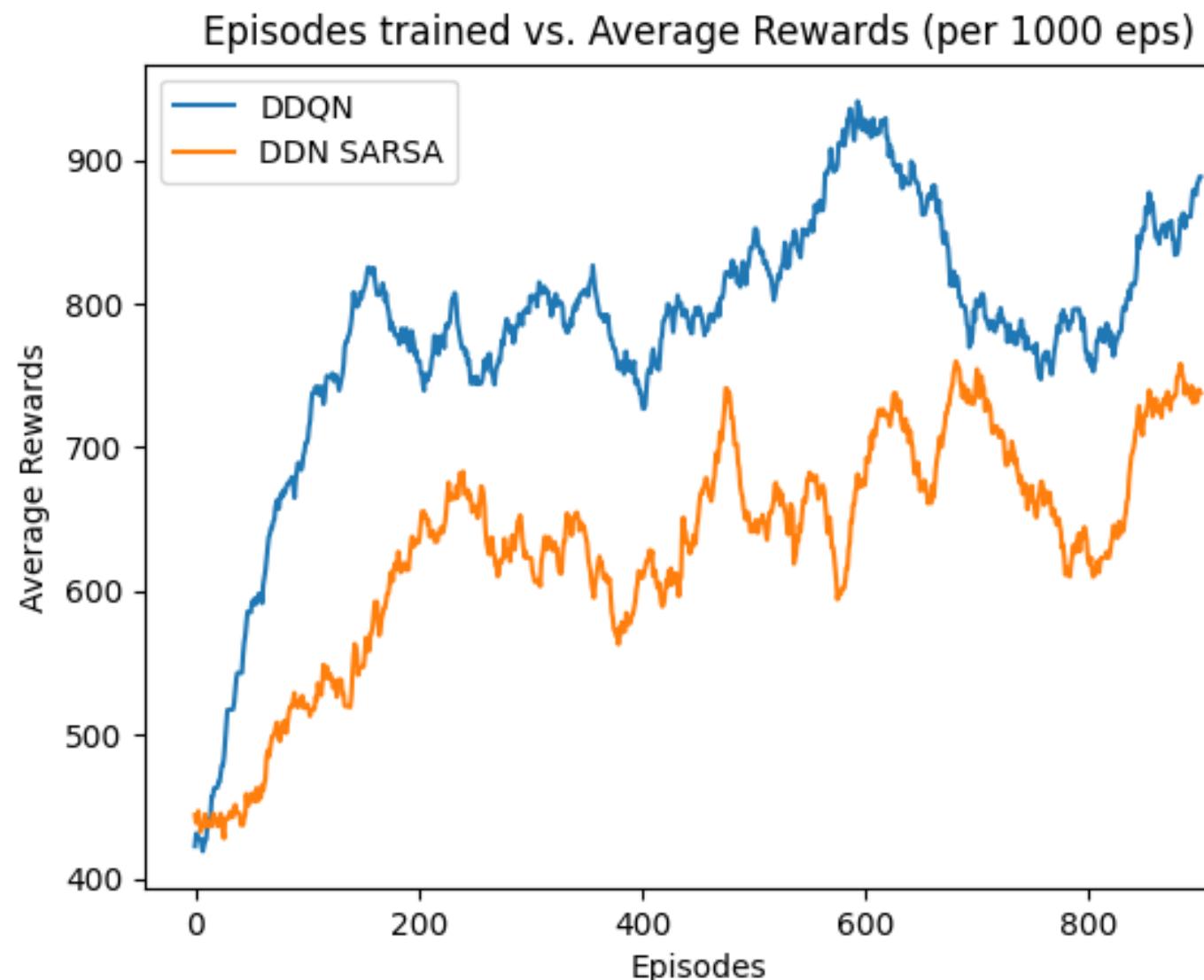
ANALISI DEI DATI

Deep Q-Network vs Deep Network Sarsa

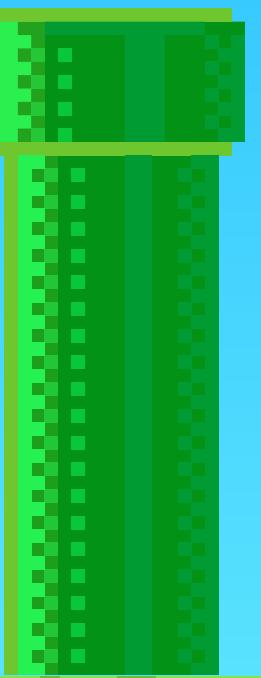
