Applied Artificial Intelligence Project -1

Username: bolt

Domain: Parkinson's Disease Symptom Recognizer (PDSR)

Abstract: The PDSR is designed using JESS Rule Engine and can predict based on the information provided by patients whether the patient is exhibiting symptoms of Parkinson's Disease. In this system, each patient is asked to answer 8 questions which the most prevalent symptoms in Parkinson's Disease are. All these eight parameters are the basic checklist when it comes to Detecting Parkinson's Disease. Apart from the above-mentioned parameters, I have also considered age as a factor in determining the chances of patient exhibiting symptoms of Parkinson's Disease. All symptoms do not carry the same weightage.

Features: The Recognizer is designed to interact with the patient by letting the patient enter integer value in the range of 0 – 10 corresponding to the degree at which mentioned problem/ symptom is faced, it then arrives at the conclusion whether the patient is exhibiting symptoms of Parkinson's Disease and if so what are the chances of him actually having the disease and accordingly recommends patients next step for example: if he/she should visit a doctor for further confirmation.

The various input parameters to the system are:

- Age of the patient
- Rate at which the issue of sleeping problem is faced
- Rate at which the issue of slowness of motion problem is faced
- Rate at which the issue of decreased facial expression problem is faced
- Rate at which the issue of tremor in finger, thumb, hand or chin is faced
- Rate at which the issue of unsteady balance is faced
- Rate at which the issue of constipation or urinary problems are faced
- Rate at which the issue of abnormal tone or stiffness in trunk and extremities is faced
- Rate at which the issue of shuffling gait and stooped posture problem is faced

Rules and Description: Once we get all the parameters from the patient, we can now run the PDSR, which has rules in JESS pertaining to all the various permutations and combinations of values for these nine factors. It evaluates the symptom-score of a patient based on the value provided by the patient for each symptom and gives the evaluation as the output accordingly. As mentioned earlier different weightage is given to the symptoms based on their contribution towards the final verdict.

The different weightage given to various symptoms are:

- Sleeping problem: 15%
- Slowness in movement: 15%
- Decreased facial expression: 15%
- Tremor Issues: 15%
- Balance Issues: 15%
- Urinary and Constipation Issues: 15%

• Stiffness in trunk and other extremities: 15%

•Shuffling gait and stooped posture issue: 10%

For older people, symptom score of 10 indicates very high chance of exhibiting Parkinson's Disease symptoms while range of 8-9 is high chances whereas 6-7 indicates good chances.

For younger people (< 50), symptom score range 9-10 indicates very high chance of exhibiting Parkinson's Disease symptoms while range of 8 is high chances whereas 7 indicates good chances.

Templates Used:

1) **Patient template:** This store all the information regarding the patient.

```
(deftemplate patient
(slot age (default 0))
(slot sleep-score (default 0))
(slot slowness-score (default 0))
(slot facial-score (default 0))
(slot tremor-score (default 0))
(slot balance-score (default 0))
(slot urinary-score (default 0))
(slot stiffness-score (default 0))
(slot gait-score (default 0)))
```

2) **Question template:** This holds the questions in the format they have to be asked from the patient.

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

3) **Answer template:** This stores the answers that are provided by the patients corresponding to the questions.

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

Valid cases/ Constraints:

• You can try out any test case with numeric value for every symptom between 1 and 10 only. If input value is greater than 10 or less than 0, then for evaluation purposes values considered are 10 and 0 respectively.

• Age brackets have been defined in rules in a manner that it covers infants as well as elderly people. However, age is restricted to an integer value and cannot be over 150 or below 0. If age specified is above 150, then age value considered is 150 and if it is less than 0, then user is asked to reenter valid value.

Expected Output:

