University of Colorado at Colorado Springs

Home Work Assignment 1

Due 09-28-04

Read the Power Point presentation I found on the Web. The handout is by Ammar and Wright. They are from Le Moyne College in Syracuse, New York. The presentation discusses the use of fuzzy logic in decision making. It gives a very simple example where we determine the potability of a bottle of liquid based on two attributes: toxicity and alcohol-content. It works out a complete example where fuzzy rules are used.

I would like you to implement an extended version of the problem discussed in this presentation.

1. Extend the discussion in the presentation so that you consider 3 more fuzzy linguistic variables. List the fuzzy linguistic variables you need to rewrite the rules given above.
2. Clearly write the grammatical rules you use to define the values these linguistic variables can take. Allow for at least five qualifiers such as *not*, *very*, *more or less*, etc.
3. For each linguistic variable and the values that the variable can take, provide a membership function. Describe why you think the membership function is appropriate. Graph the membership functions over a certain reasonable range of input values.
4. Clearly specify how you construct the membership functions for composite linguistic terms you use. Draw graphs to illustrate the membership functions for five such complex terms.
5. Now, write 10-15 rules using fuzzy linguistic variables.
6. Implement a simple fuzzy reasoning system in the lines of the one in the Power Point presentation. Define what the inputs to the fuzzy reasoning system are. Define what the outputs of the fuzzy reasoning system are.
7. Make up five questions you want to ask of the system, input them to the system, and provide the answer in linguistic terms.
8. Extra credit will be given if you implement anything substantially beyond what I ask here and you document it appropriately.

What to hand in

You will submit a small paper with a title and your name. In this paper, you will have several short sections with an appropriate heading for each. For example, there should be a section describing the architecture of your program. There should be a section on each of the main modules of your program, any significant data structures you use, the membership functions, the interface provided for users, etc.

You must also have a section called *Results*.You also must discuss shortcomings of your program and ideas regarding how they can be improved.

In addition, please provide a print-out of your code. You will be required to do a demo during my office hours.