# COMP606 – Foundations of Information Science

## Assignment Part 2 – Fuzzy Logic Application

**Due Date:** Friday, May 24th 2019 at 5:00 pm.
Late submissions will incur a 10 marks penalty per day.

**Weighting:** 15% of the final course mark

**Submission:** You will need to submit the written part of this assignment, together with your Fuzzy Inference Model (.fis file) through Blackboard in the Assessments section of this course.

This assignment involves building a Fuzzy Inference System (FIS) capable of solving a real-world problem. You are required to choose a dataset to design and implement a fuzzy model using MATLAB's Fuzzy Logic Toolbox. You need to assess the performance of the system you have designed and report the results obtained.

Regarding the choice of dataset, consider the following: You will use the **same** dataset of assignment 1 if the dataset **only has two classes**. Otherwise please contact your TA to choose a different dataset that meets the aforementioned condition (two classes only).

### Task 1

Attribute selection (300-400 words). **[25 marks]**

- Choose two attributes of your dataset that in your opinion are the most useful to solve the problem (Hint: Use the plotmatrix command in Matlab, and/or calculate a correlation coefficient to find out). Elaborate on the rationale for choosing them.
- Describe your chosen attributes. Why are they important to predict the class of the dataset's instances?

## Task 2

Using Matlab, design and build a FIS capable of solving your classification problem. **[40 marks]**

- Identify the attributes' linguistic (fuzzy) values, parameterize the appropriate membership functions, and build the rules of your FIS.

- Select 20 examples (rows) of your dataset at random. Use them to refine your rules so that they predict correctly the response variable. Using this training set of 20 examples, compute and report a confusion matrix with the corresponding accuracy, precision and recall of the positive class for your final rules. Save your model as a .fis file (you will submit this file together with your report through Blackboard).

## Task 3

Evaluate your model's performance on a test set (300-400 words). **[30 marks]**

- Choose another 10 examples of your dataset at random (different from the ones you already used in task 3) and test your rules on them. Compute and report a confusion matrix together with the corresponding accuracy, precision and recall of the positive class.
- Compare the performances of your system on task 3 and task 4 and provide an analysis of the results.
- Plot the response surface of your FIS. Describe how the response of your system varies as the inputs vary.
- Explain the rationale for choosing your membership functions.

There will be **5 marks** for the presentation of the assignment including spelling and grammar, layout and formatting, and readability of figures.

Good luck!