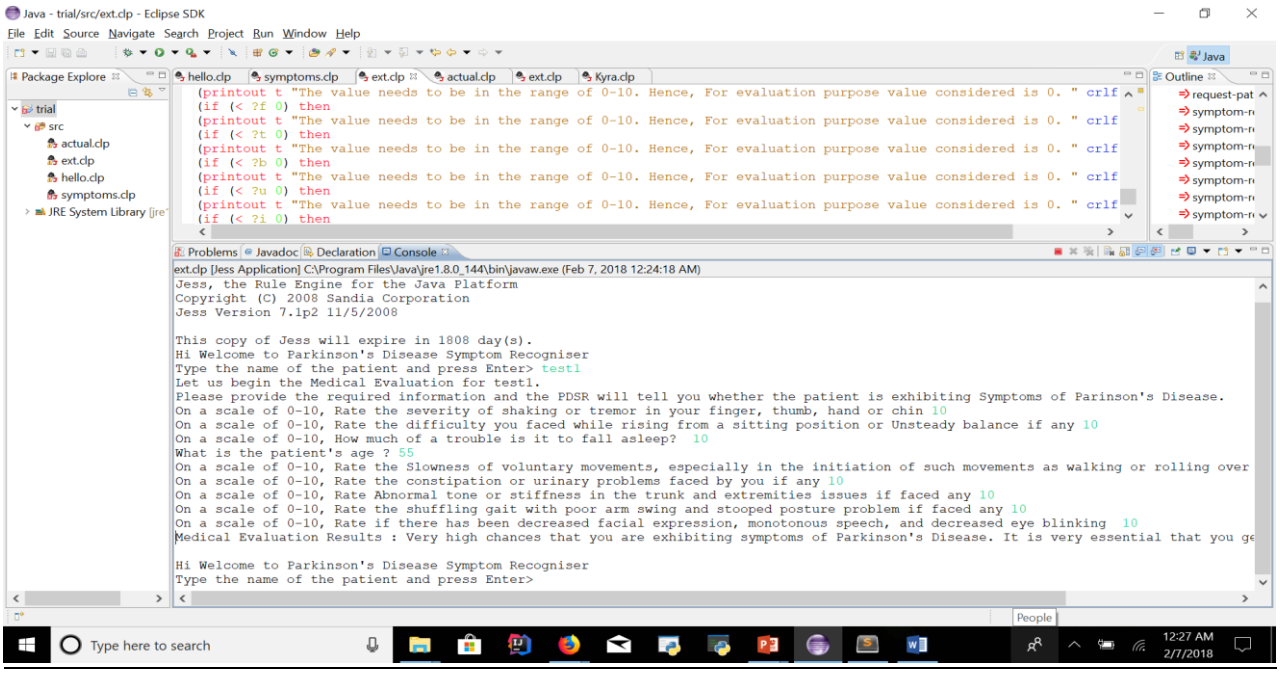
• The Recognizer would give you a verdict whether the patient is exhibiting symptoms of Parkinson's Disease or not along with the chances of it being Parkinson's Disease and recommending next step of advised action.

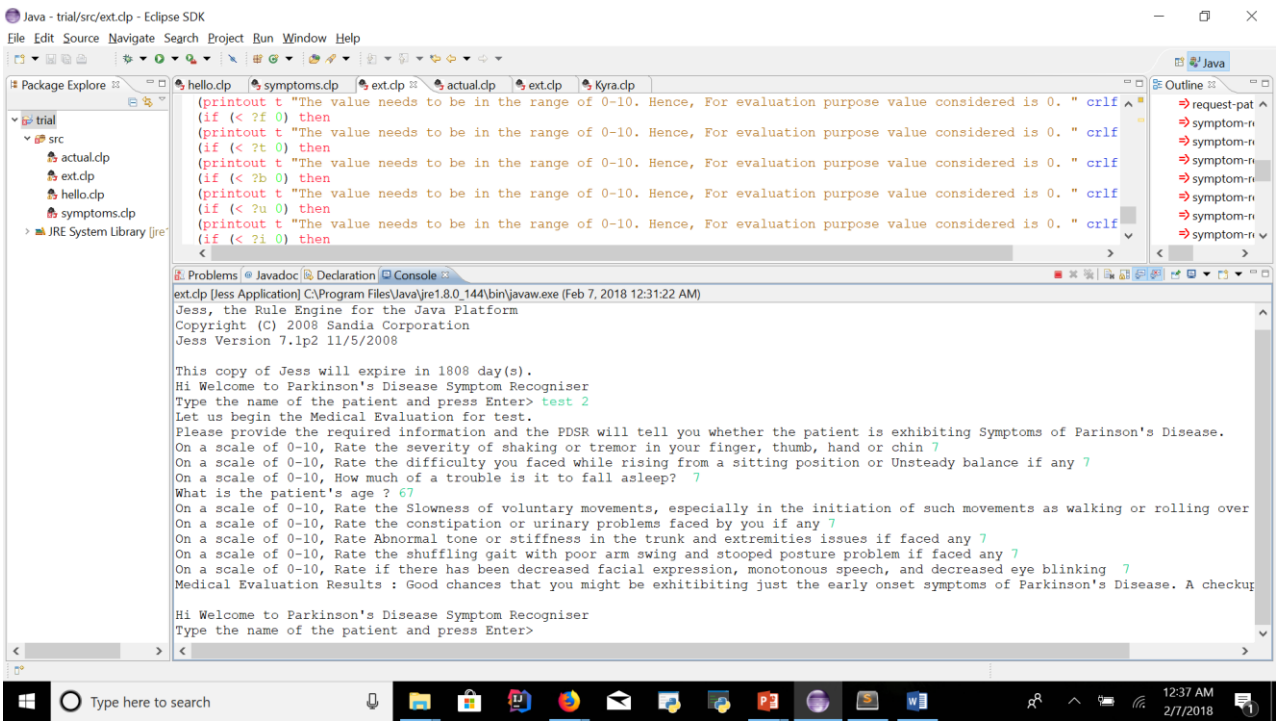
Usage manual:

