Machine Reasoning Workshop
KIE
Enhanced Mortgage Process

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[Please note that all the data that will go through the system will not be recorded or used in anyway. Everything is used solely just for demonstration purpose]

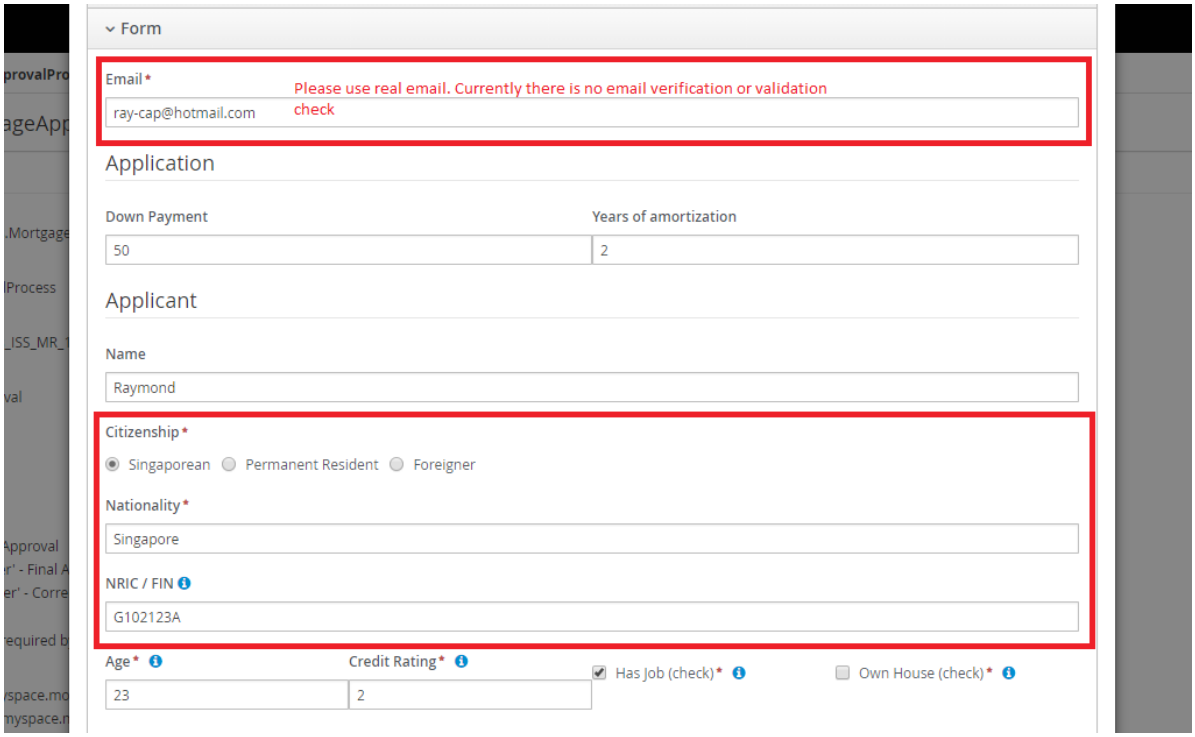
Enhanced Version

The system that we present is an enhanced version of the basic workshop system of mortgage process. Many additional features has been added to make the process looks more realistic (and more complicated). There are 4 main features that has implemented in this system:

