Universidade de Pernambuco
Programa de Pós-Graduação em Engenharia da Computação (PPGEC)

Proposta de Dissertação de Mestrado

Área: Computação Inteligente

Título: Deep Reinforcement Learning for Robot Control

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Descrição – Intelligent robots have recently taken their first steps into industrial scenarios, where mostly preprogrammed robots have been used so far. It is thus expected that robots learn to perform tasks which are often considered rather simple for humans. However, for a robot to reach human-like performance diverse subtasks need to be accomplished in order to satisfactorily complete a given task. These subtasks include perception, understanding of the environment, learning strategies, knowledge representation, awareness of its own state, and manipulation of the environment.

Reinforcement Learning (RL) [1] is a learning approach supported by behavioral psychology where an agent, e.g., a person or a robot, interacts with its environment trying to find an optimal policy to perform a particular task. In every time step, the agent performs an action reaching a new state and, sometimes, may obtain either a reward or a punishment. The agent tries to maximize the obtained reward by choosing the best action in a given state [2].

On the other hand, deep learning [3] is composed of many processing layers and has been successfully tested, among others, in image classification by representing different levels of abstraction [4]. Moreover, deep reinforcement learning [5] has combined the two aforementioned approaches to learning a motor policy mapping from a set of states to a set of actions. Deep reinforcement learning uses a neural network to learn the sum of direct rewards and expected future rewards for each action-state either in discrete or continuous domains [6].

In this project, the student will work with the deep reinforcement learning approach applied to an industrial scenario as a production line. In this context, it could also be used a human-robot scenario where it is expected the robot observes the environment states by using deep learning approaches and decide actions to perform by means of the reinforcement learning method.

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