# Assessing the Impact of Robust Stochastic Operators on Q-learning Efficiency in an OpenAI Gym Environment with a Large Observation Space

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Reinforcement learning is a form of machine learning that trains a digital model by associating a reward value with different actions based on how beneficial they are. Several algorithms have been developed to facilitate the management of Q-tables, data structures used to store information about the effectiveness of each action at each state. A new algorithm, known as Robust Stochastic Operators, has been shown to perform better than pre-existing algorithms, like the Bellman or Consistent Bellman, within relatively simple training environments. This experiment sought to determine if these benefits of the Robust Stochastic Operators hold true in more complex environments as well. To do this, a program that compares this algorithm and pre-existing algorithms was created for the relatively complex BipedalWalker-v3 environment in OpenAI Gym. After training the model with these different algorithms, the RSO algorithm had a higher average reward and a longer average survival time, which indicates that the benefits of this algorithm did in fact, hold true. This improvement could have significant implications in numerous new technologies that utilize machine learning, such as autonomous vehicles.

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