

MASTER OF TECHNOLOGY PROJECT REPORT

Mortgage Process System

TEAM MEMBERS

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MASTEROFTECHNOLOGY

1 EXECUTIVE SUMMARY

The mortgage process system implements the home mortgage approval process, and utilizes the machine reasoning technics to improve the process.

2 PROBLEM DESCRIPTION

The mortgage approval process requires the manual work to determine the mortgage application should be considered to approve according to the applicant details. So in order to improve the work process, the history mortgage application data should be analysed to draw the rules. Then the machine reasoning technics can be utilized to follow the same rules, and thus replace the manual work to be automated process steps.

2.1 PROJECT OBJECTIVE

The mortgage process system analyses the home mortgage application approval data and induces the machine reasoning rules to determine whether the home mortgage application should be considered to approve.

3 KNOWLEDGE MODELING

Knowledge modeling can be decomposed into three main stages (Schreiber, et al., 2001), namely

- (i) Knowledge identification
- (ii) Knowledge specification
- (iii) Knowledge refinement

Various activities are carried out during each of these stages and the crux of model construction lies in (ii) Knowledge specification.

3.1 KNOWLEDGE IDENTIFICATION

The knowledge sources are identified in the file “https://github.com/caoliang/IRS-MR-2019-01-19-IS1FT-IND-CaoLiang-Mortgage_Process_ISS_MR/blob/master/Miscellaneous/S-MR%20bank%20loan%20example%20v001.xlsx”.

3.2 KNOWLEDGE SPECIFICATION

The knowledge specification is defined in the following items.

SNO.	Name	Description
1	Age	Applicant age
2	Has_Job	Whether applicant has job
3	Own_house	Whether applicant owns a house
4	Credit_Rating	Application credit rating level
5	Outcome	Whether applicant mortgage should be considered

Table1: Knowledge Specification

3.3 KNOWLEDGE ACQUISITION

Following from the identification of knowledge sources, knowledge acquisition is conducted to capture the problem solving domain knowledge. The dependency diagram is shown in Figure 1.

Dependency (Inference) Diagram

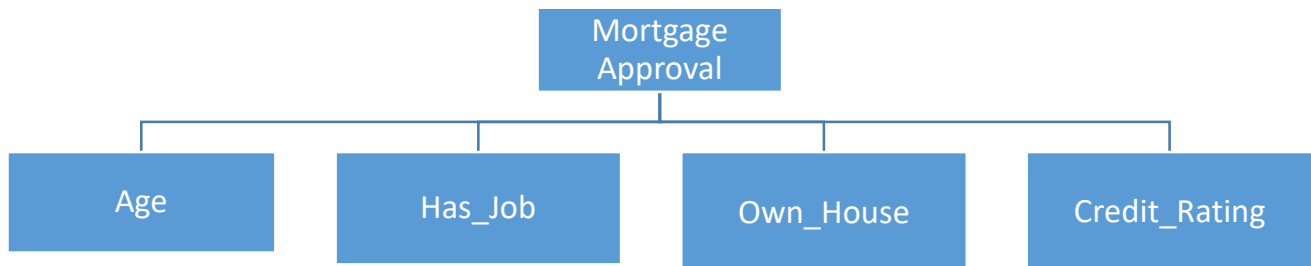


Figure 1: Dependency Diagram

The knowledge mode and rules are further identified with Orange3 tool, and the decision tree diagram is shown in Figure 2.

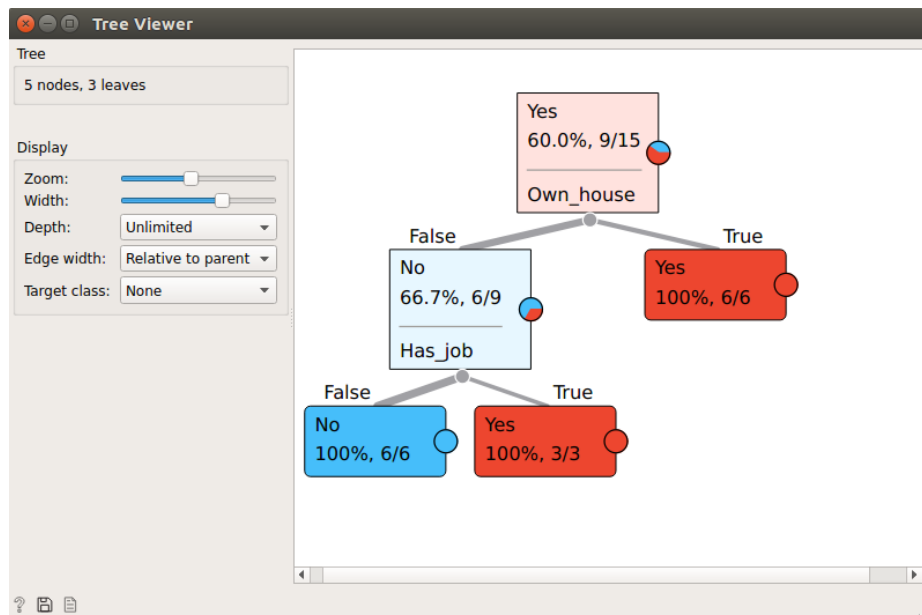


Figure 2: Decision Tree Diagram

3.4 KNOWLEDGE REFINEMENT

The knowledge model and rules can be continuous improved with the knowledge refinement process which is shown in Figure 3.

