DEEP REINFORCEMENT LEARNING FOR GENERAL GAME PLAYING

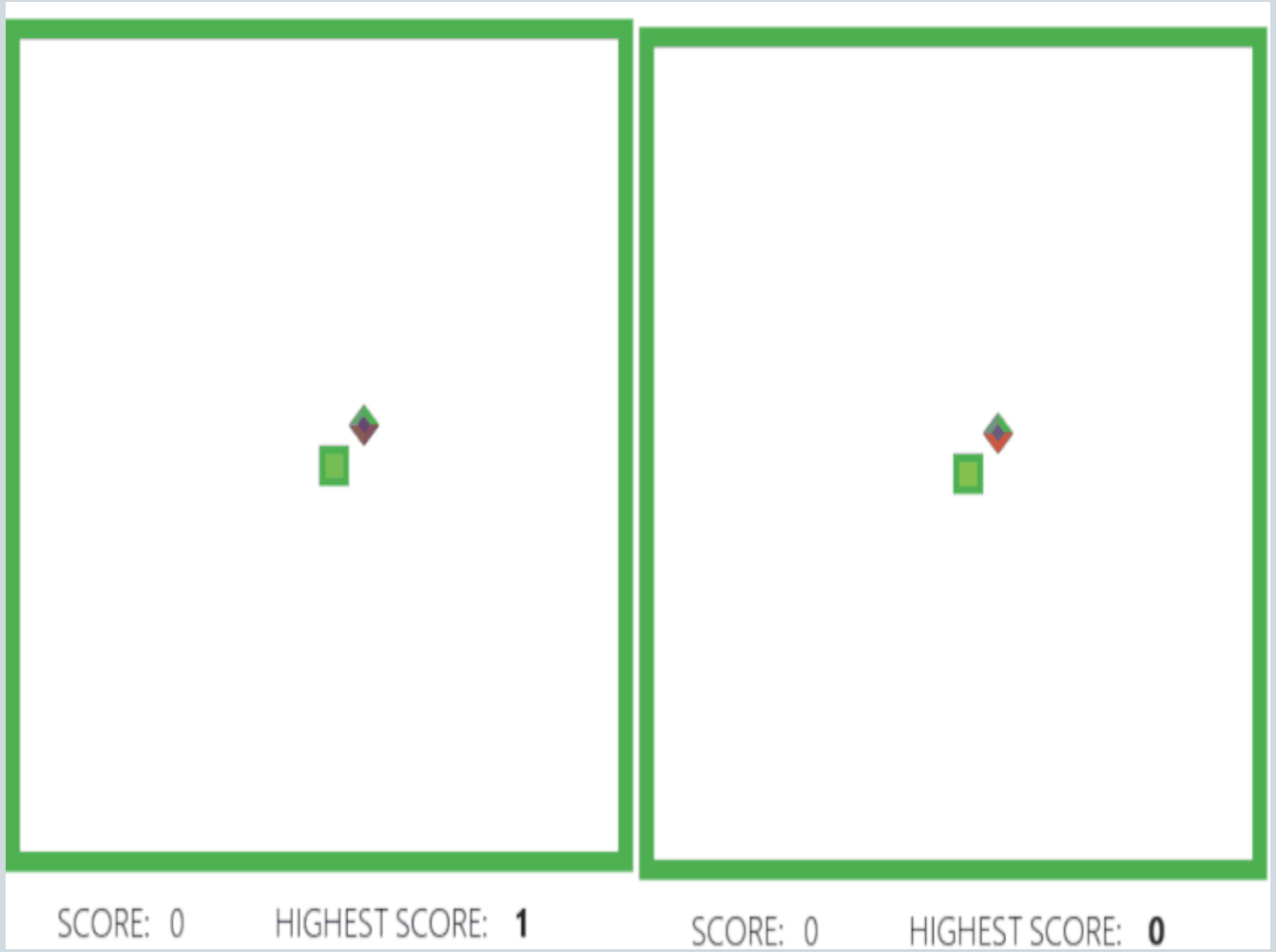
Name: Luisiana Dominguez

Home's Institution: Lehman College

Mentor: Larry Holder

PROBLEM

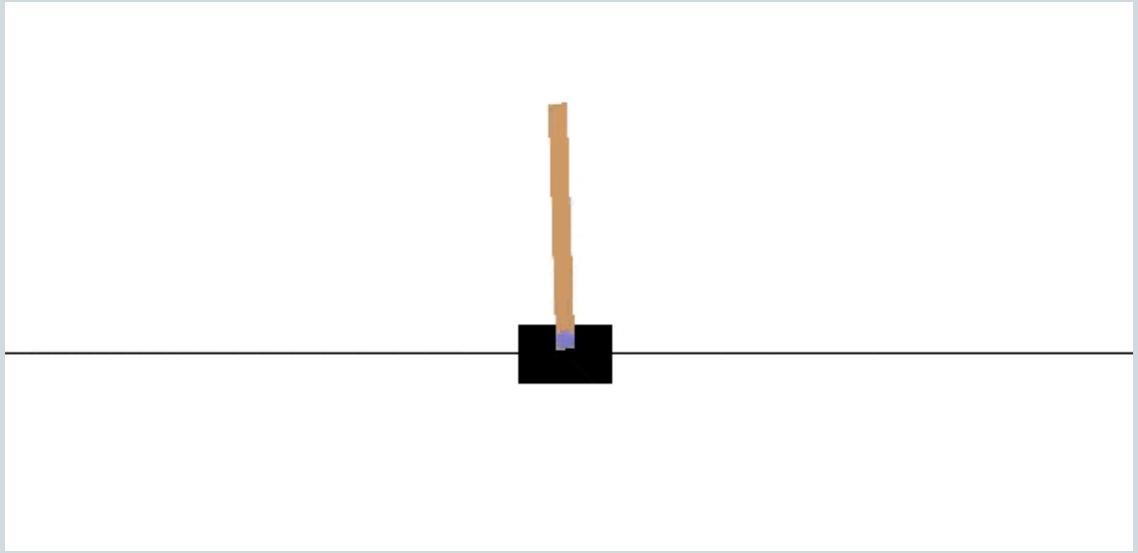
- Deep reinforcement learning is a category where machines intelligently learn from actions
- An untrained agent vs a trained agent
- Most Deep RL agents are designed to play a specific type of game



Comi, Mauro. "GIF." Towards Data Science., 2018.

PROBLEM

- Yet when the agent is used to play a different game, the agent performs poorly
- A trained agent on two different games

