Case Report

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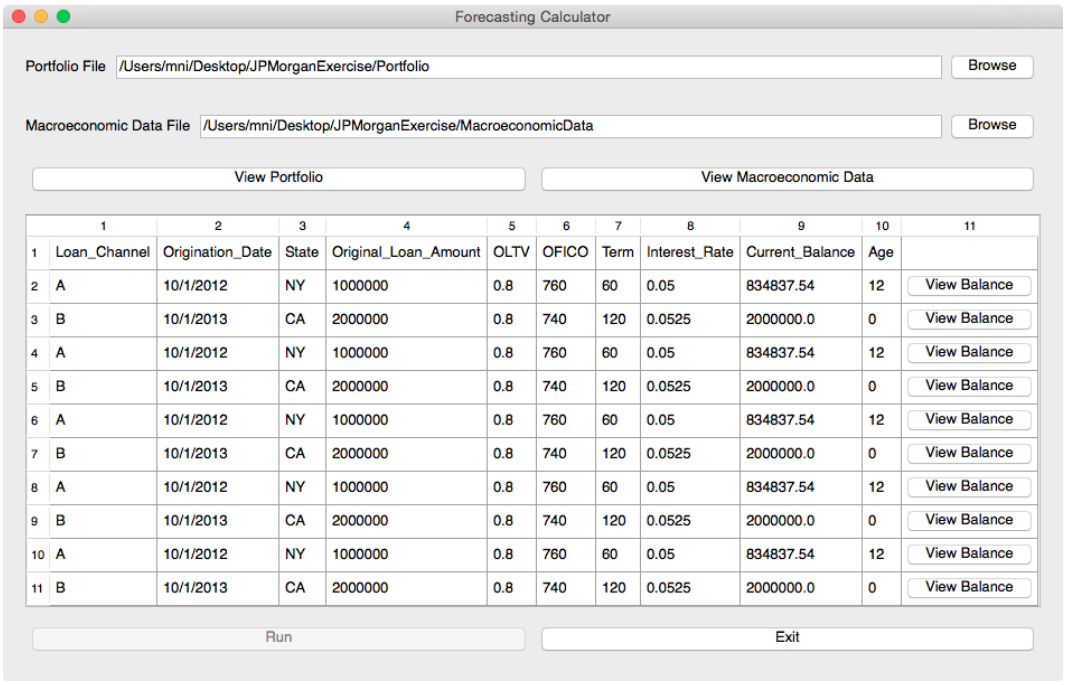
1 Introduction

This document should provide an overview of my solution to the forecasting engine case problem, followed by a detailed instruction at the end. The program is written in pure Python and have the following dependencies: NumPy, Pandas, and PySide. PySide is Python library to create cross-platform graphical user interfaces. It is a Python binding to the Qt framework.

2 Design Rational

The program provides a user interface with the basic functionalities, such as importing, viewing, and performing calculations on data. The program takes in two input files: a portfolio file and a macroeconomic data file. After clicking the "Run" button, the program produces the balance information for each loan in the portfolio. Below is a snapshot of the interface.



	1	2	3	4	5	6	7	8	9	10	11
1	Loan_Channel	Origination_Date	State	Original_Loan_Amount	OLTV	OFICO	Term	Interest_Rate	Current_Balance	Age	
2	A	10/1/2012	NY	1000000	0.8	760	60	0.05	834837.54	12	View Balance
3	B	10/1/2013	CA	2000000	0.8	740	120	0.0525	2000000.0	0	View Balance
4	A	10/1/2012	NY	1000000	0.8	760	60	0.05	834837.54	12	View Balance
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3 Technical Detail

3.1 Class Structure

The forecasting engine is consisted of two separate classes which are `ForecastEngine` class and `Balance` class. Each handles different responsibilities. The `ForecastEngine` class handles importing and displaying the information. The `Balance` class handles the actual calculation and displaying the balance information.

3.2 Important Assumptions

(a) For the purpose of this demo, the program assumes the portfolio file can be all fit into memory. However, the file I/O function does handle the case when the portfolio is too large by using an iterator to read the file one chunk at a time.

