Human Tracking By Deep Reinforcement Learning Frameworks

Proposta de Projeto

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1 Objetives

The development of automated methods for surveillance applications has been concentrating growing research efforts and, due to current concerns about security and safety of modern societies, considerable amounts of economic and human resources are being putted on this type of tasks. In the scope of automated surveillance systems, the ability to robustly track a human is an essential prerequisite to an increasing number of applications such as criminal seek or forensics.

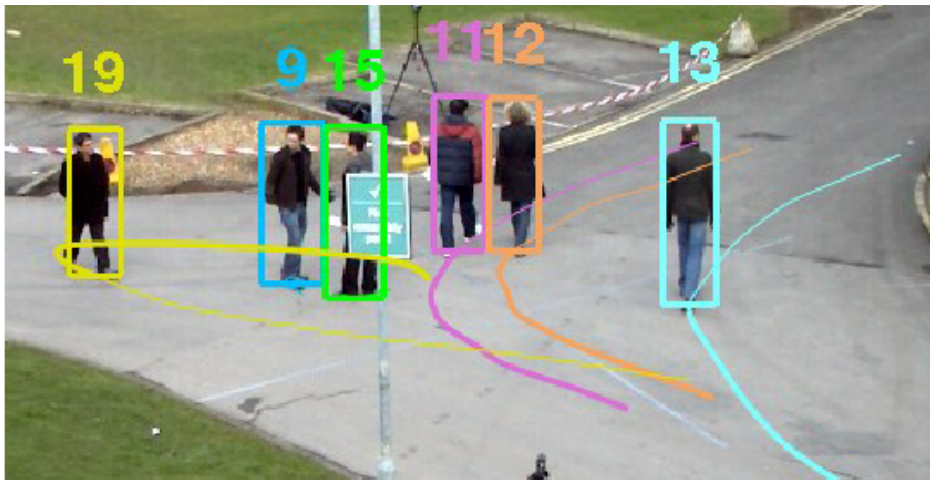

Figure 1: Example of the results expected from a multi-object human tracking module, proding an "ID" for each object in the scene, together with a log of the previous "N" positions of each object in the recent past (image taken from Utasi *et* al. DOI: 10.1145/2304496.2304499).

The idea behind Reinforcement Learning is that an agent will learn from the environment by interacting with it and receiving rewards for performing actions, which is a learning paradigm that comes from the human natural experiences. It is an

area of machine learning concerned with how agents take actions in an environment in order to maximize some notion of cumulative reward.

This learning paradigm is one of three basic machine learning paradigms, alongside supervised learning and unsupervised learning. It differs from supervised learning in not needing labelled input/output pairs be presented, and in not needing sub-optimal actions to be explicitly corrected. Instead the focus is on finding a balance between exploration (of uncharted territory) and exploitation (of current knowledge).

Hence, in this project we are interested in develop an automaton able to track the sequence of position of multiple humans in typical visual surveillance scenes, using "Deep Reinforcement Learning" frameworks, traditionally developed upon supervised learning paradigms. This automaton should reproduce the typical behaviour of human tracking modules, but at the cost of a much less amount of human labelled data.

2 Plano de Trabalho

T1: Estudo das arquitecturas de aprendizagem por reforço (Reinforcement Learning) baseadas em "Deep Learning".

T2: Implementação da(s) abordagem(s) selecionada(s);

T3: Testes e otimização;

T4: Escrita de relatório.

3 Requisitos Académicos

• Interesse nas áreas de Inteligência Artificial e Aprendizagem Automática

• Conhecimentos de Programação, e interesse em aprender *Python*, Keras e *Tensorflow*.

4 Resultados Expectáveis

- Um protótipo computacional
- Um relatório

5 Contactos

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