IMAT5119: Matlab Laboratory 4 [1]

Learning Outcomes

After this lab you will be able to use if-then rules within an FIS and also develop a small FIS.

Tasks for Lab 4

Having had some exposure to membership functions, we can start to consider how to put these together in rules in a FIS in Matlab. To do this we are going to develop a small set of rules. We have a small, simple system that gives advice on whether a bank should give a loan based on two things: period of employment and salary. We have conducted a knowledge acquisition exercise with an expert from which we have gleaned the following information:

1. The salaries under consideration range from £0 to £100,000;
2. The period of employment is the number of year they have been in their current job, ranging from 0 to 40 years;
3. The linguistic salary (lsalary) has three labels, low medium and high where medium is best represented by a trapezoidal membership function and low and high are 'shoulders';
4. The linguistic period of employment (lperiod) is covered by five labels (very low, low, medium, high and very high). These are represented by triangular membership functions;
5. The decision takes three linguistic terms low, medium and high. Low and high are triangular whilst medium is trapezoidal. The decision range is 0 to 100.

There are two rules initially:

1. If lsalary is high and lperiod is very high and then decision is high;
2. If lsalary is low and lperiod is very low then decision is low.

To add a rule to a FIS we use the following:

```
addRule(a,ruleList)
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where a is FIS name and ruleList is a matrix. See the help to see how it works and to find out how to write the rules in matrix form.
Your tasks are to:

1. Create the variables and plot them on the same figure;
2. Add the rules to your system.

Using *showrule*, produce an output showing the fuzzy sets and associated rules.

If you have spare time put in all the rules.

[1] Sarah Greenfield (acknowledging Bob John, Paco Chiclana and Jenny Carter), 26/10/20