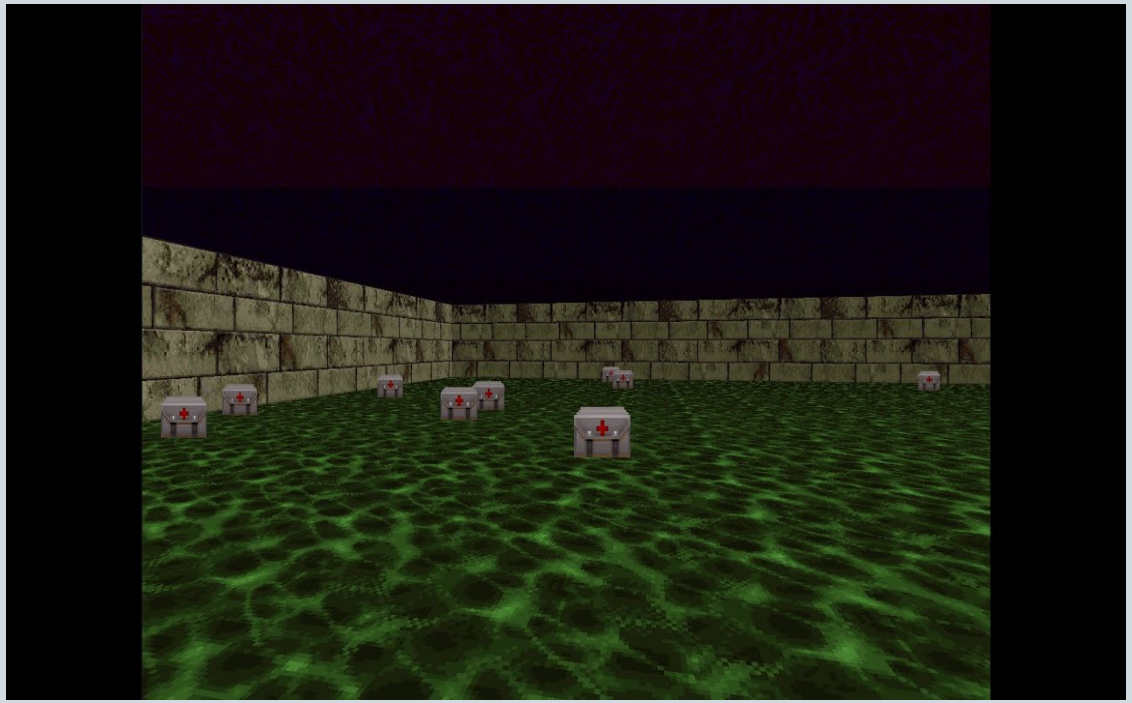


APPROACH

- To train three agents to play different scenarios based on different basic actions that can be done on VizDoom
  - VizdoomDefendCenter-v0
  - VizdoomHealthGathering-v0
  - VizdoomMyWayHome-v0
- Them to train an agent based on the previous scenarios

APPROACH

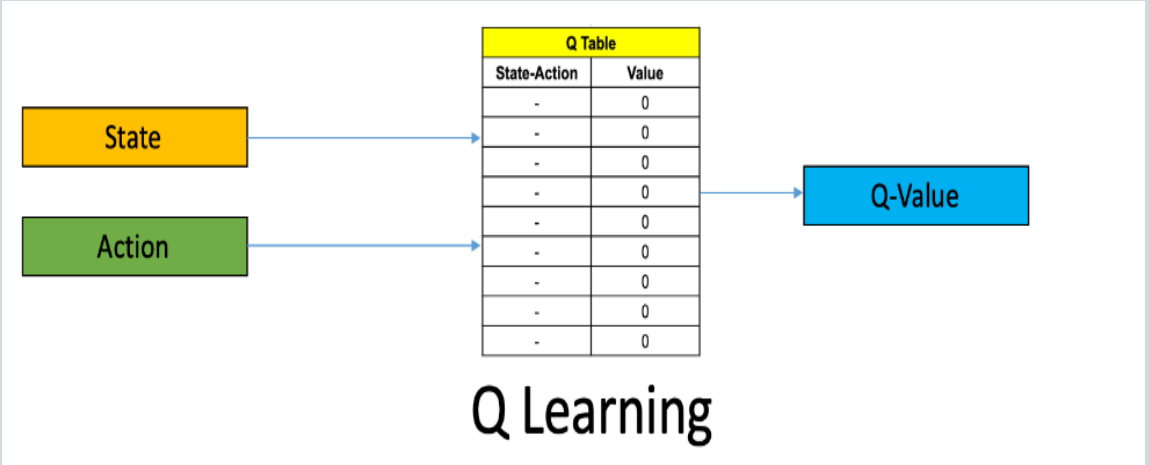
- The current approach would be to create three different agents to train