(b) The program exploits the fact that macroeconomics data is relatively small. This means the time to calculate balance information for one loan is negligible. Therefore, the program chooses to perform calculation of the balance information on the fly, instead of precomputing such information for the whole portfolio beforehand.

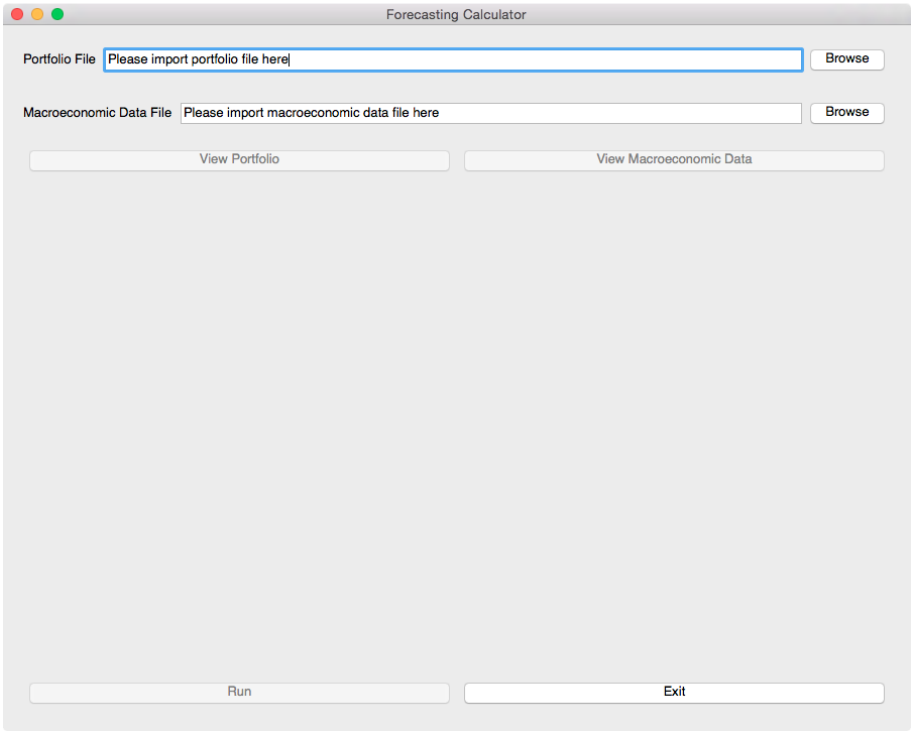
(c) The program addresses the bonus problem where mortgage interest rates fluctuate by a Gaussian noise.

Instruction

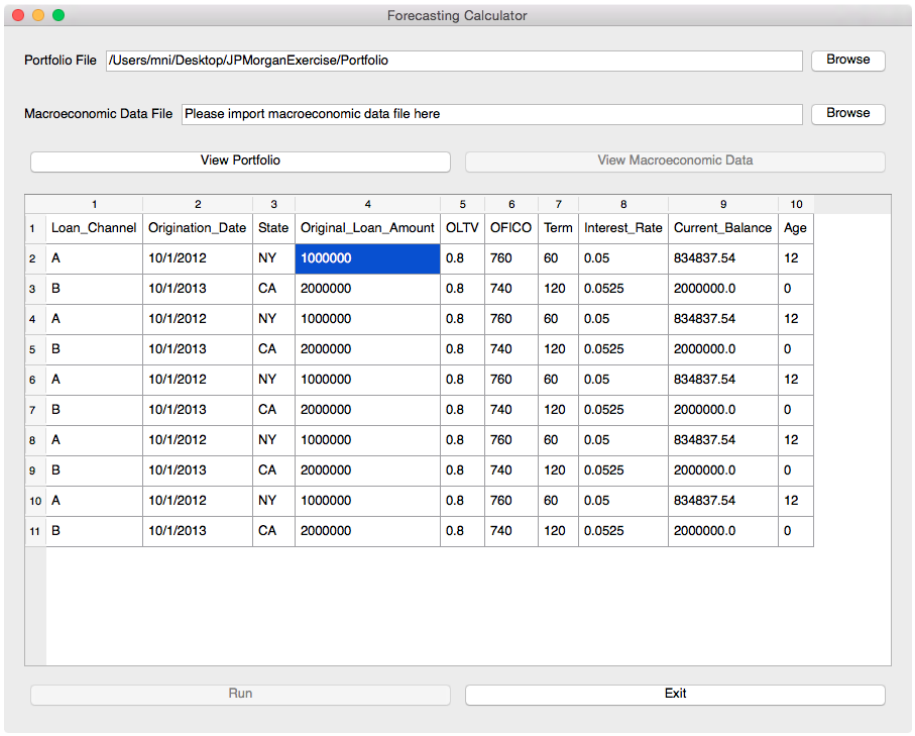
1. Execute the Python program by running the following command:

