Programming Assignment Sheet 3

Programming Assignment 3  
Mamdani-Assilian Controller

Implement necessary data structures and algorithms for a Mamdani-Assilian controller that shall operate on two input variables $\xi_1$ and $\xi_2$. In detail, implement the following steps:

a) Enable the user to enter the ranges for $\xi_1$, $\xi_2$ and for $\eta$.

b) Implement an interface s.t. the user can specify linguistic terms for a given variable.

c) Implement a routine that partitions a variable by letting the user define membership functions for all linguistic terms of the chosen variable.

d) In order to input a fuzzy rule base, implement a method that enables the user to specify a linguistic term as output for all combinations of linguistic terms of $\xi_1$ and $\xi_2$. This can be done effectively by representing the rule base as a two-dimensional matrix.

e) Implement a method that creates a fuzzy set as control output for a given $(\xi_1, \xi_2)$.

f) Implement the three defuzzification methods discussed in the lecture.

g) Put all parts together into a main method s.t. the user can create a fuzzy controller.

h) Implement a test to verify that your code produces the expected results for Assignment 32.