- It is more effective to create agents in a more general approach, so that human interaction is less needed during training
- The human design for each agent would depend in certain characteristic

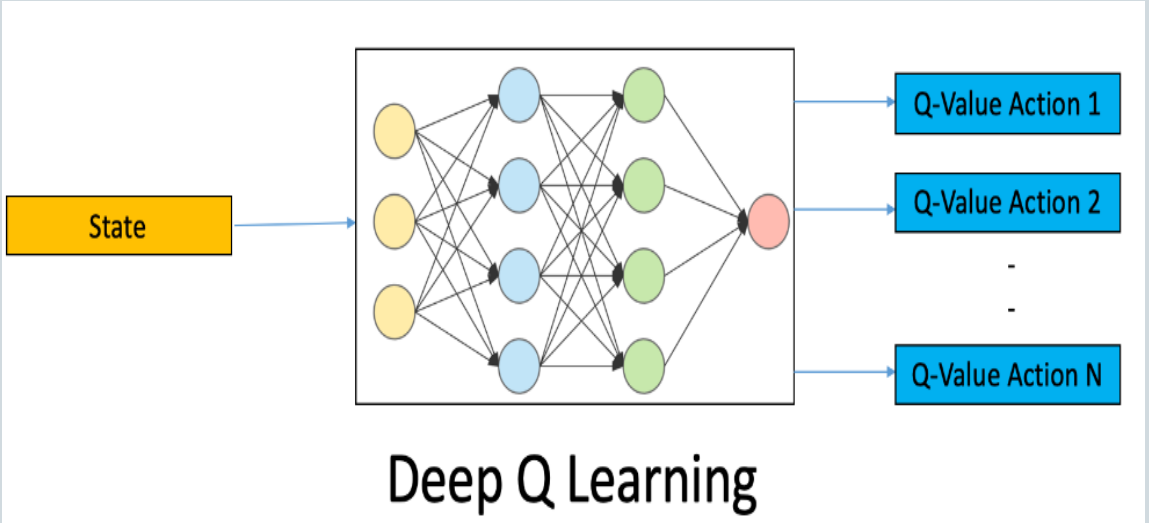


APPROACH

- Q-Learning: It's an algorithm that is trained to learn a policy by telling an agent what action to take under what circumstances