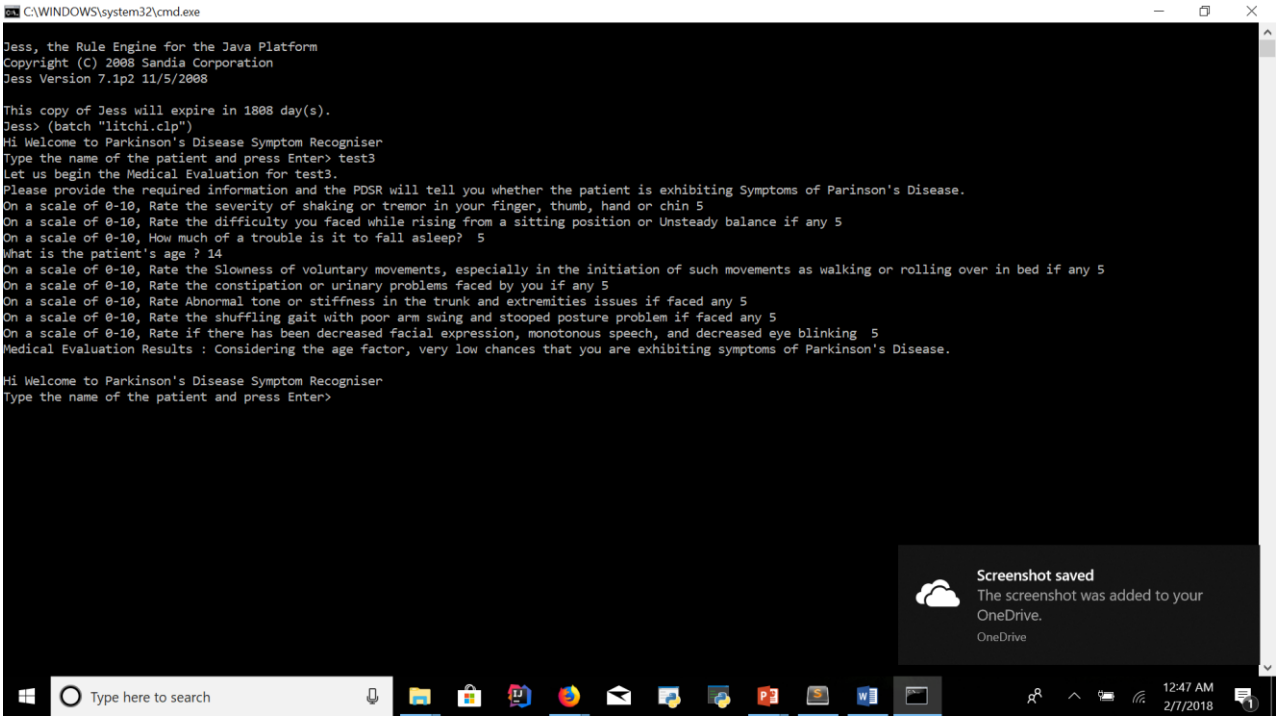
Using Eclipse IDE: Save the “bolt.clp” file in the “Jess71p2\bin\” folder on your local system.

