Applied Artificial Intelligence Project - 1

Domain: Loan Evaluation Engine (LEE)

Abstract:

This rule based expert system is designed using JESS Rule Engine. It acts as an pre - evaluating system for loan applying users. In this system, I have considered some of the rules which lenders consider while evaluating a loan application. This will help applicants to see if there loan-application will be approved or rejected.

Features:

This system was designed to interact with the user by letting him enter the parameters, it then computes the final result of the application. The various inputs to the system are:
• Income
• Credit-score
• Required loan-amount
• Collateral value (value of the collateral used to support a loan)
• Time period for returning the loan.

Once we get all the inputs, we now run the module.
The structure of the system:
• It first checks the loan demanded is provided by the lender. The maximum loan provided is 10000000 by this lender.
• Then , it checks if the collateral provided is sufficient to support the loan I.e it should be more than the loan amount.
• Then, it checks the credit score of the applicant to see if the risk is low or high. The range for the credit-score I considered is 600-850.
• Then , it checks if the applicant is able to pay the monthly installments with his 60 percent of the income in the given period of time.
• Combining all the above checks is one of the criteria followed by lenders to decide your loan application. So, if all of the rules are true , then your loan application is approved. Congratulations!

Rules and Description:

Knowledge base: The Knowledge base of the system consists of the following:

Facts:

1. Questions: This consists of questions. The questions have an id to distinguish them type , which specifies the type of expected answer. The various questions are:
   - What is your income?
   - What is the total value of collateral?
   - What is your credit-score?
   - In how many years will you repay the loan?
   - What is the loan amount required?

Templates:

1. Applicant template: It stores all the applicant's information that was asked to him via questions.
   ```
   (deftemplate applicant
   (slot income (default 0))
   (slot collateral (default 0))
   (slot credit-score (default 0))
   (slot time-period (default 0))
   (slot loan-amount (default 0)))
   ```
2. Question template: This holds the questions in the format they have to be asked from the user.
   ```
   (deftemplate question (slot text) (slot type) (slot ident))
   ```
3. Answer template: This stores the answers that are provided by the user .
   ```
   (deftemplate answer (slot ident) (slot text))
   ```
4. Loan-Check Template: This holds the rating (1) if the loan amount does not exceed the value that can be lend else 0.
   ```
   (deftemplate loan-check (slot rating (default 0)))
   ```
5. Sufficient-Collateral template: This stores the rating (1) if there is sufficient collateral else 0.
   ```
   (deftemplate sufficient-collateral (slot rating (default 0)))
   ```
6. Risk template: This holds 1 if the credit score is between 600 and 850 else 0.
   ```
   (deftemplate risk (slot rating (default 0)))
   ```

7. Payment-ability template: This holds 1 if user is able to pay the monthly installments with 60 percent of his salary.

   (deftemplate payment-ability (slot rating (default 0)))

8. Final-result template: This holds the final result of the evaluation.

   (deftemplate final-result (slot text))

Rules:

1. defrule ask::ask-question-by-id
       To asks the questions to user.
2. defrule welcome
       Displays the welcome message to the user.
3. defrule request-income
       rule to Request the income
4. defrule request-collateral
       rule to Request the collateral
5. defrule request-credit-score
       rule to Request the credit-score
6. defrule request-time-period
       rule to Request the time-period
7. defrule request-loan-amount
       rule to Request the loan-amount
8. defrule assert-applicant-fact
       rule to assert all the details as facts
9. defrule check-amount
       rule to check if the loan demanded is provided by the lender.
10. defrule check-sufficient-collateral
       rule to check if the collateral provided is sufficient to support   the loan.
11. defrule check-credit
       rule to check the credit score of the applicant to see if the risk is low or high
12. defrule check-payment-ability
       rule to check if the applicant is able to pay the monthly installments with his 60 percent of the income in the given period of time.
13. defrule check-eligibilty
       rule to check eligibilty considering sufficient-collateral, ability-to-payment, credit history all together.

14. defmodule result
        rule to print the result.

USAGE MANUAL:

1. Save the "1_loan.clp" file in the "Jess71p2\examples\jess" folder on your local system.
2. Go to command line interface. Change the current directory to Jess71p2.
3. Execute the following command to run the project.
4. bin/jess examples/jess/1_loan.clp

Test-Case 1

The loan is approved.

```
This copy of Jess will expire in 1804 day(s).
Start your Loan Application!
Type your name and press Enter> John
Let us begin John.
Please provide the required information.
What is your credit-score? 700
In how many years will you re-pay the loan? 5
What is your income ? 4000
What is the total value of collateral?  150000
What is the loan amount required? 100000
Congratulations. Your loan is approved.
```

Test-Case 2 (The credit score is low.)

```
This copy of Jess will expire in 1804 day(s).
Start your Loan Application!
Type your name and press Enter> Sebastian
Let us begin Sebastian.
Please provide the required information.
What is your credit-score? 500
In how many years will you re-pay the loan? 5
What is your income ? 10000
What is the total value of collateral?  140000
What is the loan amount required? 100000
Sorry, Your loan is not approved.
```

Test-Case 3 (The collateral value is not sufficient.)

```
This copy of Jess will expire in 1804 day(s).
Start your Loan Application!
Type your name and press Enter> Rachel
Let us begin Rachel.
Please provide the required information.
What is your credit-score? 780
In how many years will you re-pay the loan? 5
What is your income ? 10000
What is the total value of collateral?  100000
What is the loan amount required? 130000
Sorry, Your loan is not approved.
```