



Loan Application Simulator

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CLK

Asia

Project Design

1. Customer Log In & Customer creation

When a customer uses our app, he/she will be prompted asking whether he/she is a new user.

a. New User

If the customer is a new user, then a form will appear to ask for customer's detail such as name, date of birth, job title, annual income, etc. **A customer class object** is created. Customer information will be saved into CSV.

b. Old User

If a customer has logged in before, we will ask the customer for a unique id. We then retrieve the customer detail from the CSV file and return a **Customer class** object as logged in user.

2. Customer Apply Loan

When a customer applies for a loan, the customer will be prompted to fill in a form that gets details about loan amount applied, loan duration, credit card usage, the number of times customers defaulted in the past. This information will be stored in the **LoanApplication class** object and will be saved into a CSV file as well.

3. Customer Manage Loan

A list of the approved loan (**Loan Class Object**) will be presented for customer to manage, ie (pay the instalment , terminate, etc)

4. Calculate Credit Scores of other users in the database

With a raw data file (from Lending Club website) that contains approximately 1 million people who have previously been granted their loans from the bank, **Algorithm class** will play a role of calculating each person's credit score in accordance with the credit score model (this model has been named as "PennCLK score") of which it is based on FICO score that the commercial banks use in real life.

Once each person is given the PennCLK score, then they will be categorized from A to E, while the score has the highest of 850 points and the lowest of 300 points.

5. Calculate Credit Score of the user from the LoanApplication object

Once the user completes entering his information, the LoanApplication object will be parsed onto Algorithm class, and the user's own PennCLK score and the credit grade will be given.

6. Loan Application Result

After the user is given his credit score, he/she will be assigned a credit grade from A to E. With this output, the user's credit results will be compared to the database and if the user's score is below 300 points (the credit grade will be below E), then he/she will be rejected for his application. Else, he will be prompted with the message that he is likely to get approved his loan application with approximate interest rates. This interest rate will be calculated based on the weighted average of interest rates per each grade (from A to E) within the database file.

7. Create Loan Schedule

Given the loan application result that produces money to be lent, loan period, and the interest rate, calculate the monthly payment that the user needs to pay. Payment class is used to as values in a hashmap to store information (monthly total amount to be paid, monthly principal amount, monthly interest amount, whether the customer paid that month(T/F), how much he paid) for the set of keys, e.g. number of months.

8. User Interaction to Manage Outstanding Loan

Given that all loans are to be paid back in increments of 1 month period, the user will be asked 1. to choose the date in which he wants to make the decision on whether to pay and 2. To choose how much to pay. If the user decides not to fully comply with his monthly payment due, the method keeps track of the sum of money not paid in its entirety. When certain conditions are met for termination, loan program ends and calculate the return on investment for the lender.

CRC Cards

Customer (basic information about a customer)	
Responsibilities	Collaborators
has user id	Loan Application
has name	Loan
has annual income	
has job title	
has credit rating	
can manage loan	
can apply loans	

Loan Application (customer apply for a new loan)	
Responsibilities	Collaborators
has loan_application_id	Customer
has loan_application_amount	
has loan_application_duration	
has reason_for_applying	
has approval_status (true or false)	
has date_of_application	

Admin - ie the Bank	
Responsibilities	Collaborators
Can approve loan	Loan Application
Can terminate loan	Customer
Can impose penalty fee	Loan
Can generate credit scores	

Storage - a class to handle reading and writing from csv	
Responsibilities	Collaborators
can store customer info into csv	Loan Application
can get customer info into csv	Loan
can store loan info into csv	
can get loan info from csv	
can get loan application from csv	
can store loan application from csv	

UserInterface - will be replaced with Java Swing later	
Responsibilities	Collaborators
can prompt login	Main
can prompt for customer instruction	Customer
can prompt for existing loan detail	
can prompt for new loan application	

Algorithm (to calculate PennCLK score based on five (or more) components)	
Responsibilities	Collaborators
review database users' payment history	
review database users' owed amounts	
review database users' credit history	
review database users' pursuit of the new loan	
review database users' credit mix	
calculate the PennCLK score	
assign the credit grade of a database user	