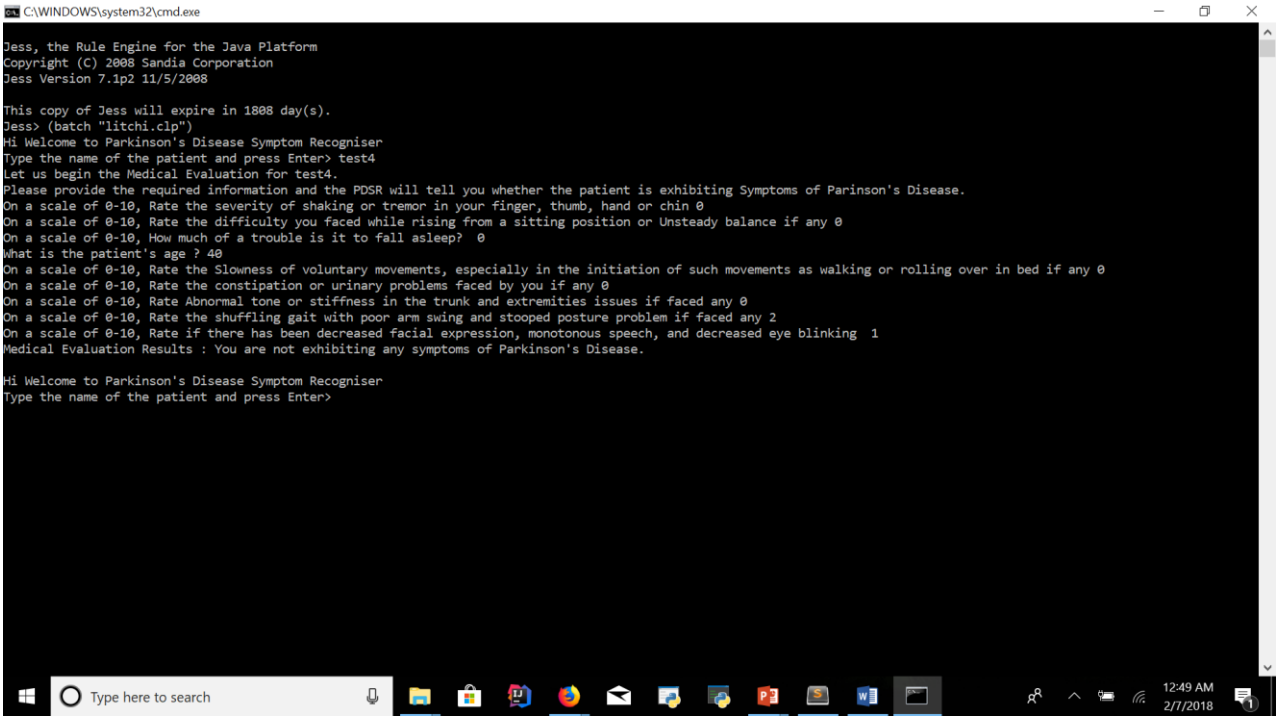
Using Command-Line interface: Go to the command line interface for Jess and execute the file using the batch command along with the correct location of the file on the system (batch “bolt.clp”).

Sample outputs:






C:\WINDOWS\system32\cmd.exe
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 1808 day(s).
Jess> (batch "litchi.clp")
Hi Welcome to Parkinson's Disease Symptom Recogniser
Type the name of the patient and press Enter> test3
Let us begin the Medical Evaluation for test3.
Please provide the required information and the PDSR will tell you whether the patient is exhibiting Symptoms of Parinson's Disease.
On a scale of 0-10, Rate the severity of shaking or tremor in your finger, thumb, hand or chin 5
On a scale of 0-10, Rate the difficulty you faced while rising from a sitting position or Unsteady balance if any 5
On a scale of 0-10, How much of a trouble is it to fall asleep? 5
What is the patient's age ? 14
On a scale of 0-10, Rate the Slowness of voluntary movements, especially in the initiation of such movements as walking or rolling over in bed if any 5
On a scale of 0-10, Rate the constipation or urinary problems faced by you if any 5
On a scale of 0-10, Rate Abnormal tone or stiffness in the trunk and extremities issues if faced any 5
On a scale of 0-10, Rate the shuffling gait with poor arm swing and stooped posture problem if faced any 5
On a scale of 0-10, Rate if there has been decreased facial expression, monotonous speech, and decreased eye blinking 5
Medical Evaluation Results : Considering the age factor, very low chances that you are exhibiting symptoms of Parkinson's Disease.
Hi Welcome to Parkinson's Disease Symptom Recogniser
Type the name of the patient and press Enter>
Screenshot saved
The screenshot was added to your OneDrive.
OneDrive
Type here to search
12:47 AM
2/7/2018


C:\WINDOWS\system32\cmd.exe
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 1808 day(s).
Jess> (batch "litchi.clp")
Hi Welcome to Parkinson's Disease Symptom Recogniser
Type the name of the patient and press Enter> test4
Let us begin the Medical Evaluation for test4.
Please provide the required information and the PDSR will tell you whether the patient is exhibiting Symptoms of Parinson's Disease.
On a scale of 0-10, Rate the severity of shaking or tremor in your finger, thumb, hand or chin 0
On a scale of 0-10, Rate the difficulty you faced while rising from a sitting position or Unsteady balance if any 0
On a scale of 0-10, How much of a trouble is it to fall asleep? 0
What is the patient's age ? 40
On a scale of 0-10, Rate the Slowness of voluntary movements, especially in the initiation of such movements as walking or rolling over in bed if any 0
On a scale of 0-10, Rate the constipation or urinary problems faced by you if any 0
On a scale of 0-10, Rate Abnormal tone or stiffness in the trunk and extremities issues if faced any 0
On a scale of 0-10, Rate the shuffling gait with poor arm swing and stooped posture problem if faced any 2
On a scale of 0-10, Rate if there has been decreased facial expression, monotonous speech, and decreased eye blinking 1
Medical Evaluation Results : You are not exhibiting any symptoms of Parkinson's Disease.
Hi Welcome to Parkinson's Disease Symptom Recogniser
Type the name of the patient and press Enter>
Type here to search
12:49 AM
2/7/2018