IMAT5119: Matlab Laboratory 3 [1]

Learning Outcomes

In this lab you will do more with membership functions.

Tasks for Lab 3

A Fuzzy Inferencing System (FIS) consists of fuzzy rules, membership functions and so on. We are going to develop an FIS in Matlab. The following code creates a linguistic variable representing age with 3 associated linguistic terms or labels. We see in this code that to do this we create a FIS first. Note the use of % to allow for comments. Enter this code into an m-file and see the results. Use the help where necessary to fully understand what is going on.

```
% This m-file creates a linguistic variable for age with three linguistic
% labels - young, middleaged and old.  The first statement creates a new FIS
% with string name test and Matlab variable a. The FIS adopts certain defaults.

a = mamfis('Name',"test");

% This adds a variable called 'linguistic age' to the FIS which is
% of type input and lies between 0 and 70.

a = addInput(a,[0 70],'Name',"linguistic age");

% We now add three membership functions associated with this variable.

a = addMF(a,"linguistic age","gaussmf",[10 0],'Name',"young");
a = addMF(a,"linguistic age","gaussmf",[10 40],'Name',"middleaged");
a = addMF(a,"linguistic age","gaussmf",[10 70],'Name',"old");

% This plots the membership functions:

plotmf(a,'input',1)
```

Now add a new variable into your m-file called 'male linguistic weight' which describes someone as small, medium or large over a domain ranging from 65Kg to 120Kg. Use triangular membership functions. Plot the result.

Finally add a third variable to the same m-file 'male linguistic foot size' choosing five sensible labels and domain. Use membership functions that are not gaussian or triangular.

Pictures are very important when developing fuzzy systems. Investigate the subplot command to show all three variables in some sensible way together. Use appropriate labelling etc.

Since you will also need to be able to imbed these sort of pictures in documents take this figure and place it within a text file.

[1] Sarah Greenfield (acknowledging Bob John, Paco Chiclana and Jenny Carter), 19/10/20