- Deep Q-Learning: It's an algorithm that is trained to learn a policy by telling an agent what action to take under several circumstances





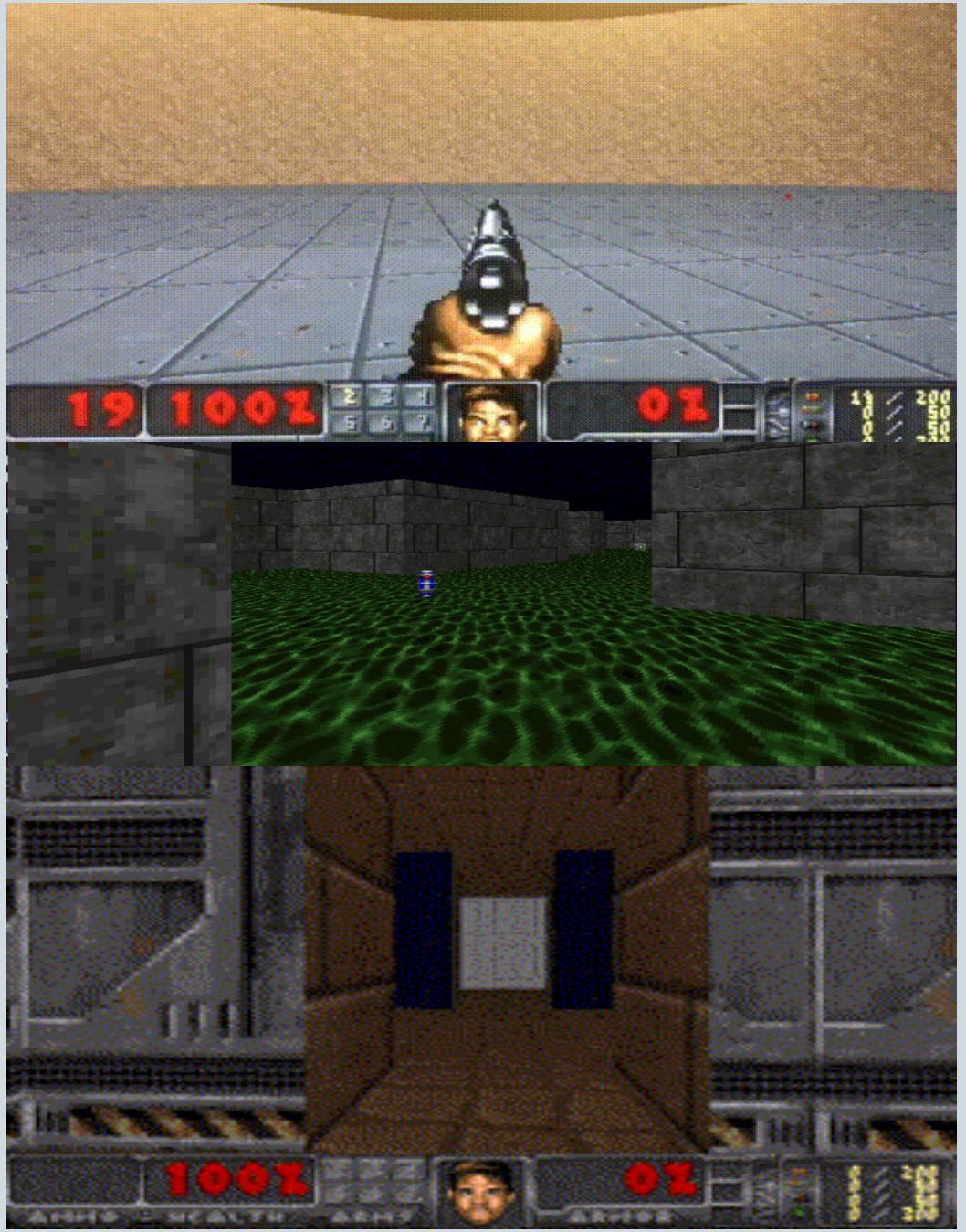
EVALUATION

- Have the three different agents play each scenario and another general agent to play them all
- The agents use a reward system that goes from 1 to 80
- Trials of 15 with episodes of 30 were given for each agent were use
- The rewards are measure depending of the scenario