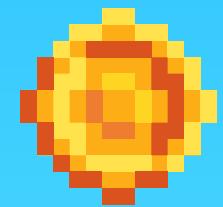
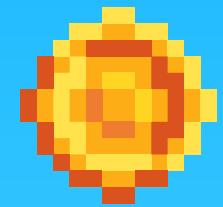
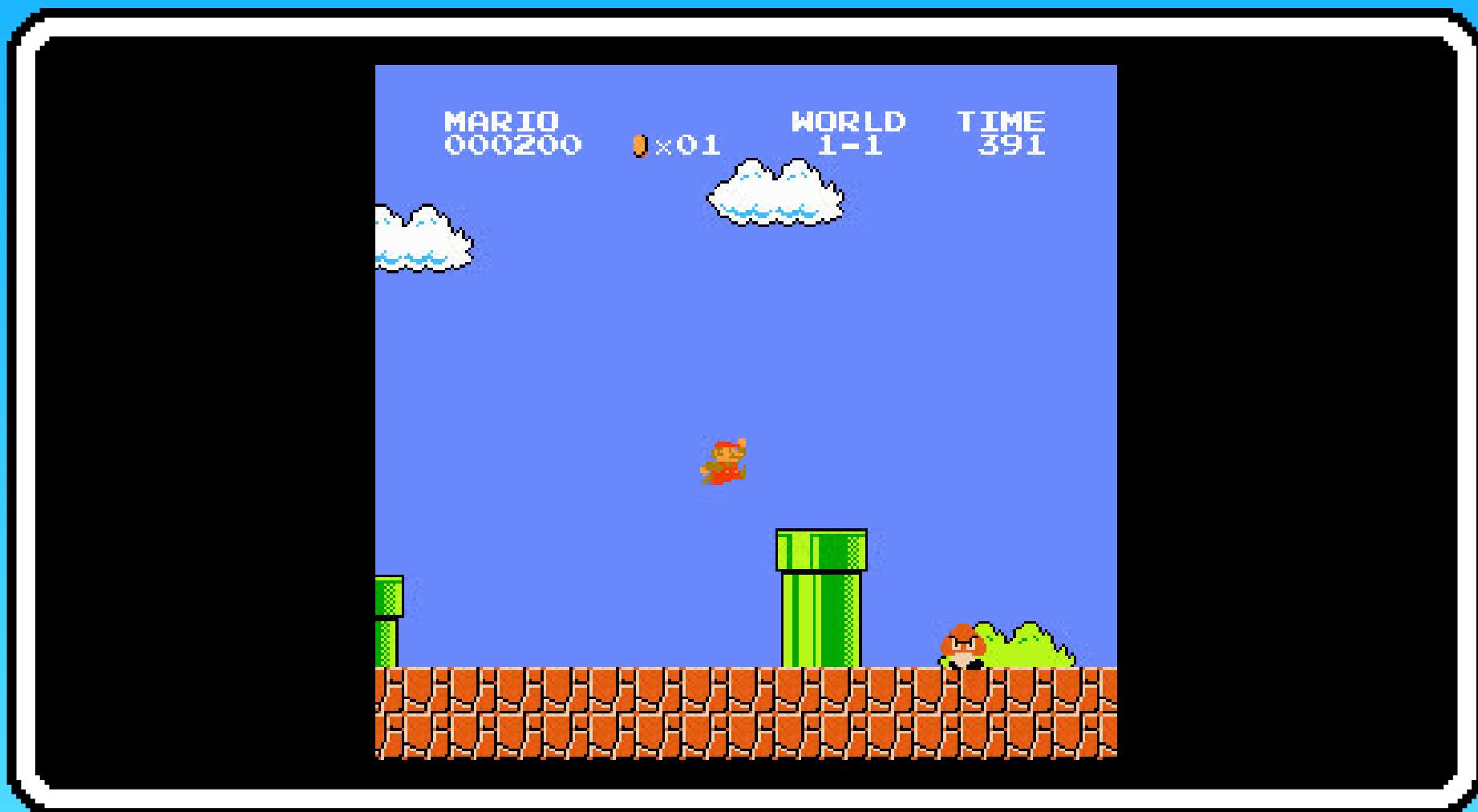


