DIABETES EVALUATION ENGINE
(Evaluates the risk of having diabetes)

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Abstract

Diabetes Risk Evaluation Engine is a rule-based system built on JESS that is designed to take certain health related parameters from the user and infer certain vital parameters and makes recommendations to the user of the system. The system predicts user, his chances of getting diabetes based on the person's age, waist length, weight, glucose level, diet, family history, etc.

Features

1. The system asks the patient a few questions about his health.
2. It then assesses your risk of having diabetes based upon the parameters.
3. The more the age and the waist circumference, the more is your risk of having diabetes.
4. Also, in addition, if you have unhealthy diet habits, the more you are prone to be affected by the disease in future.
5. After calculating the risk factor, the system groups the risk into three categories:
   i) Very High Risk
   ii) Average Risk
   iii) Low Risk
6. In case the system finds users with extreme symptoms, the system recommends the user to consult a physician immediately.

Rules and descriptions

There are 5 templates described in the code. They are described as follows:

1. Patient

```
(deftemplate patient
    (slot age (default 0))
    (slot waist (default 0))
    (slot exercise (default 0))
    (slot BP (default 0))
    (slot food(default 0))
    (slot family(default 0))
    (slot overwt(default 0))
    (slot glucose (default 0)))
```

2. Risk

```
(deftemplate risk
    (slot score))
```

3. <u>Recommendation</u>

```
(deftemplate recommendation
    (slot risk)
    (slot explanation))
```

4. <u>Question</u>

```
(deftemplate question
    (slot text)
    (slot type)
    (slot ident))
```

5. <u>Answer</u>

```
(deftemplate answer
    (slot ident)
    (slot text))
```

Now, in total there are 24 rules, which are explained in the table below:

Module name	Rule name	Description
(defmodule ask)	(defrule ask::ask-question-by-id	rule to assert the answers given by the user to the question asked
(defmodule application-startup)	(defrule welcome-user	Startup rule for the application that prints the Welcome message
(defmodule request-user-details)	1. (defrule request-age 2. (defrule request-waist 3. (defrule request-glucose 4. (defrule request-BP 5. (defrule request-exercise 6. (defrule request-overwt 7. (defrule request-food 8. (defrule request-family	rules to request the various details

(defmodule request-user-details)	(defrule assert-patient-fact	rule to assert the answers based on the different question
(defmodule risk-recommendation)	1. (defrule risk-group1 2. (defrule risk-group2 3. (defrule risk-group3 4. (defrule risk-group4 5. (defrule risk-group5 6. (defrule risk-group6 7. (defrule risk-group7 8. (defrule risk-group8 9. (defrule risk-group9 10. (defrule risk-group10 11. (defrule risk-group11 12. (defrule risk-group12	rules than determine what risk and evaluation the patient would get depending on the values entered and the various combinations of these values in the answers
(defmodule result)	(defrule print-result	rules to print out the final result of the evaluation

Usage Manual

Instructions:

You can run it either in eclipse or in jess.

1. Eclipse:
    (i) Create a new java project in eclipse. Copy the file 'diabetes.clp' to the src folder inside the java project.
    (ii) Run the file using the eclipse run menu.

2. Jess:

If you wish to run the file using jess, then follow the below instructions:

(i) Copy the file diabetes.clp to the BIN folder under the JESS directory.
(ii) Open JESS and execute the below command:
(batch "diabetes.clp")

