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



