Reinforcement Learning and Its Supervised View

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Abstract

The task of training an artificial agent with test examples before placing it in the real environment is a typical learning methodology. However, making an agent learn by placing it directly in the real environment without providing any prior training and information about the environment and with no proper supervision is quite a difficult and challenging task. Such task is achieved by a different learning strategy called reinforcement learning. The trained agents are based on the concept of supervised learning; the untrained agents form a part of special class of problems called exploration problems and which are studied under the domain of reinforcement learning. This paper introduces the reinforcement learning, its types and focuses on the situation where reinforcement learning may be viewed under the domain of supervised learning.

Keywords: *Reinforcement Learning, Utility function, Q-learning agent, Active and Passive Agent, Q-Learning Agent*

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INTRODUCTION

For decades proper learning in human beings leads to the modification of the behaviour and same would be the case if some learning element is introduced in simple artificial agent. An artificial agent simply reacts to its percepts without making any effort to learn and perform better. It always takes the same sec of action depending the percept it receives. In order to make an agent perform better it must possess some learning module, which shall allow the agent to use the percepts for learning as well as for improving their performance rather than just for performing fixed set of actions. However, for this to take place, learning module must possess ability that allows an agent observe its interactions with the environment and its own decision making process. The basic learning module includes components like learning element, performance element, problem generator and critic element to achieve the required task and the agent with such learning module is termed

performance in the environment. Among all these components, feedback is quite a crucial component [1]. The type of feedback received by the agent is an important indicator about the agent's performance in the environment. The feedback component also helps in determining the nature of the learning problem and depending upon the nature, the learning strategies may be categorized as supervised learning, unsupervised learning and reinforcement learning [2].

In supervised learning, an agent is trained under the supervision of an external entity (supervisor) and it uses the labelled training data set to make the agent learn. The labelled data set includes a set of test examples where each example is pair of two values. One value is the input and other value is the desired output needed for input provided. By using the labelled training data set, the purpose is to allow the agent to learn and approximate a function from that training set and later use