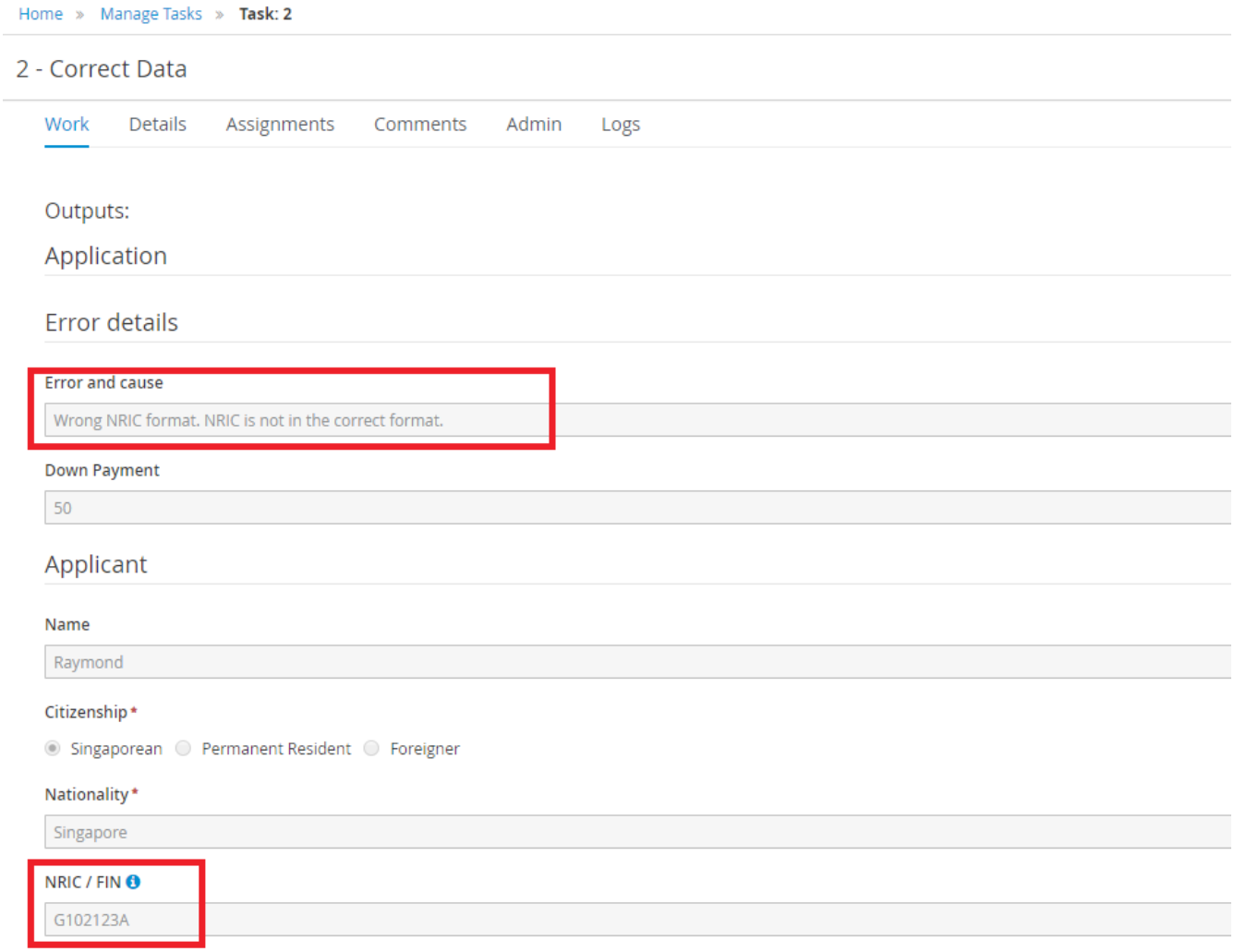
1. Citizenship ID and its validation

User now will be able to key in his citizenship particular details. This is also another important factor to consider when deciding application status for a company. This feature also come with basic validation to validate that the user has correctly give the data. Here are some validation that we have:

- For Singaporean, the nationality must be Singapore and its NRIC should be started with "S" or "T" followed by 7 digits and ended with characters ABCDEFGHIZ [1]
- For Permanent Resident the nationality must not be Singapore. However Permanent Resident has the same rule of Singaporean NRIC while Foreigner FIN rule must start with F or G and end in either one of these character: KLMNPQRTUWX [1]