EVALUATION

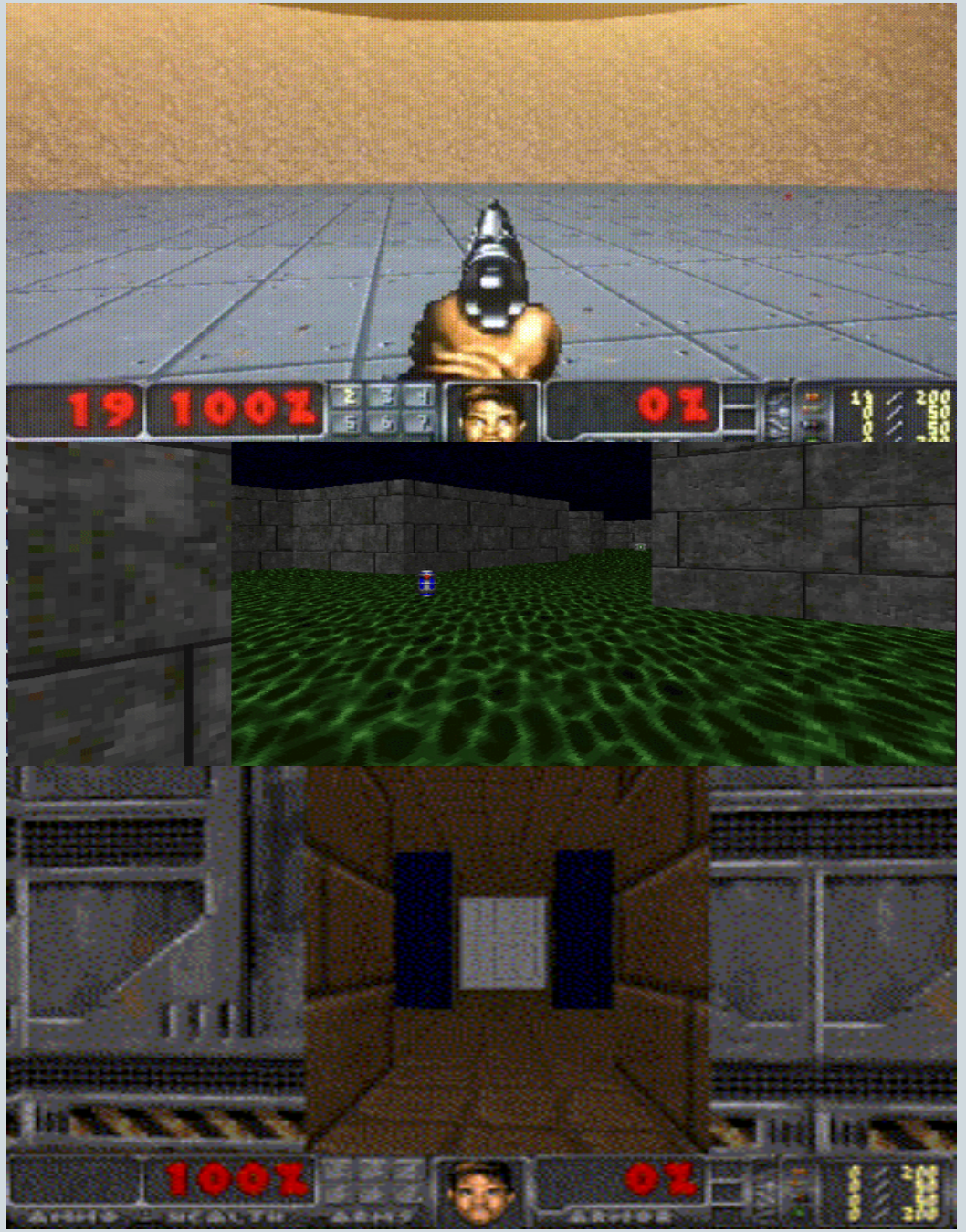
Reward:

