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Thesis Title Development of a Tool for Neuro Fuzzy Controller Simulation

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ABSTRACT

In the design of a conventional fuzzy controller, the user must tune by trial and error the membership functions of the fuzzy sets defined in the input and output universes of discourse. This drawback can be eliminated by using a neuro fuzzy controller derived from the generic model of a 3 - layer fuzzy perceptron. In this thesis, the model has been implemented in the graphical simulation environment, and it was able to learn fuzzy sets while controlling the simulation of a dynamic system by backpropagating a fuzzy error measure through its architecture. The learning process does only optimize both the antecedent and consequent parts of a linguistic rule-based fuzzy system. Using this dynamic control system, the control of an inverted pendulum has been implemented. The results were that the learning procedure improved the performance of the fuzzy controller. It can be concluded that neuro fuzzy controller is able to eliminate the design problems of a conventional fuzzy controller.