CIS-445 DATA MINING

Project #5

Due: See Blackboard

Worth 100 points

Objectives:

(1) Get familiar with fuzzy systems based on fuzzy sets and fuzzy rules

(2) Get familiar with MatLab Fuzzy Logic Toolbox to create a simple tipping fuzzy system

Task: Estimation – Predicting the value of the continuous variable – the *Tip*
Method: Fuzzy Systems - Fuzzy Sets and Fuzzy Rules
Software: MatLab Fuzzy Logic Toolbox

Before you start this project, you need to work and understand Tutorial 4.

1. Create your own tipping fuzzy system by modifying the fuzzy rules and the membership functions for the fuzzy sets and run the system for the same values for *Service* and *Food* as in Tutorial 4. Summarize the results in the table similar to the one from Tutorial 4. The objective is to obtain as smooth control surface as possible, so that Tip depends on both variables: the quality of *Service* and the quality of *Food*. The better the Service and/or Food are, the higher the amount of Tip. Your modified system should give a reasonable and common sense output.

2. To the *Service* and *Food* input variables add an additional input variable named *Cleanliness* which can also be the factor in determining the amount of *Tip*. For this variable define 3 fuzzy categories of your choice, create membership functions, and incorporate the variable and its fuzzy categories in the fuzzy rules. Note, that you will have 4 variables now (3 input variables and 1 output variable). To display 3-dimensional control surface, one of the three input variables has to be set to a constant value on the Surface Viewer. Your modified system should give a reasonable and common sense output.

Write a short summary with the discussion of your results from Points 1 and 2. In the summary, answer the following questions. Out of the three systems, the one from Tutorial 4 and your own two systems from Points 1 and 2 above, which one works the best? (Check control surfaces of the three systems and briefly discuss the results.) Do these systems produce reasonable results? Is the Toolbox easy to use? Did it help you to understand the basic fuzzy logic concepts? Attach to your summary: (1) the membership functions for all three input variables and the output variable, (2) the rules, and (3) control surfaces for the systems you created in Points 1 and 2. Merge all into a single file and e-mail to jozef.zurada@louisville.edu on the due date.