   `python forecastEngine.py`

2. You should see the following user interface.



3. Click "Browse" to import the portfolio file. Note the "View Portfolio" button is enabled. Click the button to view portfolio information.



	1	2	3	4	5	6	7	8	9	10
1	Loan_Channel	Origination_Date	State	Original_Loan_Amount	OLTV	OFICO	Term	Interest_Rate	Current_Balance	Age
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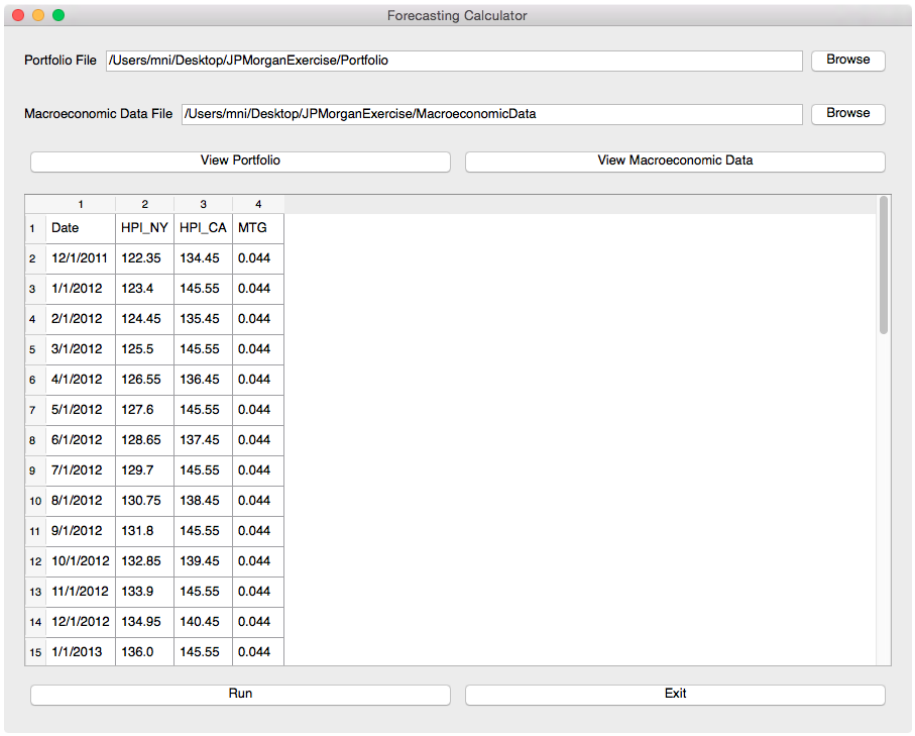
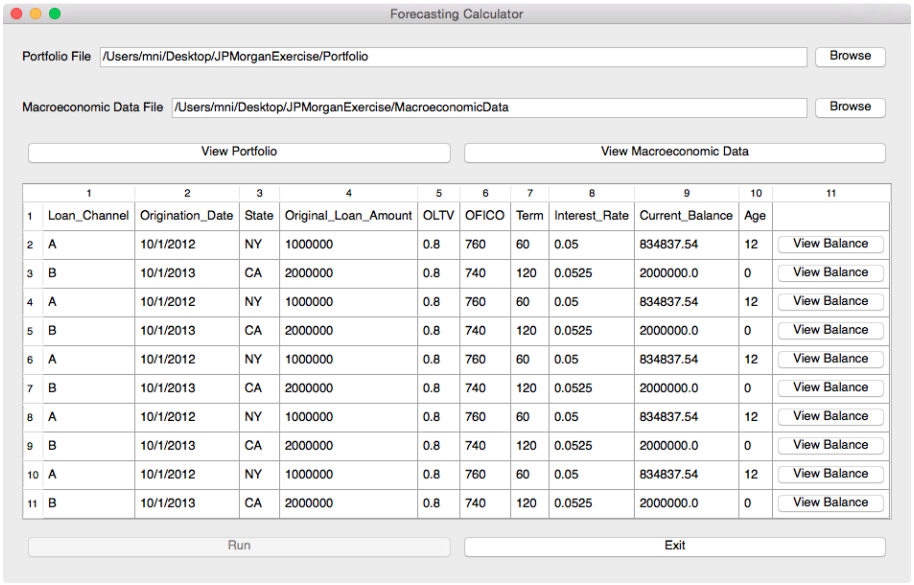
4. Import the macroeconomics data. Note the "View Macroeconomics Data" button is enabled. Click the button to view macroeconomics information.