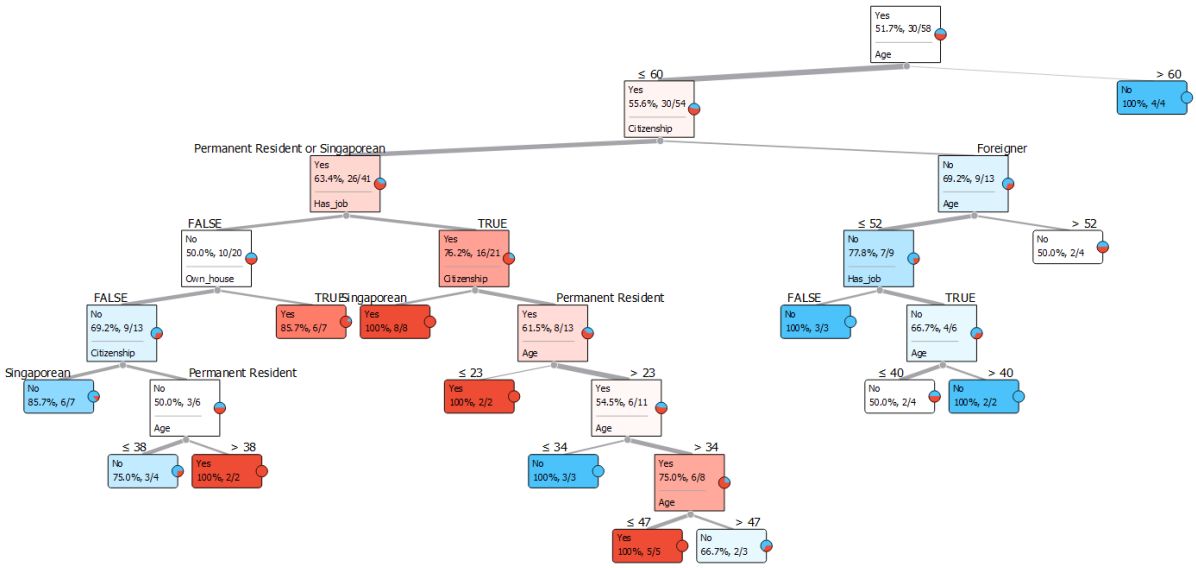


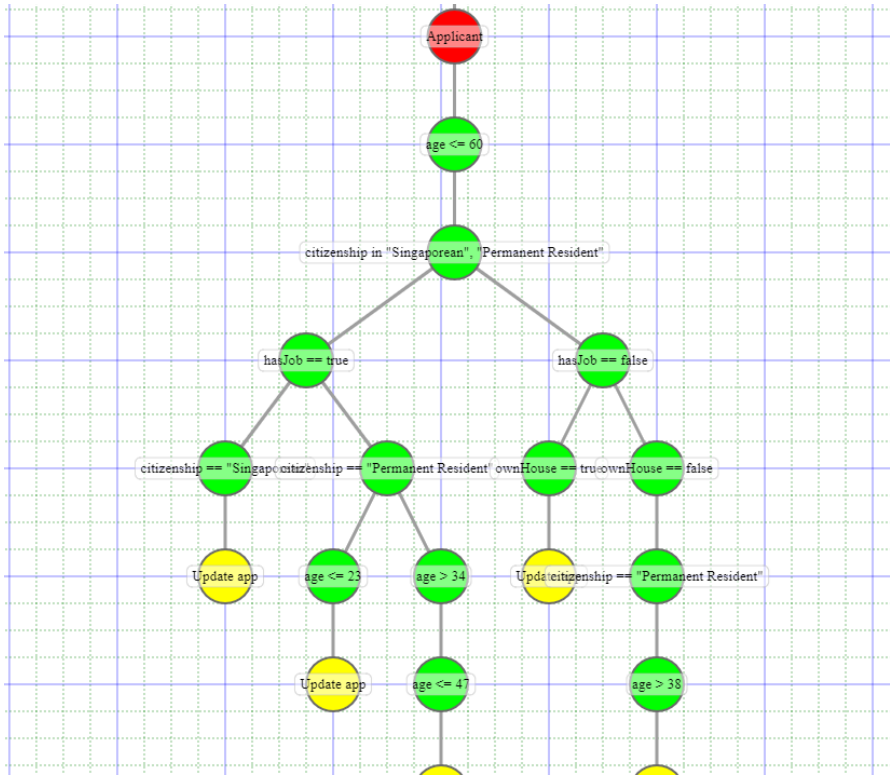
[1] Extracted and simplified from many sources: https://ayumilovemaple.wordpress.com/2008/09/24/validation-singapore-nric-number-verification/, https://en.wikipedia.org/wiki/National_Registration_Identity_Card



