CS 514
Applied Artificial Intelligence
Project 1

STROKE RISK ESTIMATING EXPERT SYSTEM

Abstract:

This is a rule based expert system built on JESS that is designed to take four measures of a patient test results and estimate the degree of chances of a stroke. The system highlights the problems or the causes due to which it arrived to a conclusion.

Features:

The system uses the measure of the patient's blood pressure levels, BMI, sugar levels (both fasting and after meal) and cholesterol (total i.e. LDL and HDL combined) levels. The system takes these measures as input. It assesses these measures to classify the degree of the probability of a stroke into the following classes:

Extremely Low Risk: The patient is perfectly fit and all the measures are in normal range.

Considerately Low: The important measures are in normal range, but some minor measures have abnormality.

Low Risk: Most of the important measures are in normal range except for 1-2. Minor test results are in normal range.

Considerate Risk: Some of the measures are not in normal range and can pose a risk if not heeded to.

Moderate Risk: Fair risk of a stroke since many of the measures aren't in normal range.

High Risk: Most of the important measure are not in normal range.

Extremely High Risk: Almost all the measures are abnormal.

Rules and descriptions:

There are total 22 rules defined in the system:

#	Rule Name	Description
1	getDetails	Fetches the user and measure information.
2	checkBP	Checks the blood pressure level entered is normal/abnormal.
3	norBP	Checks the cholesterol level after normal blood pressure is confirmed.
4	norBPCH	Checks sugar level after normal blood pressure and cholesterol levels are found.
5	norBPCHS	Checks the BMI after sugar, blood pressure and cholesterol levels are found to be normal.
6	norBPCHaS	Checks the BMI after blood pressure and cholesterol levels are found to be normal, but sugar levels are abnormal.
7	norAllbS	Displays the result when all measures are normal but for sugar levels.
8	norAll	Displays the result when all measures are normal.
9	nBPCHaSaBMI	Displays the result when all measures are normal except sugar levels and BMI.
10	norAllbBMI	Displays the result when all measures are normal but for BMI.
11	norBPaCH	Checks sugar level after normal blood pressure and abnormal cholesterol levels are found.
12	norBPaCHnS	Checks the BMI after blood pressure and sugar levels are found to be normal, but cholesterol levels are abnormal.
13	norAllbCH	Displays the result when all measures are normal but for cholesterol levels.
14	nBPnSaCHaBMI	Displays the result when all measures are normal except cholesterol levels and BMI.
15	norBPaCHaS	Displays the result when all measures are normal except cholesterol and sugar levels.
16	abnBP	Checks the sugar level after abnormal blood pressure is confirmed.
17	abnBPaS	Displays the result when abnormal sugar and blood pressure levels are confirmed.
18	abnBPnS	Checks cholesterol level after abnormal blood pressure and normal sugar levels are found.
19	abnBPnSaCH	Checks BMI after abnormal blood pressure and cholesterol levels are found, but sugar levels are normal.
20	abnBPnSnCH	Checks BMI after normal sugar and cholesterol levels are found, but blood pressure level is normal.
21	abnBPnSnCHnBMI	Displays the result when all measures are normal but for blood pressure level.
22	abnBPnSnCHaBMI	Displays the result when all measures are normal but for blood pressure level and BMI.

Usage Manual:

Instructions:

Copy the file StrokeRiskEstimator.clp to the BIN folder under the JESS directory.

Open JESS and execute the below commands:

```
(batch StrokeRiskEstimator.clp)
```

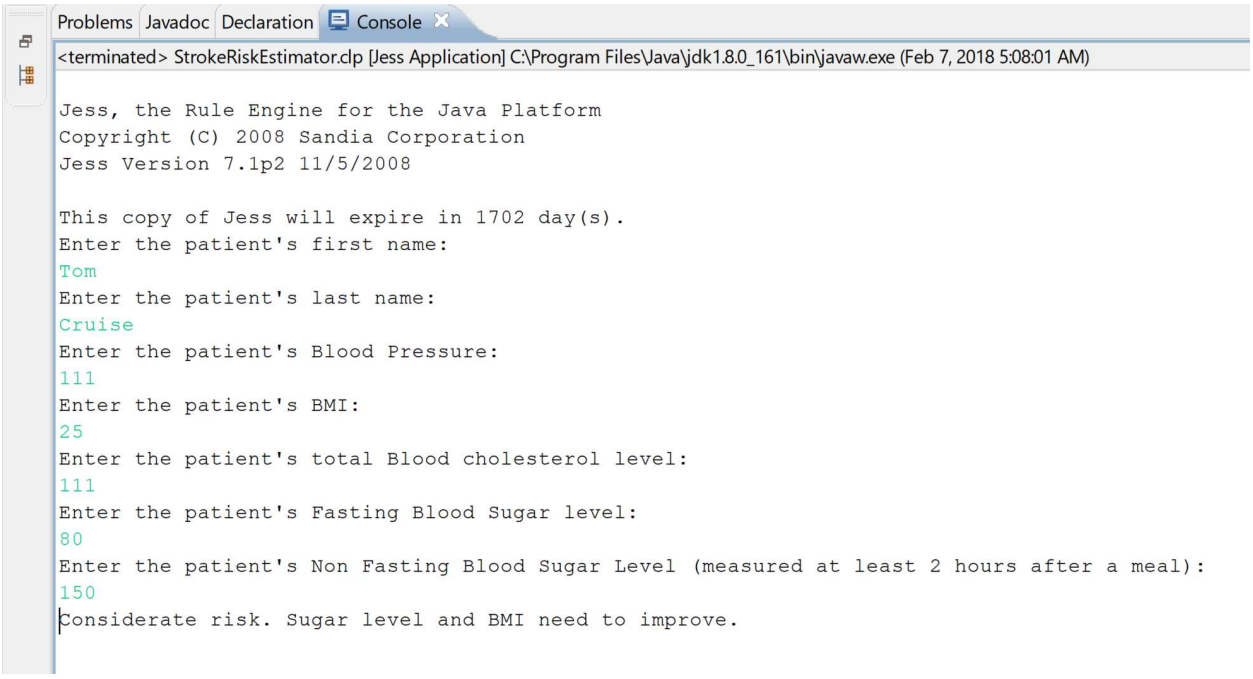
Enter the details.