	1	2	3	4
1	Date	HPI_NY	HPI_CA	MTG
2	12/1/2011	122.35	134.45	0.044
3	1/1/2012	123.4	145.55	0.044
4	2/1/2012	124.45	135.45	0.044
5	3/1/2012	125.5	145.55	0.044
6	4/1/2012	126.55	136.45	0.044
7	5/1/2012	127.6	145.55	0.044
8	6/1/2012	128.65	137.45	0.044
9	7/1/2012	129.7	145.55	0.044
10	8/1/2012	130.75	138.45	0.044
11	9/1/2012	131.8	145.55	0.044
12	10/1/2012	132.85	139.45	0.044
13	11/1/2012	133.9	145.55	0.044
14	12/1/2012	134.95	140.45	0.044
15	1/1/2013	136.0	145.55	0.044

5. In addition, the "Run" button is enabled. Click "Run" button to display the table to view balances.



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6. Finally, click "View Balance" buttons to view the balance information for that loan.

	1	2	3	4	5
1	Date	Normal Repayment	P(Refinance)	P(Default)	Expected Balance
2	10/1/2013	$697,025.31	0.04834%	0.00705%	$696,698.11
3	11/1/2013	$683,404.84	0.04937%	0.00469%	$683,068.07
4	12/1/2013	$669,265.01	0.05077%	0.00449%	$668,925.87
5	1/1/2014	$654,736.50	0.05071%	0.00429%	$654,405.09
6	2/1/2014	$639,954.68	0.04939%	0.0041%	$639,639.17
7	3/1/2014	$624,909.38	0.0479%	0.00391%	$624,610.64
8	4/1/2014	$609,666.76	0.04632%	0.00373%	$609,384.95
9	5/1/2014	$594,268.89	0.04516%	0.00355%	$594,001.04
10	6/1/2014	$578,851.83	0.04406%	0.00339%	$578,597.28
11	7/1/2014	$563,105.14	0.04325%	0.00323%	$562,862.11
12	8/1/2014	$547,321.11	0.04204%	0.00308%	$547,091.48
13	9/1/2014	$531,105.19	0.03984%	0.00293%	$530,894.05
14	10/1/2014	$515,286.25	0.03726%	0.00279%	$515,094.67
15	11/1/2014	$499,035.87	0.03432%	0.00266%	$498,865.01
16	12/1/2014	$482,821.99	0.03264%	0.00253%	$482,664.79
17	1/1/2015	$466,434.27	0.03228%	0.00241%	$466,284.08
18	2/1/2015	$450,205.21	0.03302%	0.00229%	$450,056.92
19	3/1/2015	$433,616.80	0.03264%	0.00218%	$433,475.63
20	4/1/2015	$417,125.49	0.03106%	0.00208%	$416,996.26
21	5/1/2015	$400,408.82	0.02862%	0.00198%	$400,294.54
22	6/1/2015	$383,749.67	0.02669%	0.00188%	$383,647.54
23	7/1/2015	$366,881.33	0.02562%	0.00179%	$366,787.64
24	8/1/2015	$349,863.29	0.02481%	0.0017%	$349,776.78
25	9/1/2015	$332,975.73	0.0241%	0.00162%	$332,895.75