2. Enhanced Decision Tree Machine Reasoning approval based on knowledge discovery from more complicated data.

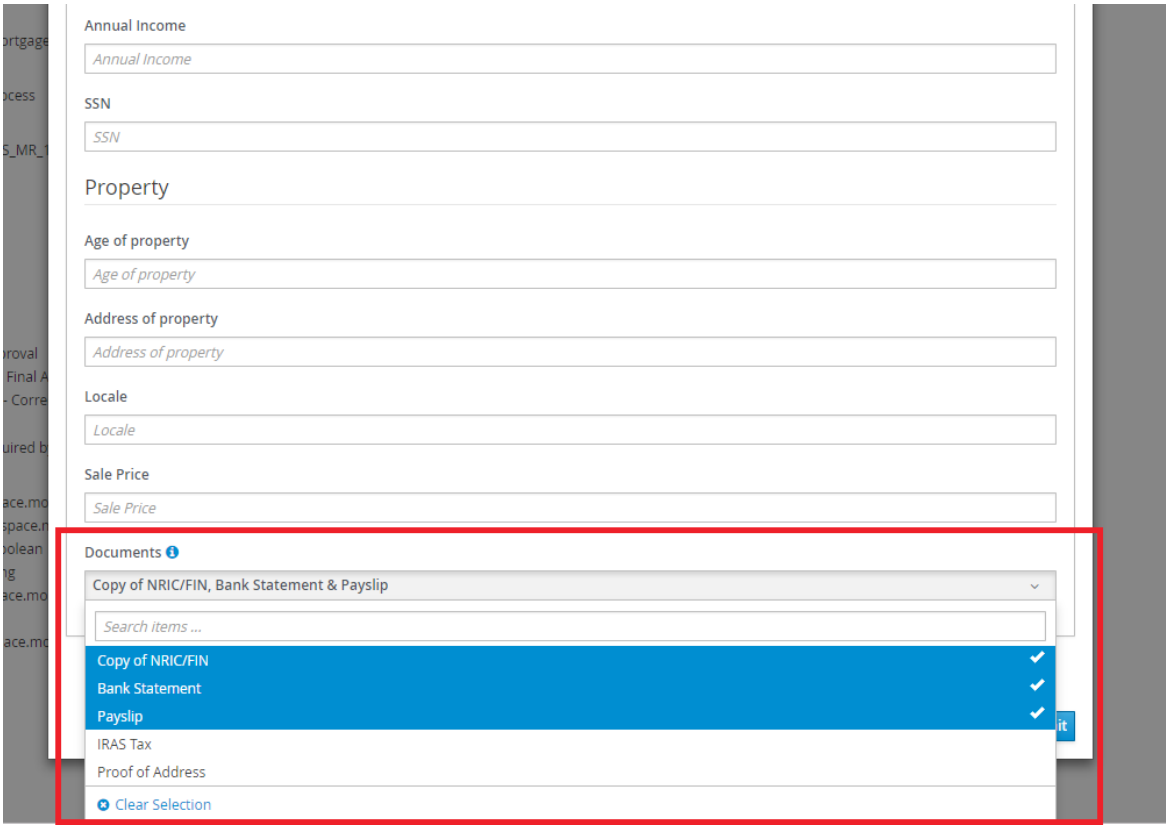
Now with citizenship details, we can further improve machine reasoning rules that will take into account of applicant nationality. We try to simulate the knowledge discovery process of the data by generating random data and use Orange software to generate new decision tree. This new decision tree is far more complicated than the basic one. The new version then is implemented into KIE process with Guided Decision Tree.