- VizdoomDefendCenter-v0 : Based on killing a monster
- VizdoomHealthGathering-v0: Based on how long it will keep itself alive and time
- VizdoomMyWayHome-v0: Based on time



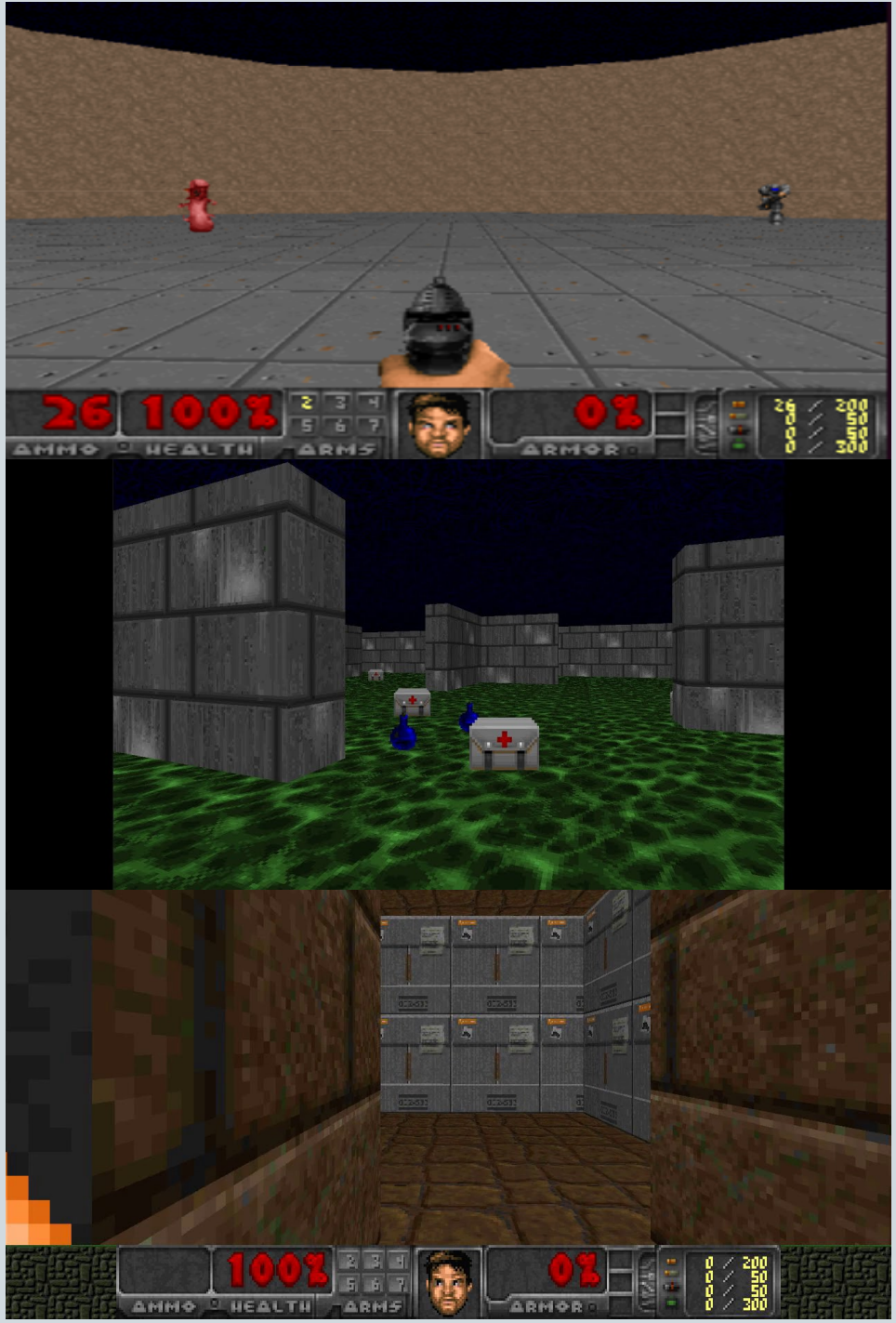
EVALUATION

- Scenarios:
  - VizdoomDefendCenter-v0: Killing the monsters is good and when monsters kill you is bad
  - VizdoomHealthGathering -v0: How to survive without knowing what makes him survive
  - VizdoomMyWayHome-v0: Navigate in a labyrinth-like surrounding