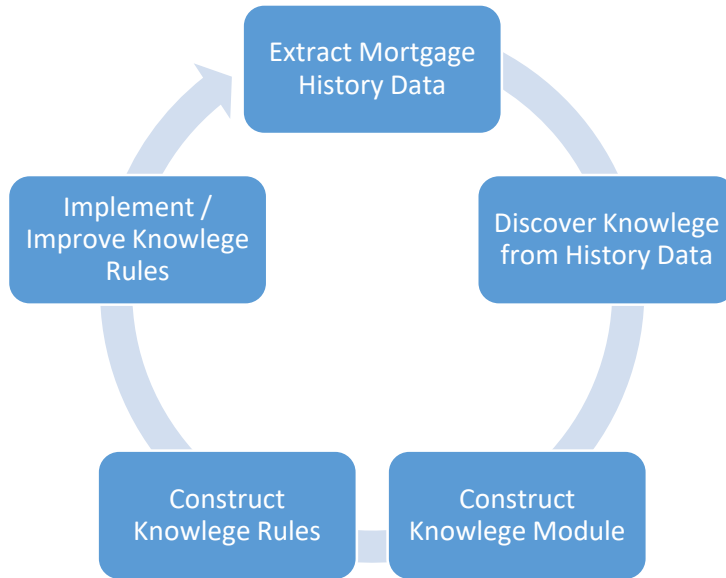


Figure 3: Knowledge Refinement Process

4 SOLUTION OUTLINE

The machine reasoning rules are defined in Drools rules to implements the mortgage approval logic according to the mortgage history data.

4.1 SYSTEM ARCHITECTURE

The mortgage process system utilizes the KIE jBPM server for deployment. The user will login the system with web browser, and the KIE server invokes the Knowledge Runtime Engine to process the pre-defined Drools rules. The system architecture is shown in Figure 4.

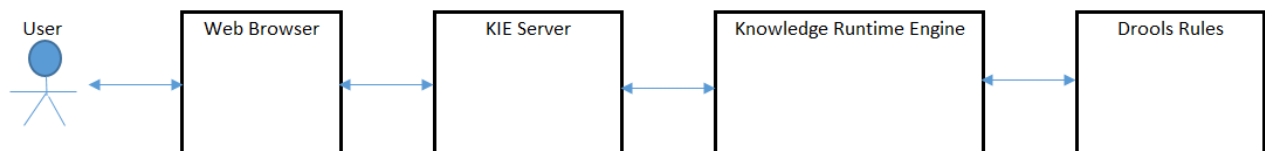
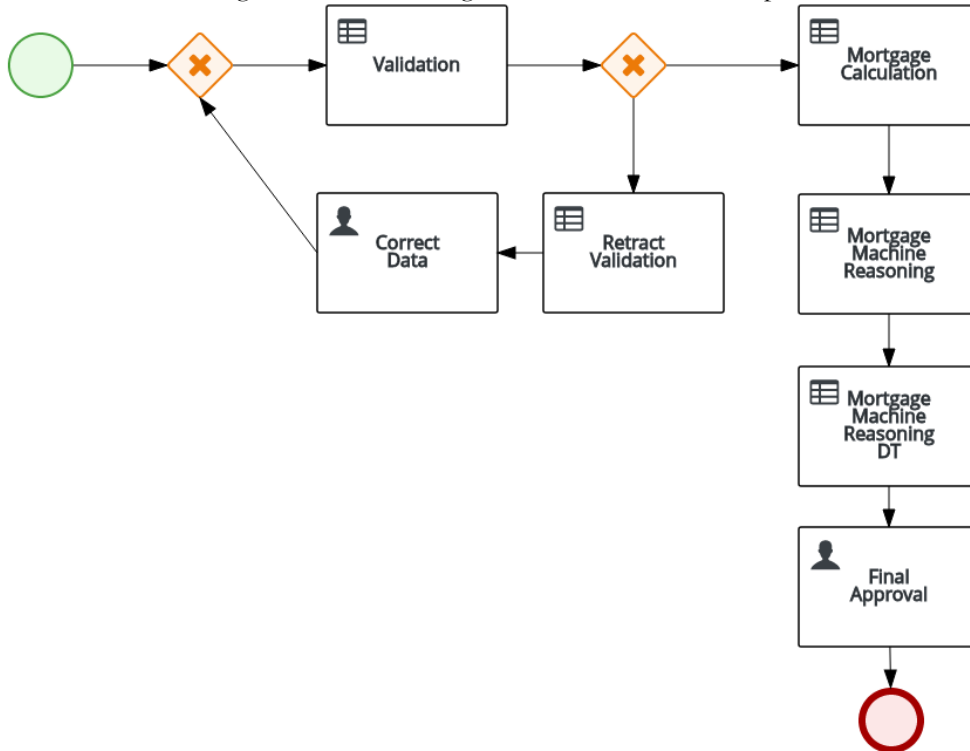


Figure 4: System Architecture

5 PROJECT IMPLEMENTATION

5.1 MAIN PROCESS FLOW

The business flow diagram is shown in Figure 5 to show the overall process.



5.2 MACHINE REASONING RULES

The project defines the rule with guided decision tree as shown in Figure 6.

MortgageMachineReasoningDT					
#	Description	ruleflow-group	Is Applicant Own House?	Is Applicant Has Job?	application
			\$ownHouse	\$hasJob	Is Approval In Limit?
1		bankmortgagecalculationdt	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2		bankmortgagecalculationdt	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3		bankmortgagecalculationdt	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4		bankmortgagecalculationdt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6 CONCLUSION

The mortgage process system shows the power of the machine reasoning that is easy to implement and improve, and can reduce manual work to improve the efficiency.

7 BIBLIOGRAPHY

jBPM is a flexible Business Process Management (BPM) Suite:

http://docs.jboss.org/jbpm/release/7.12.0.Final/jbpm-docs/html_single/

8 APPENDICES