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**Enova Data Smackdown Case Question**

**Instructions:**

1. Review the materials below. **READ THEM CAREFULLY!**
2. Ensure you understand the timelines and expected output. Clarify any questions you may have with someone from Enova.
3. Decide how you want to divide up the work on your team. Due to the short time constraints, it’s important that you maximize the productivity of everyone on your team.
4. When the time is complete, return the USB drive to the Enova employees per the instructions in this document.

**Scenario**

You are an analytics employee working for a consumer lender. For the past few years, your company has been issuing loans to customers and gathering the resulting historical performance data on this portfolio.

Your company does not lend its own capital. Instead it borrows capital from another source, which it then lends out to the consumers. Your company takes all of the credit risk; that is if the consumer does not repay the loan then you accept the full losses and if the consumer does repay the loan, you collect the full interest.

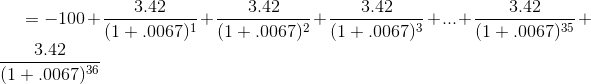
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| --- | --- |
| **Loan Structure** | A one-time loan, with fully amortizing payments occurring at the end of each month |
| **Loan Term** | Either 36 or 60 months |
| **Interest Rate** | 6% - 26% annual |
| **Loan Size (Principal)** | $1000 - $3500 |
| **Discount Rate (WAAC)** | 8% annual, or ~ .67% per month |

Note on NPV Calculation: You do not necessarily need to read and/or understand the following section to complete the project. It is not recommended that you spend a substantial amount of time with the following information. NPV is provided for you in the data set, so only read the following section if you are curious and/or think it will improve your analysis.

In order to value these loans, the lender uses the concept of Net Present Value, or NPV. NPV is simply the sum of all of the cash flows, discounted to present value. More precisely, given *N* number of periods, discount rate *i* and cash flows at time *t, ct,* the NPV equals:

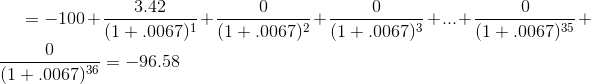
Your company’s annual discount rate is8%. Since the customer makes monthly payments on the loan, then the value of *i = 8%/12 ~ .67%*. For example, if the company lends $100 at time *t = 0* and the customer makes 36 payments of $3.42, then the NPV would be:

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However, if a customer defaulted after making their 1st payment and then made no subsequent payments, your firm would take a loss and the NPV would be represented as:



**Goal**

Your boss comes to you with a new list of prospective loans (validation.csv). He asks you to figure out to which of these customers we should lend.

The objective is to determine which customers we should lend to in the future, such that the resulting total net present value (accounting for the 8% annual discount rate) is maximized.

**Data Set**

You have been provided a training data set (training.csv), which contains all the information about the past loan performance. You also have a validation data set (validation.csv) that you are to use to determine which customers in this data set we should lend to in order to maximize the total net present value.

The variables are defined in the file data\_dictionary.xlsx. They are categorized as follows:

1. Application data: Data provided by the customer or the lender at the time of application.
2. Credit data: Data obtained from 3rd party credit bureaus that provide insight into a customer’s previous repayment history.
3. Loan Info: Information about the structure of the loan that the customer was provided.
4. Loan Performance: Information about how a particular loan performed. Notice that this data is only available in the training data set. Since we are deciding which of these customers to lend to, we do not yet know what the outcome of the loan will be.

**Output**

In order to be eligible for judging, you must provide the three items listed below. Each of these files should be stored on the provided USB drive, in the folder “Final Output”, then in the respective folders; “Validation”, “Presentation” and “Code”.

1. You are expected to provide the validation data set (validation.csv) (in its original row order) with an additional column labeled “decision” coded as 0 or 1. A value of 0 indicates that you DO NOT recommend lending to that customer, 1 indicates that you DO recommend lending to this customer. Please output this file in csv format.
2. A (brief) paper or presentation detailing:
   1. Data preparation
   2. Model building techniques and strategy
   3. Any interesting findings
   4. Conclusions/Business Recommendations
   5. Areas for future research
3. Copies of all code used to complete the analysis.