GALWAY-MAYO INSTITUTE OF TECHNOLOGY

Department of Computer Science & Applied Physics

Fuzzy Logic Employee Screening

1. Overview

In this lab we will concentrate on using the fuzzy inference provided by the JFuzzyLogic API to provide an estimation of starting salary for a newly hired Java programmer. Given the following input parameters (linguistic variables), determine the set of terms that can be used to describe each variable and declare/define the terms in FCL. Each term corresponds to a fuzzy set and requires its own membership function.

- ***IQ:*** While intelligence quotient is normally distributed in a population, for subset of a general population, the distribution can be skewed. For example, although IQ is still normally distributed among doctors, the bell curve should be skewed right, maybe from 110-150. Terms such as cleverness and stupidity can be used to describe someone's place in the bell curve.
- ***Qualifications:*** Terms such as highly (MSc/PhD), well (B.Sc), somewhat (Certificate) or none (no formal education in a field) can be used to describe someone's qualifications.
- ***Work Experience:*** highly experienced (>10 yrs), junior (<2 yrs), average (<5yrs) and experienced (5+ years).
- ***Technical Screen:*** In the context of Java programming, terms such as excellent, above average, average, mediocre and clueless may apply.
- ***Salary:*** Highly experienced Java programmers should start at circa €60K. Graduate starting rates are in the order of €20-35K.

The interaction between linguistic variables provides the basis of decision making in fuzzy systems. This interaction can be complex and subtle. For example, it is quite conceivable that someone with a lot of experience, who does an excellent technical screen might have no qualifications. Their IQ may or may not have anything to do with their level of expertise – their cumulative knowledge may be largely due to determination and hard work!

- Using the logical AND/OR/NOT/ProbOR connectives, write out a set of fuzzy rules that can be used to compute values for the salary terms.
- Code the rules in FCL and use the Centre of Gravity (COG) defuzzification method to defuzzify the linguistic variable salary.

```
DEFUZZIFY salary
  ...
  METHOD : COG;
  DEFAULT := 0;
END_DEFUZZIFY
```

- Write a Java application to start the FIS engine and show the fuzzy sets for the input and aggregate output. Take note of the crisp output result.
- Alter the defuzzification method to each of the following and explain the output and / or error messages:
  - **MM**: mean of max //MOM
  - **LM**: LeftMostMax //Same as Smallest of Max (SOM)
  - **RM**: RightMostMax //Same as Larges of Max (LOM)

- **COG**: Center Of Gravity //Mamdani method
- **COGS**: Center Of Gravity Singletons //Sugeno method
- **COGF**: Center Of Gravity Functions