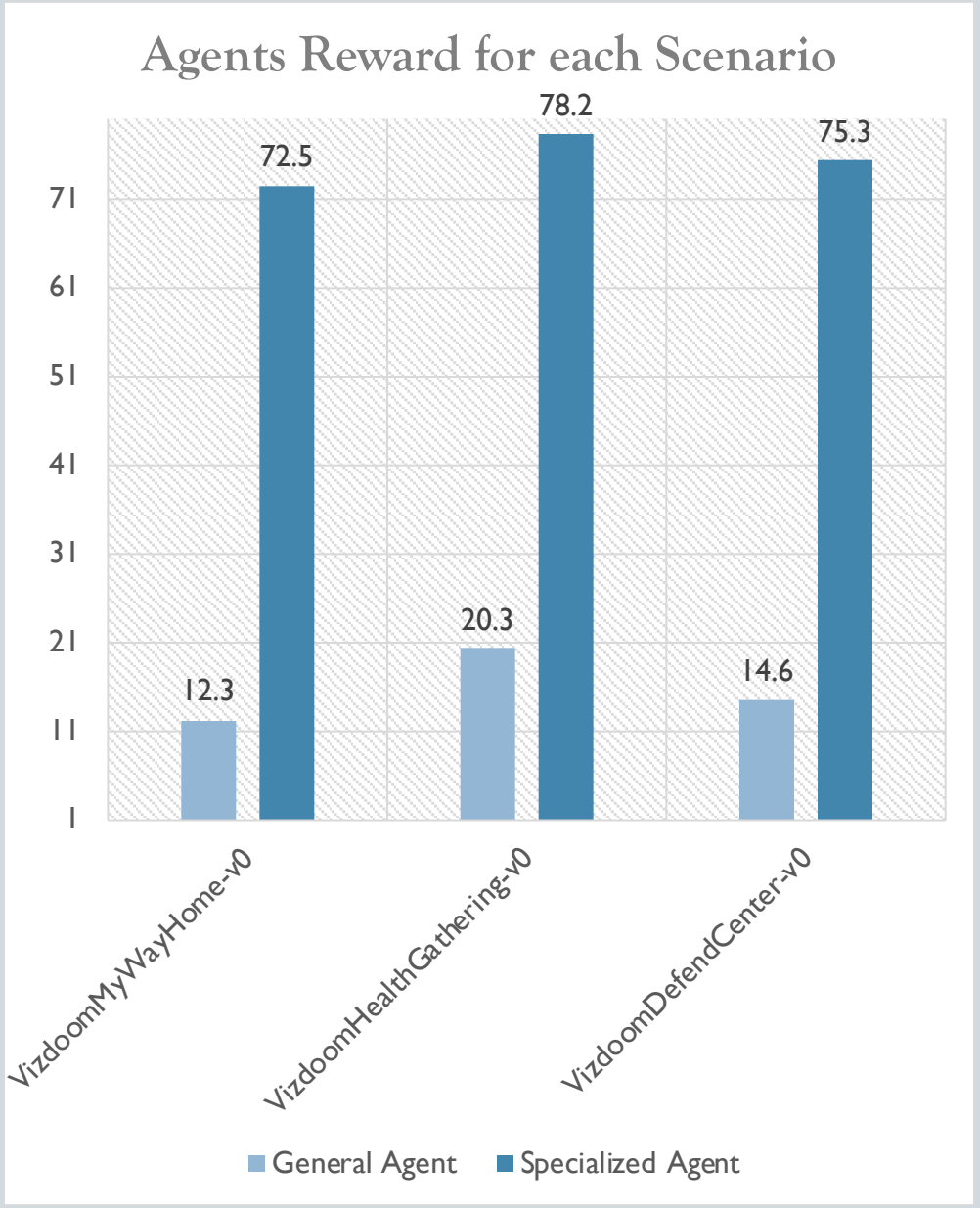
EVALUATION

- Scenarios:
  - VizdoomDefendCenter-v0: Deep Q-Learning
  - VizdoomHealthGathering -v0: Q-Learning
  - VizdoomMyWayHome-v0: Deep Q-Learning



