Report on the Fourth European Workshop on Learning Robots (EWLR'99)

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1 Introduction

EWLR '99 was held in Lausanne, a beautiful town in Switzerland. It was perfect location to inspire discussions on the topic of learning robots. The first EWLR workshop was held in the Framework of a European project B-Learn II on Learning Robots. This one was the 8th edition and a successful one.

2 Relation to other reports

The report written by Dolores Canamero makes it clear that the applications presented at EWLR '99 are varied. Also the learning techniques and representations used are varied and exciting. Other reports focus on fuzzy approaches, and reinforcement learning. Let's have a look at the neural network techniques which were presented at the workhop.

3 Neural approaches

Peter Eggenberger and Akio Ishiguro et al. followed a dynamically-rearranging neural network approach. They were inspired by the existence of neuromodulators and a 1991 article of Meyrand. Several kinds of neuromodulators

spread through the network and their effect depends on the specific receptors which can be different for different neurons. This approach allows to adapt not only the weights of a neural network, but also its structure. Their approach allows also to correlate neural activity from distant cells.

The inspiration of this approach comes from biology, where neuroscientific results suggest that biological networks may not only adjust the weights but also the neural structure. E.g. the stomatogastric network of a lobster consists of three networks (oesophageal, pyloric and gastric), which usually show independent behaviour. However, when eating, these networks can rearrange to form a new one: the swallowing network.

In the simulation part, an evolutionary approach is followed using genetic algorithms. The following mechanisms are evolved: Diffusion of neuromodulators (when and which type of neuromodulators are diffused from each neuron), and the reaction to neuromodulators (how do the receptors on each synapse interpret the received neuromodulators). E.g. depending on the received neuromodulators, the mechanism for updating the synaptic weights is either Hebbian learning, anti-Hebbian learning, non-learning or blocking. After the simulation part, the evolved controller is used in real-world. In their approach, the authors attempt to bridge the gap between simulation and real-world.

M. Quoy, P. Gaussier et al. present a neural approach for mobile robot trajectory planning. Their approach can be situated as follows. An animat moves around in an environment. There are energy levels (food, water and sleep) and motivations (hunger, thirst and rest). The network consists of two levels. There is a recognition level and a goal level. The neurons in the recognition level represent locations in the environment and respond more if the animat is closer to that particular location. In the second level a graph is built linking reachable places. There is no external explicit description of the environment.

4 Conclusion

As a concludary remark, my impression is that research is indeed heading away of toy-domains - but there's still a long way to go before we can reach stable demonstrators for useful applications. Many authors mentioned problems and future work !