ANALISI DEI DATI

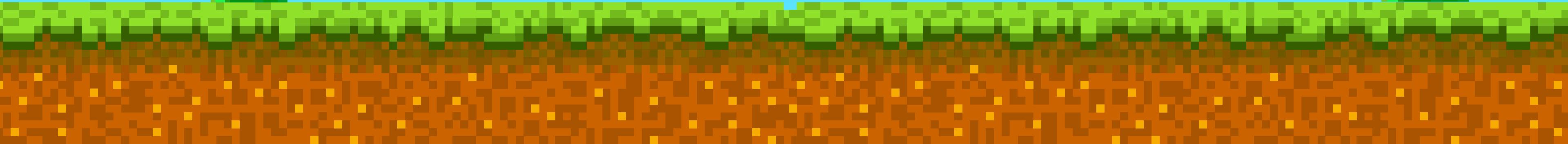
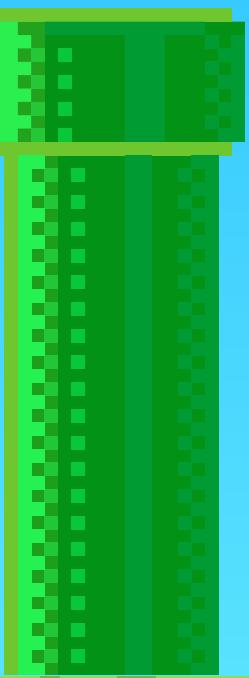
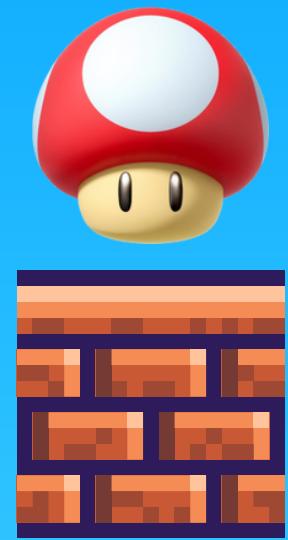
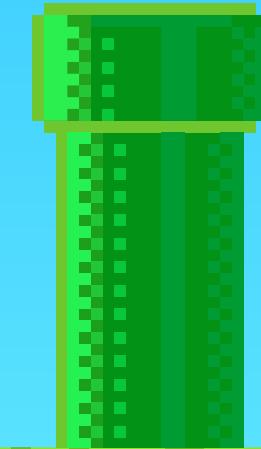
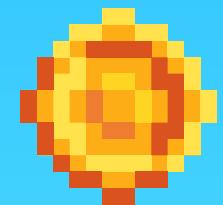
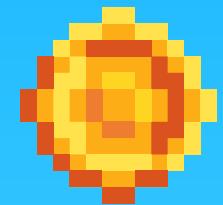
Double Deep Q-Network vs Double Deep Network Sarsa



DEMO



DISPONIBILITÀ DEI DATI



THANKS FOR
PLAYING

NEXT LEVEL !

