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- Friday, December 1, 1995  
Artificial Life

2) Here is my summary of the DECEMBER meeting. The meeting was given by Demetri Terzopolous on the topic of Artificial Life. As his summary, that I distributed beforehand led us to expect, it was indeed a little off main stream perceptual research!

2a) I have recently (November 17, 1996) come across a little section in Natural History magazine (nature.net column: Aug 1996) which refers to the following links which you might be interested and amused to follow:

The Live Alife page  
Artificial life online

An article on Demetri Terzopoulos's "Artificial Fish" from the World & I magazine.

3) Demetri's technique is of holistic modelling. This means that not only is the form of the animals he creates, modelled but also their biomechanics, behaviour etc.. The modelling includes the environment which includes, of course, other animals.

4) The predictions that these models make about animal behaviour in any situation could be output in any form for example graphs of the number of trials an animal pressed a bar for reward or whatever. The output could even be the control of a robot animal that actually carried out the behaviour! Although there has apparently been progress on building such robots, the output that is chosen here is moving 3D cartoons. The quality of these graphics is extremely good and the videos that were shown during the talk were quite mesmerising!

5) The animals that has been most extensively modelled in this way are fishes. The levels of modelling include:

a) basic motor effectors

b) motor controllers (that sequence 'higher commands' into the motor effector actions)

c) 'mental states' which include some 'innate', inborn properties (gender, food, schooling, preference for light or dark...) and some variables such as hunger, libido, fear.

d) Intension generators which decide what to do next. Sensory input is fed to the intension generator stage.

6) The connexion between the MODEL and the REAL ANIMAL is interesting and by no means fixed. There is no need for the model's processes to be the same as the real animal's processes. Thus the arrangement of muscles bears no resemblance to the actual skeletal structure of a fish and the algorithms for making decisions, for example, are not deeply routed in behavioural studies of real fish or in brain processing of information.

7) The eyes of the fish were given distinctly primate-like features including full mobility and a fovea. Their visual behaviour was correspondingly very sophisticated including saccades to targets and visually-guided navigation. This provided an interesting test-bed for ideas about vision and visually-guided movement.

8) One of the more fascinating features of this whole approach was being able to watch an animal 'learn' how to control their 'nervous systems'. That is how they adjust, for example, the motor controllers so that intensions can be carried out by the musculature. These algorithms are not provided, ready made, but rather have to be optimized by the artificial organism as a result of its 'experience'.

9) ARTIFICIAL LIFE is an extension of ARTIFICIAL INTELLIGENCE research. But now we are working with a much more realistic definition of intelligence: the ability of an ENTIRE animal (not just its cognitive processes) to survive in its environment (not just play chess). The whole idea is quite mind-boggling. I can see useful applications such as trying out what-if scenarios and discovering a whole range of consequences that might give us a better understanding of why things are like they are. But I think there is more.

10) The first Friday in January is the 5th. I am looking for volunteers for that date. Remember you can do what you like. Discuss your research, a paper, or give a seminar....

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