Food Recommender Expert System Using Fuzzy JESS.

1. ABSTRACT

The aim of the project is to provide a rule based assistant that serves as a food recommendation system on the basis of user's preference of nutrients and choice of meal. The system takes as input the amount of proteins, carbohydrates and fats the user wants to consume in a meal; and the type of meal (vegetarian or non-vegetarian). It then suggests what meal the user can cook based on his choice of nutrients. The system was evaluated with many test cases. The result of the evaluation was accurate.

2. FEATURES

- First of all, the system asks the user what type of meal the user wants.
- It then asks the user if he/she wants high or low proteins.
- Next, it asks the user if he/she wants less or more carbohydrates.
- Next, it asks the user if he/she wants less or more fats.
- Based on all of the above parameters, it makes an appropriate suggestion for the kind of meal the user can cook.

3. RULES AND DESCRIPTION

Following are the global variables used in the program:

```
(defglobal ?*meal* = (new nrc.fuzzy.FuzzyVariable "meal" 0.0 10.0 "Type of Meal"))
(defglobal ?*proteins* = (new nrc.fuzzy.FuzzyVariable "proteins" 0.0 300 "Grams"))
(defglobal ?*carbs* = (new nrc.fuzzy.FuzzyVariable "carbs" 0.0 600 "Grams"))
(defglobal ?*fats* = (new nrc.fuzzy.FuzzyVariable "fats" 0.0 200 "Grams"))

(defglobal ?*proteinsveg* = (new nrc.fuzzy.FuzzyVariable "suggestion1" 1.0 5.0 ""))
(defglobal ?*proteinsnonveg* = (new nrc.fuzzy.FuzzyVariable "suggestion2" 1.0 5.0 ""))

(defglobal ?*carbsveg* = (new nrc.fuzzy.FuzzyVariable "suggestion3" 1.0 5.0 ""))
(defglobal ?*carbsnonveg* = (new nrc.fuzzy.FuzzyVariable "suggestion4" 1.0 5.0 ""))
```

```
(defglobal ?*fatsveg* = (new nrc.fuzzy.FuzzyVariable "suggestion5" 1.0 5.0 ""))
(defglobal ?*fatsnonveg* = (new nrc.fuzzy.FuzzyVariable "suggestion6" 1.0 5.0 ""))

(defglobal ?*lowallveg* = (new nrc.fuzzy.FuzzyVariable "suggestion7" 1.0 5.0 ""))
(defglobal ?*highallveg* = (new nrc.fuzzy.FuzzyVariable "suggestion8" 1.0 5.0 ""))

(defglobal ?*lowallnonveg* = (new nrc.fuzzy.FuzzyVariable "suggestion9" 1.0 5.0 ""))
(defglobal ?*highallnonveg* = (new nrc.fuzzy.FuzzyVariable "suggestion10" 1.0 5.0 ""))
```

Now, in total there are 16 rules in the program. Following is the initializing rule (that also does the fuzzification of data:

```
(defrule initFuzzy
   =>
   (load-package nrc.fuzzy.jess.FuzzyFunctions)
   (?*meal* addTerm "veg" (create$ 0.0 5.0) (create$ 1.0 0.0) 2)
   (?*meal* addTerm "nonveg" (create$ 5.0 10.0) (create$ 0.0 1.0) 2)
   (?*proteins* addTerm "low" (create$ 0.0 100.0) (create$ 1.0 0.0) 2)
   (?*proteins* addTerm "high" (create$ 100.0 300.0) (create$ 0.0 1.0) 2)
   (?*carbs* addTerm "less" (create$ 0.0 300) (create$ 1.0 0.0) 2)
   (?*carbs* addTerm "more" (create$ 300 600) (create$ 0.0 1.0) 2)
   (?*fats* addTerm "less" (create$ 0.0 80) (create$ 1.0 0.0) 2)
   (?*fats* addTerm "more" (create$ 80 200) (create$ 0.0 1.0) 2)

   (?*carbsveg* addTerm "lowcarb" (create$ 1 2.5) (create$ 1.0 0.0) 2)
   (?*carbsveg* addTerm "highcarb" (create$ 2.5 5) (create$ 0.0 1.0) 2)
   (?*carbsnonveg* addTerm "lowcarb" (create$ 1 2.5) (create$ 1.0 0.0) 2)
   (?*carbsnonveg* addTerm "highcarb" (create$ 2.5 5) (create$ 0.0 1.0) 2)

   (?*proteinsveg* addTerm "lowprotein" (create$ 1 2.5) (create$ 1.0 0.0) 2)
   (?*proteinsveg* addTerm "highprotein" (create$ 2.5 5) (create$ 0.0 1.0) 2)
   (?*proteinsnonveg* addTerm "lowprotein" (create$ 1 2.5) (create$ 1.0 0.0) 2)
   (?*proteinsnonveg* addTerm "highprotein" (create$ 2.5 5) (create$ 0.0 1.0) 2)


   (?*fatsveg* addTerm "lowfat" (create$ 1 2.5) (create$ 1.0 0.0) 2)
   (?*fatsveg* addTerm "highfat" (create$ 2.5 5) (create$ 0.0 1.0) 2)
   (?*fatsnonveg* addTerm "lowfat" (create$ 1 2.5) (create$ 1.0 0.0) 2)
   (?*fatsnonveg* addTerm "highfat" (create$ 2.5 5) (create$ 0.0 1.0) 2)


   (?*lowallveg* addTerm "lowall" (create$ 1 2.5) (create$ 1.0 0.0) 2)
   (?*highallveg* addTerm "highall" (create$ 2.5 5) (create$ 0.0 1.0) 2)

   (?*lowallnonveg* addTerm "lowall" (create$ 1 2.5) (create$ 1.0 0.0) 2)
   (?*highallnonveg* addTerm "highall" (create$ 2.5 5) (create$ 0.0 1.0) 2)
```

4. USAGE MANUAL

1) Create a new Java project in eclipse. Make sure you include the JAR file "fuzzyJ-2.0.jar" under New Project > Libraries.

2) Add phoebe.clp to the src folder of the project or create a new file and copy the contents of phoebe.clp into the blank file. Make sure you save the file with .clp extension.

3) In the run configurations of the file, change "jess.Main" to "nrc.fuzzy.jess.FuzzyMain".

4) Run the project. In case you run into any errors, make sure that the run configs is pointed to the FuzzyMain as by default it is shifted back to jess.Main.

5) The allowed input values are given in the parenthesis when a question is asked to the user.

5. SAMPLE OUTPUTS

1) Sample 1:

Please enter your name: Joe

Hello, Joe.
Welcome to the Fuzzy Food Recommender System.
Please answer the following questions and we will tell you what you can eat.
What would you like to have?(veg or nonveg):
nonveg
Do you want to have a high protein meal or a low protein meal?(low or high):
low
Do you want to have a less carbohydrates or more carbohydrates in your diet?(less or more):

less
How much fats do you want to consume in your meal?(less or more):
more
You can cook grilled lamb with steamed broccoli and spinach.

2) **Sample 2:**

Please enter your name: Mona

Hello, Mona.
Welcome to the Fuzzy Food Recommender System.
Please answer the following questions and we will tell you what you can eat.
What would you like to have?(veg or nonveg):
veg
Do you want to have a high protein meal or a low protein meal?(low or high):
high
Do you want to have a less carbohydrates or more carbohydrates in your diet?(less or more):
less
How much fats do you want to consume in your meal?(less or more):
less
You can cook Cashew Noodles with Broccoli and Tofu.