

## 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.