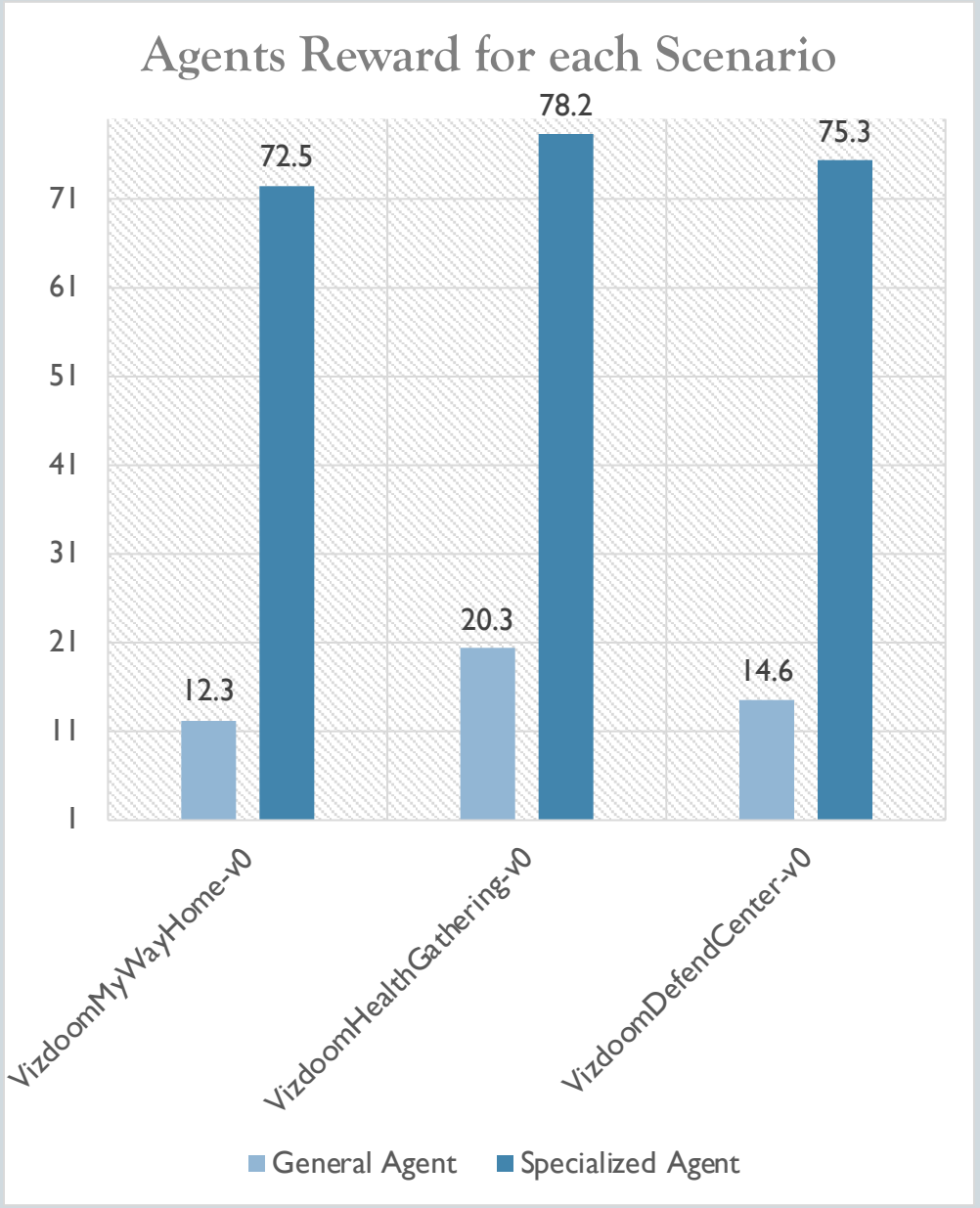
RESULT

- There is a drastic gap in performance between the specialized agents and the general one
- If the agents were trained for longer, the difference may be more drastic



RESULT

- The gap on VizdoomMyWayHome is possibly due to its random nature
- The gap on VizdoomHealthGathering is possibly due to the nature of the scenario
- The gap on VizdoomDefendCenter is the most standard case between the prior ones



CONCLUSION

- Help to improve the generality of the agents
- To design more general agents that can perform a variety of tasks well,
- Train agents on game from different genres to see how the agents will react to different environment and objects

ACKNOWLEDGEMENT

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THANK YOU

ANY QUESTIONS?