ApplicationResult - will the user be approved or rejected for his/her application	
Responsibilities	Collaborators
calculate the PennCLK score of the user	Customer, Algorithm
assign the credit grade of the user	Customer, Algorithm
give a result of the loan application	
if approved, calculate interest rates	Algorithm

Loan class	
Responsibilities	Collaborators
Has principal	
Has interest rate	
Has loan period(months)	
Has loanID	
Has cusomerID	
Has Payment	Payment
Has HashMap loanSchedule <month, Payment>	
Take principal, interest rate, loan period(months) and calculate monthly PaymentDue for the borrower.	
Take loan period(months) and PaymentDue to create a hashmap loanSchedule	

Payment	
Responsibilities	Collaborators
Has monthlyPaymentForPrincipal	
Has monthlyPaymentForInterest	
Has monthlyPaymentTotal	
Has boolean payOrDefault	
Has paymentMade	

Libraries

1. Java Swing for UI

Responsibilities

1. Chian Yee, Lee - handling UI for gathering customer information, log in, loan application information. Also, handling of storage of information into csv files.
2. Yeong Hun (Luke), Lee - set up an algorithm to calculate the credit score of the user of the application and users from the database file (from Lending Club). Afterward, give a result to the loan application based on the algorithm.
3. Kyusub Chung - Given the result of loan application, if the user is approved of a loan, calculate monthly payment. Handle user interaction and manage the loan, i.e. user chooses the date on which he wants to pay the monthly payment, user can choose how much to pay for each month. Set conditions for loan termination and upon such event, calculate return on investment for the lender.

Overview

Create a loan simulator program that calculates the amount of loan that he or she may borrow.

Goals

1. Help the client simulate the possibility of being granted a loan regardless of whether this is the first time the user raising a loan or the extension of the existing loan.
2. Automate the process of assigning credit grading, amount to lend, a period of loan for a customer based on personal information and income data. The credit grading, amount to lend and interest rates are based on past historical data obtained publicly from Lending Club.

Specifications

There are three main functions of this program. They are as follows.

Get Customer Information (Chian)

1. Ask borrower whether he/she is a new customer or existing customer
2. If new borrower, collect borrower's name, date of birth, amount of loan to borrow, loan period, job title, income per month.
3. If an existing borrower, ask for previous loan's amount, loan period, payment pattern (whether pay on time or not)
4. Create a Customer class, PastLoan class and save both this information into CSV file.
5. Basic UI will use Java Swing.

Analyse past loan data and the application decision based on the user input (Luke)

1. Create a FileReading & Writing class to source the file from Lending Club.
2. From the source file given by Lending Club, the program will incorporate an algorithm of determining the user's credit grades, expected borrowing rates and available loan period based on the user's information given.
3. The analysis result, which represents the general credit profile of the user will be parsed into a data decision class - whether to approve or disapprove the loan for the client.
4. Once approved, the user will be shown the decision with the expected approved loan amount, the interest rates and the term of the loan.

Apply Payment Module to Track Customer Balance (David)

1. Given a loan, this module will calculate how much interest the user needs to pay for the given time frame.
2. If the user pays the interest, move onto the next payment schedule. If the user does not pay the interest in full, incur a penalty fee that will have to be paid along with the principal at maturity. If the interest is paid partially, he is to go default. This will lower his credit rating(rules need to be applied here) and increase the interest rate for future payments.
3. Track the balance of the customer. In the end, if the user pays the principal, print out the real interest rate that the investor has paid over the total loan period. If the user does not pay the principal, he is to go default. For the loan that was given out to the user, calculate the actual return on investment that the bank has accrued given all the payment that the user has made over time.

Milestones

I. Project Proposal - 27 Oct 2019

Basic description of what we are building and allocation of work.

II. Project Design - 10 Nov 2019

III. Final Project Submission- 8 Dec2019



TBC