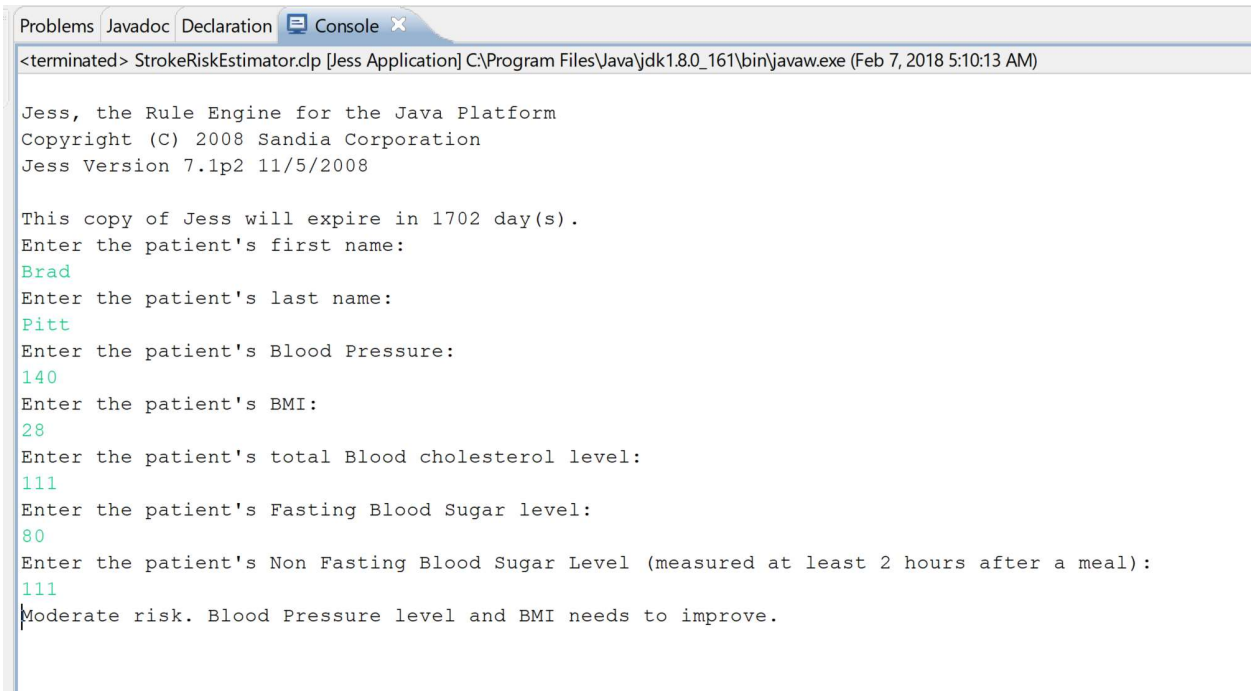
Note:

1. Kindly enter legitimate values for the details. Most of them (except first and last name) should be positive numbers in appropriate range.
2. Normal blood pressure → 90-120
3. Normal cholesterol → <200
4. Normal BMI → 18.5-24.9
5. Normal Sugar → 70-99 (Fasting) and <140 (At least 2 hours after meal)

Sample Test Case:

Input values entered are shown in green in the below screenshots




Problems
Javadoc
Declaration
Console
<terminated> StrokeRiskEstimator.clp [Jess Application] C:\Program Files\Java\jdk1.8.0_161\bin\javaw.exe (Feb 7, 2018 5:10:13 AM)
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 1702 day(s).
Enter the patient's first name:
Brad
Enter the patient's last name:
Pitt
Enter the patient's Blood Pressure:
140
Enter the patient's BMI:
28
Enter the patient's total Blood cholesterol level:
111
Enter the patient's Fasting Blood Sugar level:
80
Enter the patient's Non Fasting Blood Sugar Level (measured at least 2 hours after a meal):
111
Moderate risk. Blood Pressure level and BMI needs to improve.