Sample runs

Run #1

```
Console ☒
<terminated> diabetes.clp [Jess Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_131.jdk/Contents/Home/bin/java (Feb 6, 2018 7:09:47 PM)
Jess, the Rule Engine for the Java Platform
Copyright (C) 2008 Sandia Corporation
Jess Version 7.1p2 11/5/2008

This copy of Jess will expire in 1811 day(s).
Welcome to the Diabetes Risk Prediction Engine!
Kindly read the instructions carefully in the NOTE that follows!!
Type the name of the patient and press Enter> Rachel
Let us begin the Diabetes Risk evaluation for Rachel.
Please provide the required information and it will tell you the risk and recommendation for the patient.
**NOTE** - The *AGE* of the patient must be between *20-65 YRS* and the *WAIST-LENGTH* must be greater than *65 CM*
What is your age ? 23
You do not exercise on a regular basis? (type 0 for NO or 1 for YES) 1
Any family members diagnosed with diabetes previously ? (type 0 for NO or 1 for YES) 0
Have you ever taken medication for high BP ? (type 0 for NO or 1 for YES) 0
What is your waist length (in CM) ? 85
Have you ever been diagnosed with high glucose level ? (type 0 for NO or 1 for YES) 0
You do not eat vegetables, fruits on a regular basis ? (type 0 for NO or 1 for YES) 0
Are you overweight (75 kg or more)? (type 0 for NO or 1 for YES) 0
*** The risk for this player is :9
Explanation: You have a low risk of diabetes! Congratulations, you are healthy!
```

Run #2

```
Console ☒
<terminated> diabetes.clp [Jess Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_131.jdk/Contents/Home/bin/java (Feb 5, 2018 1:54:05 PM)
Jess, the Rule Engine for the Java Platform
Copyright (C) 2008 Sandia Corporation
Jess Version 7.1p2 11/5/2008

This copy of Jess will expire in 1812 day(s).
Welcome to the Diabetes Risk Prediction Engine!
Kindly read the instructions carefully in the NOTE that follows!!
Type the name of the patient and press Enter> John
Let us begin the Diabetes Risk evaluation for John.
Please provide the required information and it will tell you the risk and recommendation for the patient.
**NOTE** - The *AGE* of the patient must be between *20-65 YRS* and the *WAIST-LENGTH* must be greater than *65 CM*
What is your age ? 60
You do not exercise on a regular basis? (type 0 for NO or 1 for YES) 1
Any family members diagnosed with diabetes previously ? (type 0 for NO or 1 for YES) 1
Have you ever taken medication for high BP ? (type 0 for NO or 1 for YES) 1
What is your waist length (in CM) ? 100
Have you ever been diagnosed with high glucose level ? (type 0 for NO or 1 for YES) 0
You do not eat vegetables, fruits on a regular basis ? (type 0 for NO or 1 for YES) 0
Are you overweight (75 kg or more)? (type 0 for NO or 1 for YES) 1
*** The risk for this player is :38
Explanation: You have an average risk of diabetes! You might want to see a doctor to make sure!
```

Run #3

```
Jess, the Rule Engine for the Java Platform
Copyright (C) 2008 Sandia Corporation
Jess Version 7.1p2 11/5/2008

This copy of Jess will expire in 1812 day(s).
Welcome to the Diabetes Risk Prediction Engine!
Kindly read the instructions carefully in the NOTE that follows!!
Type the name of the patient and press Enter> Dan
Let us begin the Diabetes Risk evaluation for Dan.
Please provide the required information and it will tell you the risk and recommendation for the patient.
**NOTE** - The *AGE* of the patient must be between *20-65 YRS* and the *WAIST-LENGTH* must be greater than *65 CM*
What is your age ? 56
You do not exercise on a regular basis? (type 0 for NO or 1 for YES) 1
Any family members diagnosed with diabetes previously ? (type 0 for NO or 1 for YES) 1
Have you ever taken medication for high BP ? (type 0 for NO or 1 for YES) 1
What is your waist length (in CM) ? 115
Have you ever been diagnosed with high glucose level ? (type 0 for NO or 1 for YES) 1
You do not eat vegetables, fruits on a regular basis ? (type 0 for NO or 1 for YES) 1
Are you overweight (75 kg or more)? (type 0 for NO or 1 for YES) 1
*** The risk for this player is :57
Explanation: You have a very high risk of diabetes! Consult a doctor immediately!!
```