University of Moratuwa

ADAPTIVE FUZZY SYSTEMS

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G L P J De Silva

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The work presented in this dissertation has not been submitted
for the fulfillment of any other degree

UOM Verified Signature *UOM Verified Signature* 21-11-20

G L P J De Silva

Candidate

Dr. J A K S Jayasingha
Mr. B S Samarasiri

Supervisors

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ABSTRACT

Fuzzy sets offer a possibility to formally describe linguistic expressions. An adaptive fuzzy logic system not only adjusts to time or process phased conditions but also changes the supporting system controls. A real time target tracking system has been selected as a situation where an adaptive fuzzy controller can be implemented. The inputs to the system will be the Error, The rate of change of error and the previous velocity of the platform with respect to the target for elevation as well as for the azimuth. The output will be the velocity required for the platform to track the target.

Target tracking systems have been designed in various methods, and in the project I have selected to use an adaptive fuzzy system to simulate the target tracking system.

Objectives

(a) to design a Matlab interface to study the behaviour of a fuzzy system. The inputs, outputs, term sets and the rules to be specified in the system and to be used subsequently to study the system behaviour.
(b) to simulate a target tracking system and to design its controller.
(c) to test an adaptive technique on the system and to compare the adaptive system with the normal fuzzy system to decide on the optimum controller.

The interface was designed using Matlab version 4.00, and the inputs are the number of inputs and outputs, names of inputs and outputs, term sets and the rules. Separate Matlab .m files were written to implement the controller.

Adaptive techniques can be used in the system with modifications to the controller implementation. The number of rules to be used can also be increased by modifying some of the functions. It can be shown that when an adaptive technique is used the target can be tracked with a minimum error.

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LIST OF ABBREVIATIONS USED

fig.	-	figure
AFAM	-	Adaptive fuzzy associated memory
BIO	-	Binary input output
eg.	-	for example

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