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

Proposta de Dissertação de Doutorado

Área: Computação Inteligente

Título: Real-world Deep Reinforcement Learning for Drone Control

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Descrição – Unmanned aerial vehicles, such as drones, are being used in many societal areas, including the industrialized world. The movements and actions are controlled through a wireless remote control with a preprogrammed behavior or operated by a human. However, for a drone to reach an autonomous flight control to fulfill a task with human-like performance, diverse subtasks need to be accomplished in order to complete a given flight behavior satisfactorily. These subtasks include perception, understanding of the environment, learning strategies, knowledge representation, awareness of its own state, and manipulating 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.

Referências Bibliográficas

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