Yes
51.7%, 30/58
Age
≤ 60
> 60
Yes
55.6%, 30/54
Citizenship
No
100%, 4/4
Permanent Resident or Singaporean
Foreigner
Yes
63.4%, 26/41
Has_job
No
69.2%, 9/13
Age
FALSE
TRUE
≤ 52
> 52
No
50.0%, 10/20
Own_house
Yes
76.2%, 16/21
Citizenship
No
77.8%, 7/9
Has_job
No
50.0%, 2/4
FALSE
TRUE
Singaporean
Permanent Resident
FALSE
TRUE
No
69.2%, 9/13
Citizenship
Yes
85.7%, 6/7
Yes
100%, 8/8
Yes
61.5%, 8/13
Age
No
100%, 3/3
No
66.7%, 4/6
Age
Singaporean
Permanent Resident
≤ 23
> 23
≤ 40
> 40
No
85.7%, 6/7
No
50.0%, 3/6
Age
Yes
100%, 2/2
Yes
54.5%, 6/11
Age
No
50.0%, 2/4
No
100%, 2/2
≤ 38
> 38
≤ 34
> 34
No
75.0%, 3/4
Yes
100%, 2/2
No
100%, 3/3
Yes
75.0%, 6/8
Age
≤ 47
> 47
Yes
100%, 5/5
No
66.7%, 2/3


Applicant
age <= 60
citizenship in "Singaporean", "Permanent Resident"
hasJob == true
hasJob == false
citizenship == "Singapo
citizenship == "Permanent Resident"
ownHouse == tru
ownHouse == false
Update app
age <= 23
age > 34
Upda
citizenship == "Permanent Resident"
Update app
age <= 47
age > 38

3. Mocking documents approval process

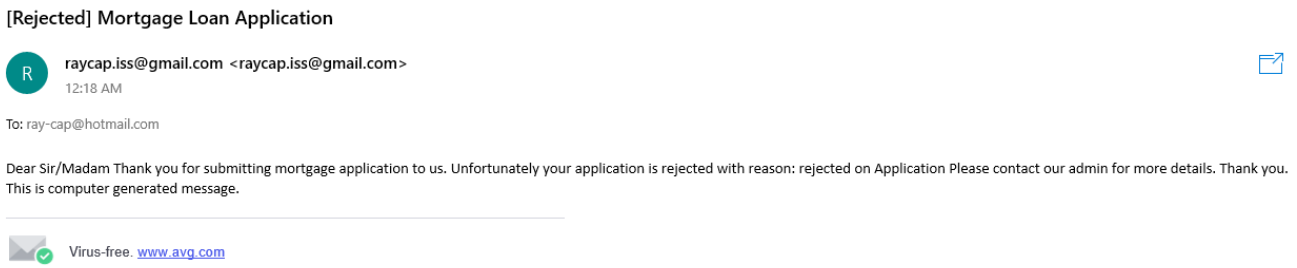
Here we also try to simulate the process of documents submission and verification. However there is no machine reasoning added into this feature. So the process is still a manual parallel process together with application process.



Task	Process Definition Id	Status	Actual Owner	Created On	Errors	Actions
Documents Approval	Mortgage_Process.MortgageApprov...	Ready		04-Mar-2019 00:15:33	0	
Final Approval	Mortgage_Process.MortgageApprov...	Ready		04-Mar-2019 00:15:33	0	

4. Email Notification feature

The system is capable of sending a rejected notification email to the application together with a simple reason (whether it is rejected due to documents or application itself).



[Rejected] Mortgage Loan Application

R raycap.iss@gmail.com <raycap.iss@gmail.com>

12:18 AM

To: ray-cap@hotmail.com

Dear Sir/Madam Thank you for submitting mortgage application to us. Unfortunately your application is rejected with reason: rejected on Application Please contact our admin for more details. Thank you. This is computer generated message.

Virus-free. www.avg.com

Limitations and Improvements

Due to limited time constraint and manpower, there are still lot of improvements that can be done. Here are some list of to do that can be done immediately to further improve the system:

1. Email validation process.
Currently there is no email validation process. It will be useful to add validation to ensure the email is correctly formatted.

2. Machine Reasoning for Documents Approval
Obviously we can try to add machine reasoning system in the documents verification process itself.

3. Gracefully handle the errors when sending emails
Currently the whole process task might break in case email cannot be sent. This is bad and should be fixed immediately. One can catch the error and then silent it so that the process can finish properly.

4. Email template
As of now there is now good template for the email. We can write one in the future for nice email.